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Proceedings of the
13th European Conference on Innovation and Entrepreneurship

University of Aveiro
Portugal
20-21 September 2018

Edited by
Professor Carlos Costa, Dr. Manuel Au-Yong-Oliveira and Dr. Marlene Paula Castro Amorim
University of Aveiro, Portugal

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ECIE 2018

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Review Process
Papers submitted to this conference have been double-blind peer reviewed before final acceptance to the conference. Initially, abstracts were reviewed for relevance and accessibility and successful authors were invited to submit full papers. Many thanks to the reviewers who helped ensure the quality of all the submissions.

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Preface

These proceedings represent the work of contributors to the 13th European Conference on Innovation and Entrepreneurship (ECIE 2018), hosted this year by the University of Aveiro, Portugal on 20-21 September 2018. The Conference Chair is Professor Carlos Costa and the Programme Co-Chairs are Dr. Manuel Au-Yong-Oliveira and Dr. Marlene Paula Castro Amorim.

ECIE is now a well-established event on the academic research calendar and now in its 13th year the key aim remains the opportunity for participants to share ideas and meet the people who hold them. The scope of papers will ensure an interesting two days. The subjects covered illustrate the wide range of topics that fall into this important and ever-growing area of research.

The opening keynote presentation is given by Professor Marina van Geenhuizen on the topic of "*University Spin-Off Firms' Internationalization: The influence of Founding Teams and Networks in Early Years*". The second keynote will be given by Prof João José Pinto Ferreira, who will be discussing *Entrepreneurship Learning Outcomes*.

In addition to the main themes of the conference there are a number of specialist mini tracks on topics including Entrepreneurial Education and Learning and Micro-Entrepreneurship.

With an initial submission of 250 abstracts, after the double blind, peer review process there are 103 Academic research papers, 11 PhD research papers, 6 Masters Research papers and 4 work-in-progress papers published in these Conference Proceedings. These papers represent research from Austria, Belgium, Brazil, Canada, China, Colombia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Ghana, Greece, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Kenya, Lebanon, Lithuania, the Netherlands, New Zealand, Nigeria, Norway, Oman, Peru, Poland, Portugal, Russia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Turkey, UK, UAE, and USA.

We hope you enjoy the conference.

Carlos Costa,
Manuel Au-Yong-Oliveira
and
Marlene Paula Castro Amorim

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Conference Committee

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Biographies

Conference and Programme Chairs

Professor Carlos Costa is a full professor and entrepreneur based at the University of Aveiro, Portugal. Carlos started out doing an undergraduate degree in regional and urban planning (University of Aveiro). This was followed by a specialization in tourism, at the master's and doctoral level, at the University of Surrey, in the UK. Carlos is now Head of Department, at DEGEIT – the largest department of the University of Aveiro. With publications at the highest level, Carlos also enjoys writing down-to-earth articles for the media and for the general public. As the Director of the PhD in Marketing and Strategy, as well as of the PhD in Tourism, both at the University of Aveiro, Carlos is an inspiration to colleagues and students alike – to perform beyond their dreams and achieve new entrepreneurial heights, whatever the domain may be.

Dr. Marlene Paula Castro Amorim was born in Oporto, in 1974, and received her PhD in Management from IESE Business School (Barcelona, Spain). Marlene holds a first degree in Economics, by the University of Porto, and a Master's degree in Management of Science Technology and Innovation, by the University of Aveiro (Portugal). She initiated her career in industry, holding managerial positions in marketing and internationalization in food manufacturing companies, in Portugal, The Netherlands and Belgium. She then moved to the academic landscape, firstly as a manager, for the internationalization of the University of Aveiro in the year 2000. Currently Marlene serves as Pro-rector for the Internationalization of the University of Aveiro. She is also an Assistant Professor at this University for the Department of Economics Management Industrial Engineering and Tourism. She has been Director of the Master's in Industrial Engineering and Management and is a member of the Scientific Commission of the Doctoral Program in Industrial Engineering. Marlene is also a researcher integrated at the Research Unit GOVCOPP.

Dr. Manuel Au-Yong Oliveira was born in London, England, in 1969. After a brief period working in the textile industry, Manuel did an MBA at Cardiff Business School, in Wales (1992-1993). Under the supervision of the Director of the Cardiff Business School, Professor Roger Mansfield, Manuel wrote a dissertation on human motivation, which was awarded a distinction. Manuel has ten years of work experience with multinational corporations – including for Accenture (1998-1999), Worthington Cylinders (2000-2004) and Waterco (2005-2009). Manuel has also worked for smaller more entrepreneurial enterprises. Manuel has a Ph.D in Industrial Engineering and

Management (FEUP), and was awarded a distinction for his thesis on innovation. Manuel is currently an Assistant Professor at the University of Aveiro, in Portugal, where he is a member of the Executive Committee for his department (Department of Economics, Management, Industrial Engineering and Tourism) and the Director of the Master's in Management degree. Manuel as a researcher is affiliated to GOVCOPP.

Keynote Speakers

Professor Marina van Geenhuizen has been a Full Professor at Faculty of Technology, Policy and Management at TU Delft in the Netherlands since 2007. She was awarded her PhD from Erasmus University Rotterdam in applied economics. Professor van Geenhuizen's research focus is on responsible/sustainable innovation and transition in energy, transport and medical/healthcare systems. Her focus is also on effectiveness in knowledge commercialization, including growth of university spin-off firms, living labs, networks, incubators and science parks, and contribution to the regional/urban knowledge economy. Theoretical perspectives include resource-based view, capabilities and social capital, and urban innovation theory. The approach is often quantitative modelling, eventually illustrated with qualitative case studies.

Professor João José Pinto Ferreira is an Associate Professor with Habilitation at the Faculty of Engineering at the University of Porto. He founded (a number of years ago, in 2004) one of the most successful and innovative Master's degrees in Northern Portugal called MIETE - The Master's in Innovation and Technological Entrepreneurship. Professor João José is an expert on entrepreneurship and has been to Babson College in the USA to further his knowledge and training in the area.

Mini Track Chairs

Alexandros Kakouris, PhD, is an adjunct lecturer in entrepreneurship and innovation at the University of Peloponnese, at the Hellenic Open University and he is also innovation consultant at the National Observatory of Athens. He holds PhD in Physics, PhD in Entrepreneurship and a MSc in Adult Education. He has been involved in entrepreneurship since 2006 researching educational and learning issues. His special interest concerns fostering entrepreneurship and innovation to science graduates and the support of youth entrepreneurship through teaching and counselling. He also specialises in nascent entrepreneurship, creativity, transformative and experiential learning.

Professor Matti Muhos is the research director of Micro-entrepreneurship at University of Oulu, the research professor of Industrial engineering and management, renewing business and digitalization and he has the title of docent in technology business at the University of Jyväskylä. Muhos received his D.Sc. (Tech.) in industrial engineering and management from the University of Oulu. He is an associate editor, guest editor and advisory board member for several international journals. He is also a popular keynote speaker and invited co-chair of academic conferences in his research field. His primary research interests are growth management in new technology and service-based firms, the development of SMEs (with a particular focus on micro-sized enterprises), technology business, technology management, agility, and internationalization processes. The micro-entrepreneurship research team, MicroENTRE, is an internationally well-known and valued expert and partner specialising in micro-entrepreneurship in northern areas. Its results are published in valued scientific forums. Activities of the team promote the operating area as a growth platform for micro-enterprises. The research team focuses on micro-enterprises and research, development and training which is important to micro-enterprises.

Biographies of Contributing Authors

Katariina Ala-Rämi is a postdoctoral researcher at MicroENTRE, University of Oulu. In the project Energy-mine she is responsible for activities related to micro-enterprises in business potential using geothermal energy. She is holding PhD in Applied Geography and Regional Planning, the doctoral theses was about Networking, collaboration and communication in SMEs' product innovation in Northern Finland.

Thamer Alkhaldi is a Doctoral student doing PhD in the area of entrepreneurship at Manchester Metropolitan University Business School, Manchester, UK. Thamer's research aim is to explore the role of government and private institutions in supporting early stage entrepreneurs in Saudi Arabia. In his data analysis stage of the research project, looking forward to benefit from the ECIE.

Marlene Amorim is Assistant professor at the Department of Economics, Management, Industrial Engineering and Tourism, University of Aveiro, Portugal and a member of the Research Unit in Governance Competitiveness and Public Policies. She serves as Pro-rector for Internationalization and currently integrates the editorial team of the International Journal of Supply Chain and Operations Resilience.

Emre Arslan holds an MA in International Business Administration from Bournemouth University. He currently works in completing his PhD thesis that deals with Strategic Entrepreneurship within Voluntary Organisations in England. He has also worked as a Lecturer in Research Methods in Bournemouth Business School.

Dr Ramika Bansi recipient of the 2014 Howard Bremer Scholarship awarded to professionals bringing creativity and innovation to the technology transfer profession. Masters topic: Management of Intellectual Property at Universities. Doctoral study focused on Technology Transfer & Commercialization of University Innovation. Dr Bansi serves as MANAGER: Intellectual Property Rights & Innovation Specialists at Durban University of Technology - South Africa.

Raphael Bar-El is Professor Emeritus at Ben Gurion University and the Chair of the Applied Economics Department at the Sapir Academic College, where he established the specialization of entrepreneurship and innovation. He led projects of regional economic development and of innovation promotion in Brazil and in Latin America.

José Jacinto Bilau: Coordinator Professor at Polytechnic Institute of Beja (Portugal) with a PhD. In Management (Technical University of Lisbon-ISEG), MBA (Technical University of Lisbon-ISEG) and Bachelor in Management (Technical University of Lisbon-ISEG). His research Interests are Entrepreneurship /Entrepreneurial Finance

Sarah Louisa Birchley Professor Birchley works in the Graduate School of Business Administration and Faculty of Business Administration, Toyo Gakuen University. She is currently on sabbatical researching expatriate entrepreneurship as a Visiting Scholar at the University of Cardiff, Wales and the University of Texas at Austin.

Thomas Bjerre Bojsen has a bachelor's degree from Department of Business Development and Technology at Aarhus University in business development engineering and is currently pursuing a master of science in technology-based business development. Thomas's main interests are within management of innovation and engineering processes in complex product development processes with emphasis on digital technologies. Thomas is working as junior compliance officer in the Dovista company.

Nancy Bouchra Hanna is an assistant lecturer at the German University in Cairo. She received her master degree from the German University in Cairo in the field of strategic management. She also worked as a part time consultant for Nestle Egypt, CSR division. She is currently pursuing her PhD in the field of strategic management and more specifically in capability development. Research interest includes: CSR, competitiveness and developing capabilities and competences, Entrepreneurship, Cognitive Psychology.

Dr. Tiina Brandt works as Research and Development specialist at Tampere University of Applied Sciences. Her research interests concerns about entrepreneurship, organizational behaviour, personality related topics

Natalia Bukhshtaber is an Associate Professor at Lomonosov Moscow State University Business School in Moscow, Russia. She has been involved in the field of entrepreneurship since 2008. Her main research interests relate to national innovation systems and entrepreneurial behaviour in the context of transitional economies, including the role of networking and social capital in innovation.

Sofia Cardim is a Professor at the Polytechnic Institute of Bragança, Portugal, where she teaches diverse courses in the field of Economics and Management. With a PhD in Applied Economics her actual research

concerns labour market, gender and development policies and entrepreneurship. She also works as a business and management consultant since 2003.

Angelo Cavallo, Ph.D., is Postdoctoral Researcher at Politecnico di Milano, Italy. The main research areas in which he operates are: Strategic Management, Entrepreneurial Strategy and Entrepreneurial Dynamics. Since 2013, he has been coordinating startup scouting projects at PoliHub - the startup incubator of Politecnico di Milano.

Jesper Lindgaard Christensen is an associate professor at Department of Business and Management, Aalborg University, Denmark. JLC is the research group manager of a reserach group with 27 scholars specialised on innovation and entrepreneurship. JLC has researched SME development and entrepreneurial finance, economic geography, innovation systems, entrepreneurship, and innovation policy.

Jeppe Christensen holds a bachelors degree in global business engineering from VIA University College. He is currently pursuing a master of science in technology-based business development from Department of Business Development and Technology at Aarhus University. Jeppe's main interests include technological development, project management and sustainable development.

Atanásio Cossa holds a master in Management, specialization in Finance, at University of Aveiro, where is currently attending Doctoral Program in Economic and Business Sciences. He has been working as teacher of corporate finance, international finance and financial analyses at Eudardo Mondlane University – Mozambique. He is a researcher in behavioral finance, financial literacy, entrepreneurship.

Diana Dias is associate professor with habilitation at Universidade Europeia Laureate International Universities and, vice-rector for research and academic development. She is also senior research fellow at Centre for Research in Higher Education Policies (CIPES) and holds a PhD in Educational Sciences and the Habilitation in Educational Psychology. Her research interests focus on the higher education topics, namely: learning outcomes and competencies; academic success; access and equity; and curriculum development (hybrid and face to face). She is also author of several publications in the national and international scope, indexed in Web of Science and/or SCOPUS.

Dr Gareth Davies is an Associate Professor in Swansea University's School of Management. His work involves research and teaching in the fields of Innovation Management and Regional Economic Development, with practitioner roles in a range of major initiatives including the Swansea Bay City Region Internet Coast City Deal.

M.Sc. Marvin Drewel studied industrial engineering at the University of Paderborn, specialising in innovation management. Since March 2016 he has been a research assistant at the Heinz Nixdorf Institute of Prof. Gausemeier in the department of Strategic Product Planning and Systems Engineering. His research focuses on industry 4.0 and strategic planning of digital platforms.

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Invited Paper

Young University Spin-off Firms' Internationalization: The Influence of Founding Teams and Networks

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Abstract: Commercialization of inventions urges university spin-off firms to develop networks abroad, particularly if they are active in a small national economy. While it is recognized that young spin-offs are vulnerable due to lack of various resources and capabilities, support in internationalization from the university is rare. We investigate university spin-offs' internationalization using a sample of 105 of such firms in Northwest European countries. In early years, 62 per cent employ international networks, enhanced by capabilities gained in PhD education, participation in market training and innovation experience at practical level, but also (and strongly) by diversity among partners in domestic networks. Subsequent growth leads to a stronger internationalization, mainly derived from early patterns of internationalization, but a good 30 per cent of the spin-offs tend to face problematic situations, namely a shrinking pattern or persistent lack of internationalization. The paper concludes with some challenges for improvement.

Keywords: university spin-off firms, internationalization, global reach, capabilities, team and network.

1. Introduction

Universities have increasingly internationalized in the past decades, be-it in attracting students and staff from abroad, or in education through 'subsidiaries'. However, attention to internationalization of their spin-off firms has lagged behind. This is remarkable because aside from 'born globals', some segments of spin-offs are 'stuck in inertia' and not able to collaborate with partners abroad.

Various studies stress the importance of knowledge collaboration on a global level today (Bolzani et al, 2015; Heitor, 2015). A stronger specialization and importance of niche markets have limited the availability of specialized knowledge to a few places in the world, and these places are increasingly outside Europe. The OECD (2012) observes a growing role in international research activity in countries like China, Korea, Brazil and India. Today, South-Korea, the US and Japan have a lead in innovation performance over the European Union (EU) while innovation growth rates indicate that China is facing the strongest growth (8.1 per cent). This changing landscape of R&D and related innovative businesses may urge university spin-offs in Europe to establish international knowledge relationships quicker and with an increasing spatial reach. In addition, the world is also facing a massive urbanization (UN, 2014), calling for innovative infrastructural and construction solutions outside Europe and US, like practiced on-site in housing projects and port development, etc.

With regard to the larger class of high-tech SMEs, internationalization is clearly promoted as making firms growing stronger and becoming more profitable (EC, 2014); this e.g. through scale and scope advantages in specialized value chains, and benefits from collaboration with demanding R&D institutes, customers and suppliers overseas (Love and Ganotakis, 2012; Onkelinx et al, 2016). Internationalization among young high-tech SMEs has received attention for a long time, be-it as a stepwise path, the 'Uppsala model' and its revisions (e.g. Johanson and Vahlne, 2009) or more radically like among 'born-global' firms (e.g. Andersson and Wictor, 2003). More recently, attention has been drawn to a larger variation in paths of internationalization (e.g. Knight and Liesch, 2016).

Internationalization can take many forms, like collaboration with suppliers abroad, FDI investment, knowledge exchange, export activity, etc. Also, internationalization can take different modes of presence abroad, like an own sales office, representing agencies, or no presence but regular visits or electronic communication, all with different challenges and risks. No matter which type and mode, internationalization requires an appropriate level of resources and timely adjustments. The core concepts here are absorptive capacity and dynamic capabilities, in other words, the building, integration and reconfiguring of capabilities that are required to enable to deal with rapid external changes and adjust to new circumstances and challenges in technology and markets (Cohen and Levinthal, 1989; Escribano et al, 2009; Teece et al, 2007). There are two contrasting views on young high-tech firms and dynamic capabilities. In one view, young firms are facing a high vulnerability (liability of newness and foreignness) preventing an adequate responding to external changes, in particular to

opportunities of international knowledge relations. In a contrasting view, young firms benefit from a relatively large flexibility in decision-making, responsive learning and quick adjustment, and 'go abroad' immediately or short after firm establishment (Zaheer, 1995; Teixeira and Coimbra, 2014). How large such different segments would be among university spin-offs is however not known, also, it is not clear whether there is change over time.

As one of the first, we picture dynamics in internationalization. To our knowledge, there has been no research of larger samples that reveal international knowledge relationships of university spin-offs over time. Also, the attention for capability factors and resources is limited in research on spin-off firms (Bjørnali and Aspelund, 2012; Taheri and van Geenhuizen, 2011). Capabilities have two origins, team capabilities developed in the past, including pre-start years (Rasmussen et al, 2014), and external capabilities through networks (e.g. Milanov and Fernhaber, 2014). There is no consensus on which matters more in internationalization, the team or the network. Internationalization is conceived in this study as employing knowledge relationships abroad, which are rather stable and through which important knowledge about R&D and business activity is developed and exchanged.

Against this backdrop the research questions are as follows: 1) What are the patterns of international knowledge relationships and which changes have taken place over time? 2) To what extent is internationalization influenced by capabilities in the founding team and capabilities through networks? 3) What may be the implications for university support?

The study draws on interview data of 105 university spin-off firms in Northwest Europe in 2006 and an update ending in 2012, and various case studies in 2014. The paper unfolds as follows. Theoretical and empirical perspectives (Section 2) are followed by methodological steps (Section 3). Next is the analysis of the changing spatial pattern in knowledge relationships (Section 4) and the exploration of capability factors (Section 5). Implications and suggestions for support are in the Conclusion.

2. Capability factors

Firms with stronger capabilities are not only better equipped to identify and gain external knowledge that is valuable wherever in the world it is, but also to learn about barriers hindering the establishment of relationships, producing that valuable knowledge. Such barriers can be grouped into three categories: resource barriers, like shortages in investment capital, management skills, reputation; cultural barriers, like difficulty to adjust to language and cultural norms in doing business and in management practice; and institutional (legal) barriers, like in dealing with different financial and tax-related regulation and intellectual ownership (IO) issues. Firms' capabilities are not the core of the current study. We address capabilities not directly, but we address factors that are associated with increase/decrease of capabilities, like participation in training.

We develop a model as a set of capability factors influencing the reach (scale) in internationalization and changes herein between 2006 and 2012. We address nine capability factors below. First, a successful training of personnel in market potentials/marketing increases firm capabilities in identification and acquisition of new knowledge, while overcoming specific barriers, even in other continents (Escribano et al, 2009; Teixeira and Coimbra, 2014). Further, drawing on literature on accumulated knowledge within firms' founding teams, we assume that size of the founding team is an important factor in building and managing knowledge relationships, while smaller teams have limited absorptive capacity and capabilities in searching for the right partners and best matching knowledge domains (Colombo and Grilli, 2010; de Jong and Freel, 2010). We also assume that accumulated knowledge through working experience and main education of founding team members, as skills, expertise and understanding that have been gathered prior to the start, are important factors in spin-off firms' capabilities in acquiring new knowledge internationally (e.g. Visintin and Pittino, 2014). For example, Bjørnåli and Aspelund (2012) suggest that university spin-offs benefit from (industrial) experience of their founding teams in establishing international relationships through strategic alliances and sales. Moreover, a PhD education of a founder could provide firms with stronger capacity to overcome barriers like cultural (language) barriers and information barriers, and utilize pre-start networks (Bolzani et al, 2015; Taheri and Van Geenhuizen, 2011). Furthermore, some literature also points to innovation experience as a source of capabilities that enhance internationalization (Castellacci, 2010). We distinguish between two broad types of innovation, the one at practical level that is less novel and closer to market (as found at engineering

schools – civil engineering, architecture and spatial planning, etc.) and the one at advanced (basic) level requiring interaction with top research groups and highly specialized service providers.

In addition, employing domestic networks provides experience that is helpful in establishing relationships abroad, aside from resources that are directly useful, like the existing marketing organization of a domestic firm (Milanov and Fernhaber, 2014). In a similar vein, pre-existing networks abroad may make later international knowledge relationships more efficient and better to manage because spin-offs have already learned how to integrate internal knowledge with knowledge from foreign partners. Because the establishment of knowledge networks and the use of an office or agency abroad are resource-intensive, we expect no drastic changes in internationalization, only minor ones, after five years (Gilbert, 2005). Though there may always be spin-offs that make a jump ahead and increase internationalization.

To control for the influence of specialization in the regional economy of university spin-off, we include location as a control variable. Accordingly, spin-offs in clusters with a focus on international oil/gas production or in a small regional economy, are seen as activated to employ international knowledge relationships to a larger extent compared to spin-offs in more diversified and larger regional economies. Further, we include two factors on entrepreneurial orientation (EO) of firms. First, being engaged in science-based versus market-based industry, where science-based firms tend to be globally oriented in learning while in sectors pushed by market demand, adaptive learning is important which benefit more from local face-to-face interactions (Asheim et al, 2007). And secondly, the initial strategic vision on growth, in terms of becoming a large and international firm or remaining small and mainly domestically oriented (Lumpkin and Dess, 1996).

3. Data and methods

3.1 Data collection

We draw on data concerning two university cities, Delft (Netherlands) and Trondheim (Norway). The two countries share a similar, somewhat risk-avoiding entrepreneurship culture (GEM, 2010), have similar scores on the main European Innovation Scoreboard in years of this study (ProInno Europe, 2011) and face relatively small domestic markets, urging specialized firms to be export-orientated. Data-collection took place in two stages, in 2006 and 2012. In 2006 we constructed the database, with spin-offs active in commercializing knowledge created at university and survived to 2006 at an age not older than 10 years (150 spin-offs). Selection bias from not-surviving can be ruled out as simulation indicated that firms that failed in this period do not differ significantly from the ones that survived. Given an overall response rate of 70%, data were collected using a semi-structured questionnaire in personal face-to-face interviews with the principal manager, as member of the founding team. In 2006, we collected cross-sectional data on international knowledge relationships, and on several firm characteristics during the start-up phase and first years. Five years later we pictured their internationalization once more, using a short e-mail survey and/or telephone call.

3.2 Measurement

The dependent variable in this study, spatial patterns of international knowledge relationships, is measured as an ordinal variable in four categories (Table 1): (1) no international knowledge relationships, (2) only in Europe, (3) only in North/South America or Asia, and (4) in all relevant continents simultaneously (Europe, North/South America, Asia). We asked the respondents about the "most important organisation from which the firm acquires essential knowledge developed in the context of the firm's growth" and its location. Because many spin-offs were reluctant to mention a particular city – for sensitivity reasons in R&D and privacy reasons for foreign firm collaboration - the country level was adopted. Due to small numbers per country, we had to aggregate countries to the level of continents.

We include participation in market-related training in the model, as a dummy variable. The other variables connected to capabilities are measured as follows: founding team size as number of its members; working experience as the average number of working years prior to firm foundation (first three members); education as number of doctorate degrees in founding team; and experience with innovation by measuring an advanced level indicated by patents and breakthrough products/services, versus a relatively modest level, indicated by orientation towards practical market demand. Furthermore, experience with domestic social networks is measured through network size (number of social partner relations) and through diversity of partners. The last is measured as the product of diversity in socio-economic background (*Hs*) and spatial pattern of partners (local, regional or national) *(EI*):

$$Div = Hs\ (1 + \frac{EI}{2}) \quad (1)$$

and $$Hs = 1 - \sum_{k=1}^{8}(\frac{a_k}{N})^2 \quad (2)$$

where a_k is the number of partners with a different socio-economic background, and where k = 1 (large business), 2 (university), 3 (small business), 4 (government), 5 (family and friends), 6 (financial investors), 7 (lead customer), 8 (others). Note that a partner could be assigned to only one main partner type (identity) while N is the total number of partners with whom a university spin-off interacts. In addition, diversity in the spatial pattern of domestic partners is calculated as:

$$EI = \frac{E_p - I_p}{E_p + I_p} \quad (3)$$

where E_p is the number of external, non-local, partners, at more than 60 minutes by car, and I_p is the number of local partners ($E_p + I_p = N$).

As pre-existing internationalization in 2006, we take the spatial pattern and the presence abroad through office(s) or distributor(s) at that time, the last as a dummy variable. With regard to control factors, firm location is measured in two categories in 2006 as a dummy variable, Trondheim or Delft. Measuring category of industry as part of EO, we distinguish between science-based as involved in basics of chemistry, life-sciences, nanotechnology, etc., versus market-based as involved in specialized input to complex production systems or infrastructures systems, e.g., information processing and sustainable energy production. Furthermore, initial strategic intention is measured using the categories small and regional/national versus large and international.

3.3 Method of analysis

In the preparation to the modelling, we checked for multi-collinearity and looked at the endogeneity issue. As social networks correlate with internationalization in 2006, these are deleted from the model for 2012. Overall, there is no serious concern for multi-collinearity. With regard to endogeneity, capability factors have been measured in 2006 mainly as the situation of the firm at start or somewhat later and partially rooted in situations at university and faculty in the years before (Rasmussen et al, 2014). In contrast, demand for internationalization has increased more recently (OECD 2012; UN 2014). Therefore we can in part exclude reverse causality.

Table 1: Descriptive statistics

Variable	
Number of university spin-off firms (2006) Idem (2012)	105 97(a)
Dependent variable: international knowledge relationships in 2006 and 2012 (b)	Not internationalized (38.0%) (18.1%) Within Europe only (28.5%) (25.7%) North/South America or Asia only (5.8%) (16.2%) All above continents simultaneously (27.7%) (32.4%)
Control variables	
Location (dummy)	Trondheim (41.0%); Delft (59.0%)
EO-Industry (dummy)	Science-based: 26.7%;Market-based:73.3%
EO-Strategic intention (dummy)	International and large: 63.8%;Regional/national:36.2%
Capability factors	
Training (dummy)	Yes (31.4%); No (68.6%)
Size of founding team	Average:2.3; s.d.:1.16;Min-max:1-5
Working experience (years)	Average:2.6; s.d.:4.05;Min-max:0-21

Capability factors	
PhD education (number)	Average: 0.6; s.d.:0.86;Min-max:0-3
Innovation experience (level of newness)	Modest level (58%); Advanced level (42%)
Domestic network size	Average: 3.5; s.d.:0.95;Min-max:2-5
Domestic network diversity	Average: 0.33; s.d.:0.19;Min-max:0-0.88
Internationalization reach in 2006	See row above on dependent variable (2006)
2006's presence abroad	No presence abroad (75.5%); Office(s) or distributors/agents (24.5%)

Eight spin-offs failed in 2006-2012.
Aggregation to three was necessary for statistical reasons.

4. Changes in international knowledge relationships

A majority of the spin-off firms in our sample (62 per cent) employs international knowledge relationships in 2006. These relationships are often crossing continents, witness the spin-offs active outside of Europe outnumbering the ones active within Europe (33.5 versus 28.5 per cent) (Table 1). Importantly, using a similar definition for internationalization as in our study, a share of 60 per cent internationalization is found among 120 university spin-offs in Italy five years after start-up (Bolzani et al, 2015), which is close to our pattern as measured in 2006. Our sample in 2012 shows that 82 per cent employ international knowledge relationships, with an increase in relationships in merely Asia or North/South America (16 per cent), a change that may be influenced by increasing innovative activities and economic growth in BRICS countries.

Next, comparing knowledge relationships in 2006 and 2012 for each spin-off individually (Table 2) we observe the following trends.

Table 2: Change in reach in knowledge relationships on individual level (2006-2012)

Change	**Abs. and %share**
Shrinking pattern incl. failed firms	17 (16%)
No change (inertia)	52 (49.5%)
Remained similar to 2006: 'not internationalized'	16 (15.2%)
Remained similar to 2006: all other reach	36 (34.5%)
Increase: one step	20 (19%)
From 'not internationalized' to 'Europe only'	9 (8.4%)
Other one-steps	11 (10.6%)
Increase: two/three steps	16 (15.5%)
From 'not internationalized' to 'NA or SA, or Asia'	6 (5.5%)
Other two/three steps	10 (10%)
Total	105 (100%)

*NA: North America; SA: South America

A large group of spin-offs (50 per cent) has not changed spatial patterns, of which a good 30 per cent could have taken next step in spatial reach. In contrast, a similar part experienced some sort of expansion in internationalization patterns, of which 20 per cent have extended knowledge relationships to the America's or Asia, or to all relevant continents simultaneously. Remarkably, 16 per cent show a shrinking pattern of internationalization - also including firms that failed to survive. All-in all, though overall internationalization has increased, a good 30 per cent of all spin-offs tend to be problematic.

5. Factors influencing knowledge relationships

The procedure of modelling is as follows. We add variables to the basic model (controls) and determine the improvement for each new model (Table 3). The three control variables (Model 1) produce a rather weak result (Pseudo R^2 of 0.07) with two EO related variables found to be positive and significant. Next, we add five variables to the model, representing capability factors in the founding team, which increases the model power by 0.06 (Model 2). Three coefficients are positive and significant, namely, participation in training, PhD education, and innovation experience at practical level. In Model 3, by adding two variables on domestic social

networks, the model power increases somewhat stronger, by 0.08. The sign of diversity in domestic networks is positive and significant, indicating a varied and rich learning that is helpful in internationalization. In the full model, additionally, size of the domestic network is negative and significant. This result refers to limited search and connection capacity abroad if spin-offs manage relatively large domestic networks.

Table 3: Regression analysis of reach in knowledge relationships (2006)

	1	2	3	4
Control variables	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
Location (Trondheim=1)	0.50 (0.38)	0.88 (0.46) *	0.40 (0.40)	0.74 (0.48)
EO (science-based = 1)	0.82 (0.42) *	1.09 (0.46) **	0.90 (0.44)**	1.05 (0.49)**
EO (international = 1)	1.10 (0.41) ***	1.17 (0.45) **	0.74 (0.44)*	1.02 (0.50)**
Capability factors				
Training (yes=1)	-	1.13 (0.46)**	-	0.95 (0.50)*
Size of founding team	-	-0.16 (0.16)	-	-0.24 (0.17)
Working experience	-	-0.01 (0.05)	-	-0.01 (0.05)
PhD education	-	0.81 (0.37) **	-	0.76 (0.39)*
Innovation (practical =1)	-	1.01 (0.51)**	-	1.38 (0.55)**
Diversity in domestic network (2006)	-	-	4.60 (1.22) †	6.18 (1.51)***
Size of domestic network (2006)	-	-	-0.21 (0.16)	-1.54 (0.63) **
LR Chi square	16.70 †	30.79 †	34.13 †	52.49 †
Pseudo R^2	0.07	0.13	0.15	0.23
Log likelihood	-104.23	-97.18	-95.51	-86.33

* P<0.1, ** P<0.05, *** P<0.01, †P<0.005

Next, we focus on international knowledge relationships for the same spin-offs in 2012 (Table 4). For this year, we also explore influence of existing reach and being-present abroad in 2006. In the first step, three control variables are included and this again produces a weak result of Pseudo R^2 of 0.07 (Model 1). By including the five capability factors in the founding team, in Model 2, the model power increases only slightly by 0.02, without a significant beta-coefficient of these factors. This situation seems to be logically following from changes in founding teams towards more professional management teams. However, some early developed capabilities may become relevant, in particular working experience. In next step (Model 3), adding early knowledge relationships regarding spatial reach and presence abroad, gives a substantial increase in model power, namely to 0.25, with significance of both factors. And finally, the full model (Model 4) is slightly stronger, pseudo R^2 reaches 0.29, with significance of working experience and innovation level. The last indicates lost importance of practical innovation in favor of advanced innovation, most probably after maturation of advanced innovation.

And finally, we need to mention a consistent lack of influence of size of the founding team. Further, we may note that the most consistent factor influencing spatial reach in internationalization – for both 2006 and 2012 - is 'entrepreneurial orientation', indicating a positive influence of the early strategic vision of the spin-offs on their growth and how to achieve it. Also noteworthy is 'location' in the full model in 2012, with a negative sign.

Most probably, the economic downturn in the observation period (2006-2012) worked out negatively on Trondheim's economy and spin-offs, thereby reducing international knowledge relationships, e.g. related to activity in oil and gas fields in new areas, like Brazil and northern Russia.

Table 4: Regression analysis of reach in knowledge relationships (2012)

	1	2	3	4
Control variables	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
Location	-0.28 (0.38)	-0.52 (0.44)	-0.41 (0.43)	-1.13 (0.51)**

EO-science-based	0.25 (0.45)	0.14 (0.47)	0.14 (0.51)	-0.08 (0.55)
EO-international	1.48 (0.41) †	1.37 (0.43) †	1.49 (0.47) †	1.45 (0.50) ***
Capability factors				
Training	-	0.51 (0.44)	-	-0.05 (0.51)
Size of founding team	-	0.03 (0.17)	-	0.08 (0.18)
Working experience	-	0.06 (0.05)	-	0.12 (0.06)**
PhD education	-	0.14 (0.36)	-	-0.23 (0.42)
Innovation (practical)	-	-0.45 (0.50)	-	-1.05 (0.57)*
Reach (2006)	-	-	1.07 (0.33) †	1.25 (0.37) †
Presence abroad (2006)	-	-	2.77 (0.66) †	3.17 (0.72) †
LR Chi square	15.66 †	19.04 **	54.85 †	62.90 †
Pseudo R^2	0.07	0.09	0.25	0.29
Log likelihood	-102.33	-100.64	-82.74	-78.71

* P<0.1, ** P<0.05, *** P<0.01, †P<0.005

Finally, we present three case studies on management capability and dealing with (potential) problematic situations, like not internationalized - despite intentions, a shrinking pattern and consolidation:

1. Weak capabilities in management, including gaining financial resources: no internationalization. Three years after establishment, the spin-off, active in health care (hygienic products) and managed by two MSc graduates, attempted to increase importance of internationalization. However, it suffered from management overload in the preparation of internationalization, like identifying user-value of the product abroad and best mode of market entry. This while the domestic market was not yet sufficiently mature, causing lack of financial capital.
2. Management overload in a 'born global' situation, in part caused by pressure from refunding of investment capital: shrinking and bankruptcy. The firm was founded by university professors and MSc graduates, on the basis of a gearless solution for wind turbines, not yet accepted in the market. Being fully internationalized after start through scientific contacts at universities, a subsidiary in a cluster abroad, and a sales office in Asia, the firm could not handle all turbulence simultaneously.
3. Uncertainty in a 'born global' development and in taking next step in manufacturing: consolidation with a question mark. The firm, founded by a university professor and managed by MSc graduates, and fully internationalized through scientific contacts, prototype testing in Asia and a supplier subsidiary in Russia, is eager to start scaling up for manufacturing of its device (writing on silicon waver using multiple electron beams) in collaboration with a partner. It fails however to find such partner, while financial issues are becoming pressing. Advanced competences are needed in negotiation and entering into important contracts, including intellectual ownership, refunding of investment capital and eventually, acquisition of the spin-off.

The above case studies indicate strong importance of management in times of turbulence in different stages of internationalization.

6. Conclusion

We investigated changes in internationalization among university spin-off firms and influence of underlying (capability-related) factors. Positive influence derived from training and PhD-education, as well as innovation at practical level, gives way to positive influence from founders' working experience. Also, prior internationalization gains importance, causing partial inertia. Our results also suggest coexistence of three segments of spin-offs: (highly) dynamic in early internationalization and further steps; early internationalization but hesitation to take further steps; and remaining dealing with merely domestic knowledge relationships. Furthermore, a deeper look into (potential) problematic situations pointed to weakness in capabilities of founding teams. Starting or consolidation of internationalization often occurs in strong turbulence and financial uncertainty, in which teams need to be able to deal with multiple management

overload. This situation, but also the different segments of spin-offs, call for customized support, not for one model.

Founding teams preferably include members with a PhD education, or benefit from similar education/experience from external specialists, e.g. in an advisory board. Further, building large domestic networks needs to be avoided because such networks act as a managerial 'burden', instead, diversity needs to be enhanced as it tends to broaden horizons in spin-offs' cognitive domain. Results like these need to be clearly communicated in incubators, to increase awareness among spin-off firms. In addition, spin-offs themselves have indicated a solution to connecting with a trustworthy partner abroad, and that is starting a program by the university (or incubator) with foreign companies in the region, through which spin-offs can learn dealing with foreign companies and with cultural and institutional barriers (Van Geenhuizen et al, 2015). More importantly, internationalization can cause or trigger situations of serious management overload, in early steps but also in consolidation. For such situations, we would suggest universities in collaboration with regional authorities, development agencies or regional banks to provide professional 'crisis management' and temporary 'postponing' of financial claims (refunding) which serves to gain time to identify potential solutions.

References

Andersson, S. and Wictor, I. (2003) "Innovative internationalisation in new firms – Born Globals: The Swedish case", Journal of International Entrepreneurship, Vol 1, pp 249-276.

Asheim, B., Coenen, L. and Vang, J. (2007) "Face-to face buzz and knowledge bases: sociospatial implications for learning innovation and innovation policy", Environment and Planning C: Government and Policy, Vol 25, pp 655-670.

Bjørnåli, E.S. and Aspelund, A. (2012) "The role of the entrepreneurial team and the board of directors in the internationalization of academic spin-offs", Journal of International Entrepreneurship, Vol 10, No. 4, pp 350-377.

Bolzani, D., Fini, R. and Grimaldi, R. (2015) "The Internationalization of Academic Spin-Offs: Evidence from Italy", [Online], SSRN (October 8, 2015), http://ssrn.com/abstract=2671330

Castellacci, F. (2010) "The internationalization of firms in the service industries. Channels, determinants and sectoral patterns", Technological Forecasting and Social Change, Vol 77, No. 3, pp 500-513.

Cohen, W.M. and Levinthal, D.A. (1989) "Innovation and Learning the Two Faces of R&D", Economic Journal, Vol 99, pp 569-596.

Colombo, M.G. and Grilli, L. (2010) "On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital", Journal of Business Venturing, Vol 25, pp 610-626.

Escribano, A., Fosfuri, A. and Tribo, J. (2009) "Managing external knowledge flows: The moderating role of absorptive capacity", Research Policy, Vol 38, No. 1, pp 96-105.

GEM 2010: http://www gemconsortium org/docs/266/gem-2010-global-report

Gilbert, C.G. (2005) "Unbundling the Structure of Inertia: Resource versus Routine Rigidity", Academy of Management Journal, Vol 48, No. 5, pp 741-763.

Heitor, M.V. (2015) "How far university global partnerships may facilitate a new era of international affairs and foster political and economic relations?", Technological Forecasting and Social Change, Vol 95, pp 276-293.

Johanson J. and Vahlne J-E. (2009) "The Uppsala internationalization process revisited: from liability of foreignness to liability of outsidership", Journal of International Business Studies, Vol 40, pp 1411-1431.

Jong J.P.J. de and Freel, M (2010) "Absorptive capacity and the reach of collaboration in high technology small firms", Research Policy, Vol 39, pp 47-54.

Knight, G.A., and Liesch, P.W. (2016) "Internationalization: From incremental to born global", Journal of World Business, Vol. 51, No. 1, pp 93-102.

Love, J., and Ganotakis, P. (2012) "Learning by exporting: lessons from high-technology SMEs", International Business Review, Vol 22, No. 1, pp 1-17.

Lumpkin, G.T., and Dess, G. (1996) "Clarifying the Entrepreneurial Orientation Construct and Linking it to Performance", The Academy of Management Review, Vol 21, No. 1, pp 134-172.

Milanov, H., and Fernhaber, S. (2014) "When do domestic alliances help ventures abroad? Direct and moderating effects from a learning perspective", Journal of Business Venturing, vol 29, No. 3, pp 377-391.

OECD (2012) Science Technology and Industry Scoreboard 2011, OECD, Paris.

Onkelinx, J., Manolova, T.S., and Edelman, E.F. (2016) "Human capital and SME internationalization: Empirical evidence from Belgium", International Small Business Journal, Vol 34, No. 6, pp 818-837.

ProInno Europe 2011: http://www proinno-europe eu/inno-metrics/page/innovation-union-scoreboard-2011.

Rasmussen, E., Mosey, S. and Wright, M. (2014) "The influence of university departments on the evolution of entrepreneurial competences in spin-off ventures", Research Policy, Vol 43, No. 1, pp 92-106.

Taheri, M., and Geenhuizen M. Van (2011) "How human capital and social networks may influence the patterns of international learning among academic spin-off firms", Papers in Regional Science, Vol, 90, No. 2, pp 287-311.

Teece, D.J. (2007) "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", Strategic Management Journal, Vol 28, pp 1319-1350.

Teixeira, A.A.C. and Coimbra, C. (2014) "The determinants of the internationalization speed of Portuguese university spin-offs: an empirical investigation", Journal of International Entrepreneurship, Vol 12, pp 270-308.

UN (2014) World Urbanization Prospects. Revision 2014. United Nations.

Van Geenhuizen M., Ye, Q., Au-Yong Oliviera, M. (2015) "University spin-offs' internationalization: importance of skills", 55th ERSA Congress, Lisbon, 25-28 August. 2015.

Visintin, F., Pittino, D. (2014) "Founding team composition and early performance of university-based spin-off companies", Technovation, Vol 34, pp 31-43.

Zaheer, S. (1995) "Overcoming the liability of foreignness", Academy of Management Journal, Vol 38, No. 2, pp 341-363.

Academic Research Papers

A Study of Enterprising Tendencies of Undergraduates of Different Fields of Study

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Abstract: Entrepreneurship has gained much attention in the recent past with the recognition of its importance to a country's economic development. Enterprising tendency measures the psychological characters associated with tendency to set up and manage projects. Understanding the level of entrepreneurial tendencies of undergraduates will help to determine if they possess the required traits necessary to become entrepreneurs and will be immensely helpful to develop tailor-made approaches to teach and conduct capacity building programs to different groups of students. Therefore the main research objective was to identify whether students from various fields of study (Agricultural Technology and Management, Psychology, Civil Engineering, Management and Veterinary Medicine) exhibit different levels of overall enterprising tendency and the key enterprising attributes. In addition, to determine the differences across first and final year students and male and female students. A sample of 386 first and final year undergraduates from the University of Peradeniya was selected using stratified random sampling technique. A validated questionnaire; Caird's General Enterprising Tendency test (GET2 test) was used to assess the level of enterprising tendency, along with few other demographic and personal characters. ANOVA, t-test and chi square methods were used to test the hypotheses in the study. Results revealed that there is a significant difference ($p<0.05$) in the level of enterprising tendencies and four out of five enterprising attributes of students from different fields of study in first year students. Agricultural Technology and Management students and Psychology students showed higher tendency levels than Civil Engineering and Veterinary Medicine students. First-year students showed higher tendency levels than final years in most disciplines of study. However, there was no significant difference in the level enterprising among male and female students. Students of University of Peradeniya; irrespective of the field of study or year of study, on average all subjects showed medium enterprising tendency level.

Keywords: Enterprising tendency, Entrepreneurial characteristics, Entrepreneurship, Students, Different disciplines of study, need for achievement, need for autonomy, calculated risk taking and internal locus of control.

1. Introduction

Entrepreneurship plays an important role especially in developing countries throughout the world as it creates self-employment opportunities thereby reducing unemployment situations, increasing economic efficiencies, introducing innovation and contributing to the national economy (Nishantha, 2009; Hindle & Rushworth, 2000; Shane & Venkataraman, 2000). Youth unemployment is considered a serious concern in Sri Lanka. The interest in entrepreneurship among youth in Sri Lanka has been found to be low and the attitude youth have towards starting up their business ventures is also negative (Ibaraguen & Cader, 2005). Sri Lankan education system introduced a new entrepreneurial studies course to the school curriculum in 2007 with the intention of promoting and encouraging entrepreneurship in the country. However the effect of these studies after many years is yet an unanswered question (Weeratunge, 2010).

Past studies suggest that study of entrepreneurship among students in tertiary education is a field of research which has gained much attention. Entrepreneurship among youth is considered necessary as it is an alternative to professional occupation especially for graduates (Brenner, et al., 1991). Most graduates tend to seek paid jobs than starting their business soon after graduation. However, the increasing demand for limited paid jobs creates an unhealthy competition among graduates. The government, therefore, has taken many measures to enhance entrepreneurship in youth (Ariyawansa, 2011). Research has been carried out to find out to find the entrepreneurial career aspirations (Rosa et al., 1997; Gunawardena et al.,2018), entrepreneurial intentions and inclinations (Samantha Kumara, 2012), the effect of personality traits on entrepreneurial capacity (Denis, et al., 2016) and motivation for entrepreneurship career (Nishantha, 2009) of undergraduates in Sri Lanka. However, there is a dearth of studies on enterprising tendencies of undergraduates in Sri Lanka.

Entrepreneurial trait theory claims that entrepreneurs have distinct perceivable psychological characteristics that can be nurtured via education and training (Eken, 2017). Thus assessing of enterprising tendencies of undergraduates will enable understanding if undergraduates possess the traits necessary to become entrepreneurs, to develop tailor-made programmes for various students groups.

The study is timely because understanding the enterprising potential will enable developing more appropriate business education programs for school and university students. Because past research indicates that significant trait deficiencies may lead to possible business training opportunities for enterprising individuals (Johnston Jr, 2007). Recent research concludes that, although entrepreneurial traits needs to be developed at an early stage in life, understanding the enterprising potential of students could enable academics to develop course curriculum that can stimulate enterprising traits resulting in enhanced enterprising potential (Van der Lingen & Van Niekerk, 2015).

The following research questions were raised; whether students from different fields of study exhibit different levels of overall entrepreneurial tendencies and entrepreneurial attributes? Whether students from different fields of study exhibit different levels of entrepreneurial attributes? Whether there is a difference in the level of entrepreneurial tendencies of male and female students? Whether there is a difference in the level of the entrepreneurial tendency in the first year and the final year students of a given field of study?

1.1 Research objectives

1. To determine whether students from different fields of study exhibit different levels of overall entrepreneurial tendencies.
2. To determine whether students pursuing different fields of study exhibit different levels of entrepreneurial attributes.
3. To find if there is a difference in the level of entrepreneurial tendencies of male and female students.
4. To find if there is a difference in the level of the entrepreneurial tendency in the first year and the final year students of a given field of study.

2. Literature review

According to McClelland, an entrepreneur organizes a business and increases its productive capacity driven by the need for achievement. Gibb (1987) defines an entrepreneur as 'someone who demonstrates a marked use of enterprising attributes, such as initiative, persuasive powers, moderate risk-taking, flexibility, creativity, independence, problem solving, need for achievement, imagination, leadership, hard work and internal locus of control'. McStay (2008), based on past literature, identified three approaches to entrepreneurship, namely; the trait, behavioural and cognitive. Past research on entrepreneurial tendencies emphasises on identifying individuals with an inclination to behave entrepreneurially by considering personality characters which are similar to entrepreneurs (Cromie, 2000). The enterprising tendency is defined as the psychological characteristics associated with the tendency to set up and manage projects (Caird, 1991). However, this does not imply that all enterprising people are entrepreneurs, but a more substantial fraction of entrepreneurs may show psychological characteristics of enterprising people. People with higher levels of enterprising tendency tend to set up growth-oriented and innovative projects more frequently and good at utilising human, technological, physical and organisational resources. One's ability to develop enterprising potential may perhaps change depending on the changing constraints and context in life and career (Caird, 2013).

Enterprising tendencies can change over time and could be changed by many factors such as education, family, culture, social environment, technological environments. (Tiftik & Zincrikiran, 2014).

Caird (1991) states that most significant characteristics cited in many studies have been measured using psychological tests namely; a high need for autonomy, high need for achievement, calculated risk-taking, creative tendency and internal locus of control. Many studies in that past have considered high motivation levels as a unique characteristic for entrepreneurs (McClelland et al., 1953; Weber, 1930; Young, 1983). According to McClelland, "the arousal feeling an individual get when there is competition with a standard of excellence in situations where performance is assessed for success" is considered as the need for achievement (McClelland et al., 1953). Young (1983) states that individuals with high need for achievement are characterised as social entrepreneurs, who were enterprising to benefit the society. According to (Collins et al., 1964) entrepreneurs are not comfortable with authority figures, the determination and self-reliance are additional attributes related to need for autonomy. The high need for autonomy is related to one's independence and self-confidence (Johnson et al., 1987). Watkins (1976) in Caird, (1991) states that "the need for achievement is the strongest reason for entrepreneurs to start a business". Research by Caird (1991) and Cromie & O'Donoghue (1992) indicates that entrepreneurs tend to display a strong need for autonomy than

other occupational groups. Individuals who show a high need for autonomy often show dissatisfaction and discomfort when expected to work within boundaries and rules (Demirci, 2013).

According to Schumpeter entrepreneurial function involves revolutionary innovation of new products, and processes (Schumpeter, 1950). Caird (2013) argues that an enterprising individual is restless with ideas, can solve problems creatively and see the life differently. Innovative tendency makes individuals develop new technologies, businesses, projects, organisations, comedy and artistic outputs. Bessant & Tidd (2011) also argue that innovation is an essential element for starting new business as it allows to recognize opportunities and defines creativity as "making and communication of meaningful new connections to help us think of many possibilities; to help us think and experience in varied ways and using different point of view".

Risk-taking was first introduced as an essential entrepreneurial character by Richard Cantillon in 1755 and is considered one of the earliest defined characteristic in an entrepreneur. It is said that entrepreneurs are moderate risk takers (McClelland, 1961). A highly enterprising person always seeks for information and is opportunistic, they evaluate the worth of pursuing the opportunity with some risk. Caird (2013a) states that a risk taker as someone who is able to act on incomplete information and able to take decisions with minimum information, is self-aware of ones capabilities, set goals that are challenging but attainable and can grasp the probability that certain actions will be successful.

Weinstein (1969) stated that what matters for success is people's belief that they are responsible for their success, their ability and effort rather than luck. Internal locus of control is associated with attributes such as tolerance, dominance, achievement, well-being, assertion, independence, insight, initiative, effectiveness, sociability and intellectual efficiency (Joe, 1971). Enterprising people have an internal locus of control that makes them believe they have control over their destiny (Caird, 2013a).

The GET test measures the enterprising individuals and entrepreneurial characteristics which may have been nurtured via education and training over time (Caird, 2013a). The test was first developed in 1987-1988 by Sally Caird and Cliff Johnson at Durham University Business School (Caird, 2013a). The internal consistency of GET test was found to be acceptable by previous research (Stormer & Goldenberg, 1999). Both validity and reliability of GET2 were studied in many previous studies (Caird, 1990, 1993). Cromie (2000) states that some studies have found GET test has good internal consistency, criterion and convergent validity. Van Niekerk (2015) too states that GET test is an accurate tool to measure enterprising traits.

Enterprising tendency vary based on a person's gender, education level, family background and ethnicity (Aldrich & Waldinger, 1990). A study by (Henderson & Palm, 2012) in the European Union showed that there's a significant difference between students whose first degree is on business and whose first degree isn't business, where business students showed higher overall GET test scores thus indicating that business students had higher enterprising tendencies than non-business students. In another study to determine if management education affect entrepreneurial tendency in South Africa, it was found that students that are currently active with entrepreneurship studies have shown significantly higher enterprising tendency scores (Van Niekerk, 2015). A research by (Holienka & Holienkova , 2014) have found that there exists a significant difference in the overall GET test scores between management and psychology students, where management students scored higher than psychology students, also management students scored higher scores on four out of five enterprising attributes (namely need for achievement, calculated risk-taking, creative tendency and internal locus of control) than psychology students.

Enterprising tendency levels of university male students have shown to be more entrepreneurial than females (Gure, 2017). Another study on Indian University students by Sethu (2012) revealed that the overall scores for enterprising traits showed below average and those female students had significantly higher scores on enterprising traits than that of male students. Further, this study showed that students who came from more agricultural background possessed high tendency levels than business background.

A recent study claims that there are significant differences in general enterprising tendency levels of undergraduates who follow different fields of study. The study focused on students from different majors (business administration, applied informatics, psychology, and pedagogy) and study showed that students in different disciplines exhibit different rates of overall enterprising tendency as well as specific enterprising attributes such as need for achievement, calculated risk-taking and locus of control (Holienka, et al., 2015).

Studies on enterprising tendency by Caird provides the main framework for the study (Caird, 2013a) (Caird, 1990). The study is supported by a theoretical framework which focuses on the trait approach of studying enterprising individuals. Figure 1 shows the conceptual framework of the study.

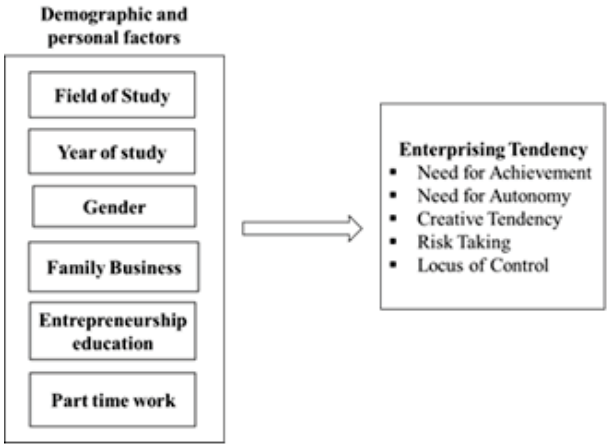

Figure 1: Conceptual Framework

2.1 Hypotheses

Based on the research question and the developed conceptual framework, the study was guided by the following hypotheses:

H1: There is a significant difference in the level of overall enterprising tendencies of students following different fields of study.

H2 - There is a significant difference in the level of key entrepreneurial attributes in students following different fields of study.

H3 – There is a significant difference in the level of entrepreneurial tendencies of male and female students.
H4 - There is a significant difference in the level of entrepreneurial tendencies of the first year and the final year students of a given field of study.

3. Methodology

The study took a deductive approach which used a cross-sectional survey research design and the research strategy used in the study was the quantitative approach. The entrepreneurial traits were quantified and measured using the GET test. The population of interest of the study comprised of first year and final year students of University of Peradeniya, Sri Lanka. The University of Peradeniya is the second largest state university in Sri Lanka based on the number of students enrolled each year (University Grants Commission Sri Lanka, 2015). The university comprises nine faculties namely; Agriculture, Allied Health Sciences, Arts, Dental Science, Engineering, Management, Medicine, Science, and Veterinary Medicine & Animal Science. First-year students are fresh undergraduates who have finished Advanced Level and just started their tertiary education in their respective field of studies whereas final year students have been studying in the university for four years and are about to make a career choice soon after finishing the degree. Thus taking students from two distinct years of studies will aid in finding if there's a difference in the tertiary education system on developing entrepreneurial tendencies among undergraduates.

The sample included students from five fields of study of the University, namely; Agricultural Technology and Management (ATM), Civil Engineering, Psychology, Management and Veterinary Science. Students who follow these fields of study are from different G.C.E Advanced Level streams of studies. However, students who follow ATM have taken either Bioscience stream with the subjects Physics or Agriculture (University Grants Commision, 2016). The individual undergraduate student was treated as the unit of analysis. Proportionate stratified random sampling techniques were used to collect the data which comprised of 386 students.

A self-administered questionnaire was used to gather necessary demographic and personal information and the enterprising tendency. A standard, validated test; General Enterprising Tendency (GET) test developed by Caird (2013) was used to measure the entrepreneurial tendency. GET test is licenced to be used in industry and it is used to measure the enterprising potential of business students (Burns, 2012). The enterprising tendency levels range from 0 to 100, 100 being the highest and similarly, to each of the traits the values range from 0 to 100 according to the online GET2test (Caird, 2013b).

The reliability analysis carried out using Cronbach's Alpha reliability tests showed that the Cronbach's alpha value (0.733) is greater than 0.7; thus the GET test has acceptable internal consistency and reliability. The first and second research questions were addressed using one-way Analysis of Variance (ANOVA) that was used to compare the overall enterprising tendency level scores as well as scores of each enterprising traits of students from five fields of study. Further, Analysis of Variance with interactions was used to check for the effect of demographic and personal characters on enterprising tendencies (faculty wise interactions). Two group mean comparison test (t-test) was used to compare the tendency levels of first and final year students of each of the study field and to compare the tendency levels of male and female students was used to address third and fourth research questions.

4. Results and discussion

The first hypothesis investigated whether there is a significant difference in enterprising tendency levels of students of different fields of study. The normality tests, Shapiro-Wilk and Skewness/Kurtosis were conducted, and the results showed significance values (p) greater than 0.05 in both the tests mentioned above thus proving that the tendency values are normally distributed. Table 1 shows the descriptive statistics of the overall entrepreneurial tendencies of students of University of Peradeniya. The overall enterprising tendency results, as well as the subscale scores, are given as percentage values (Caird, 2013b). Figure 2 below graphically depicts the overall mean GET test values of undergraduates across different study fields. One way analysis of variance was conducted to investigate whether the difference in the enterprising tendency levels of students from the five fields of study was significant. The level of significance of all statistical data analysis was set at $p<0.05$.

Table 1: Descriptive statistics of overall enterprising tendency

Field of study	Year of study	N	Min	Max	Mean	Std. Deviation
Agricultural Technology & Management	First	42	41	80	61.69	8.513
	Final	54	31	76	58.76	9.227
Civil Engineering	First	40	44	72	55.23	7.156
	Final	48	44	70	55.23	6.796
Management	First	30	44	70	59.93	6.523
	Final	31	31	76	55.13	9.106
Psychology	First	40	37	85	61.18	9.413
	Final	33	44	69	57.03	6.070
Veterinary Medicine	First	33	39	65	55.273	6.443
	Final	34	37	87	57.21	11.305

The results of Fisher's F-test one way analysis of variance suggest that there is a statistically significant difference between the overall enterprising tendency values of first year students from different fields of study ($F=6.29$, $p=0.0001$), thus accepting the first hypothesis. The findings suggest that students who pursue ATM and Psychology have a higher entrepreneurial tendency than students of other fields of study.

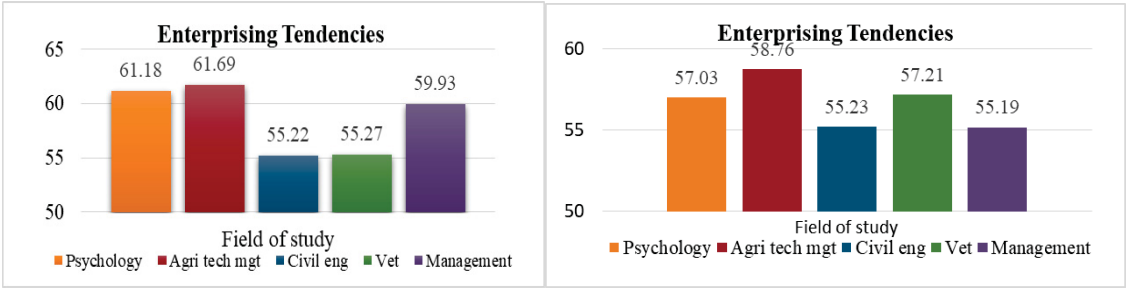

Figure 2: Overall mean GET test values of First Year Students (Left side) and Final Year Students (Right side)

Although previous studies have shown business or management students tend to have higher tendency levels (Holienka, et al., 2015), (Holienka & Holienkova , 2014) in the case of 1st year management students in University of Peradeniya, showed moderate enterprising tendency levels compared to other fields of study.

Both Veterinary Medicine and Engineering students showed the least enterprising potential. Interaction effects in the enterprising tendency scores with the field of study by demographic and other personal characters was tested using ANOVA with interactions. The table 2 below shows the effect of demographic and personal factors on enterprising tendency. Results suggested that out of all the variables considered, only the interaction of the variable; 'running their own businesses' with faculty was significant ($p<0.05$) at 95% significant level with respect to first year students.

Table 2: Interaction effect of demographic and other personal factors of first year students

Variable	Significance	(Variable)*study field Significance
Gender	0.828	0.415
Father self employed	0.933	0.142
Mother self employed	0.916	0.356
Entrepreneurship education	0.621	0.251
Family business	0.457	0.085
Role model	0.306	0.056
Involved in family business	0.141	0.330
Part time job	0.233	0.440
Running own business	0.953	0.006*

*Significant at $p<0.05$

Responses from a total of 201 final year students from the five fields of study were analysed. Although there exists a difference in the mean values of the tendency scores across fields of studies, the F-test of one way analysis of variance suggests that there is no statistically significant ($p<0.05$) difference between the overall enterprising tendency values of students from different fields of study ($F=1.40$, $p=0.2354$). Interaction effects result suggested that out of all the variables considered, only variable, 'entrepreneurship studies' was significant at 95% significant level, this showed that people who had followed entrepreneurship studies affect the enterprising tendency level. However, its interaction with the field of study was not significant.

According to the interpretation of GET2 test evaluation, average enterprising tendency values of the first year and final year students of all the five fields of study belong to the medium range. Although the average scores lied within medium scores, the overall scores were rather inclining to low levels. This suggests that the potential to start up and run a business is rather low in undergraduates of the selected streams of study.

According to (Caird, 2013a) a medium level enterprising person tend to have some enterprising characters, and they may be enterprising in some context also be able to express enterprising nature within employment as an intrapreneur or through voluntary community projects. However, Caird further states that a medium level enterprising person is highly unlikely to start up an innovative growth-oriented global business. The results of the study, therefore, agree with previous literature which suggests that there are significant differences in the general enterprising tendency levels between students in different fields of disciplines (Holienka et al., 2015; Holienka & Holienkova, 2014; Henderson & Palm, 2012; Sethu, 2012). Research suggests that different fields of study may attract various personalities of individuals and they tend to develop entrepreneurial tendencies in diverse ways, and this could be one of the causes for the difference among tendency level across different disciplines of study (Holienka et al., 2015).

An individual may be enterprising in many different ways based on the context. Caird (1990) argues that being enterprising does not necessarily mean that particular individual is starting up a business venture, but it means an enterprising person has the potential to set up and run a project in a wide range of different contexts. This can be applied to study findings, that is; ATM and Psychology students will have a better potential to set up and run a project when compared to students from other fields of study. This does not certainly mean they would start up a business but according to Holienka, higher tendency levels will help build and develop their professional careers while being innovative and may build their own professional identity. Therefore irrespective of the field of study a person pursues, investigating enterprising characters in diverse fields of study gives a better scope. Because the study itself verified that ATM, Psychology and Veterinary students showed higher entrepreneurial tendencies. From a view of entrepreneurship education perspective, it can be

reflected that different levels of enterprising tendency imply the necessity for entrepreneurship education to be employed in varied approaches (Holienka et al., 2015).

As for the second hypothesis the results showed that there is a significant difference in the key entrepreneurial attributes, results showed that need for achievement, need for autonomy, risk-taking and locus of control had significant ($p<0.05$) differences among study fields with respect to first-year students while the attributes, need for achievement and need for autonomy were significant with respect to final years. First year and final year ATM students have scored highest levels of need for achievement compared to other fields of study, while first years have scored highest in need for autonomy. Students who pursue Psychology showed higher levels of creative tendency as well as the higher internal locus of control. Final year Veterinary students showed higher levels of creative tendency and risk-taking. First-year Management students showed high levels of calculated risk-taking scores and higher internal locus of control. Engineering final years, however, had a high need for autonomy than other study streams. Although literature highlights that students who pursue business studies tend to show high levels of enterprising attributes (Henderson & Palm, 2012), in the case of this study, management students scored lower scores in need for achievement, need for autonomy and creative tendency. Engineering students too scored low in creative tendency, risk-taking and locus of control.

The third hypothesis test results indicated that although there are differences in the average scores for enterprising tendency between male and female students within each of the analysed fields of study, results of t-test suggests that there is no statistically significant difference in the overall enterprising tendency values of male and female students in any of the five fields of study at 95% significant level. The 4th hypothesis in the study was tested, and according to results, there exists a significant difference in the overall level of enterprising tendency values of first year and final year students who pursue Psychology and Management. In both fields, first-year students showed higher levels of average overall tendency levels than final year students.

Table 3 shows the paired t-test results; the t-test value and the two-tailed significance level. According to the results, there is a significant difference in the overall enterprising tendency levels of first year and final year Psychology and Management students. Although the difference was not significant in ATM students, first years showed higher tendency levels.

Table 3: Enterprising tendency levels between first year and final year students

Field of Study	Year of study	n	Mean	Paired t-test	Significance (Two-tailed)
Agricultural Technology & Management	First	42	61.69	1.613	0.110
	Final	54	58.75		
Civil Engineering	First	40	55.23	-0.028	0.997
	Final	48	55.23		
Management	First	30	59.93	2.337	0.021*
	Final	31	55.13		
Psychology	First	40	61.18	2.270	0.026*
	Final	33	57.03		
Veterinary Medicine	First	33	55.27	-0.863	0.392
	Final	34	57.21		

*Significant at $p<0.05$

There was no difference in the first and final year engineering students. However, students who pursue Veterinary Medicine showed a difference in the above pattern, where final years showed higher tendency levels than that of first years but this difference was not significant at 98% confidence level. This indicates that first-year students have higher enterprising potential than final year students.

Chi-Square test was conducted to test for significant associations of demographic and personal factors on the year of study. Results indicate that final year ATM students had followed more entrepreneurship studies than first year students and had higher involvement in family businesses. Although the overall enterprising tendency scores had no significant difference among first and final years, first years on average showed higher entrepreneurial potential despite the fact that first years had lower exposure to entrepreneurship studies and less involvement in family businesses than final year ATM students. Psychology students showed a significant difference in the level of overall enterprising tendency scores, where first-year students showed higher levels than final year students. Based on the test for associations, the first-year psychology students were involved in more part-time jobs than final year students. According to past literature, students who have part-time job

experience, tend to be more entrepreneurial. Therefore, the higher number of part-time job involvement in first-year students may have caused them to show higher enterprising potential. Concerning engineering students, final year students had followed more entrepreneurship studies than that of first years. However, there was no difference in their overall enterprising tendency levels between first year and final year students.

When it comes to the overall general enterprising tendency levels of the study sample, most of the students showed medium or low overall GET scores, with only a very few higher enterprising levels. The study, therefore, contributed toward new knowledge on the enterprising tendency levels of undergraduate students of the University of Peradeniya. Also, the research provided important evidence to show that enterprising tendency levels and enterprising attribute levels of students vary across the different field of studies.

5. Conclusion and recommendations

The study provided evidence on overall enterprising tendency levels being different among students of different study disciplines. Further evidence was found that there exist differences in the levels of important enterprising attributes across the analysed fields of study. ATM students showed the highest overall enterprising tendency levels in both final year and first year students while Engineering students and final year Management students showed the least enterprising tendency levels among the selected fields of study. Four out of five enterprising attributes showed significant differences among disciplines of study in first year students, namely; need for achievement, need for autonomy, calculated risk taking and internal locus of control whereas two out of five attributes had significant differences across the fields of study in final years, namely; need for achievement and need for autonomy. First year and final year ATM students showed higher levels of need for achievement in comparison to students of other analysed study fields.

First year students have higher overall enterprising tendency levels than final years in all the interested study fields except, Veterinary Medicine. Although the first years of the other four study streams showed higher tendency values the difference was only significant in Psychology and Management students. Although past literature suggests significant differences in enterprising potential between male and female students, in the case of this study, there was no significant difference in the enterprising levels between male and female students. Students of University of Peradeniya; irrespective of the field of study or year of study, all subjects on average showed medium enterprising tendency level, hence this research has provided insight into the enterprising traits prevalent over a cross section of students in the University of Peradeniya.

The study considered two separate samples of students from first and final years from the same discipline of study. However, if continuous data collection method is implemented, the change of enterprising tendencies of undergraduates over time can be studied. The study was only carried out in a single state university. If similar studies could be conducted for both private and government university students, it will provide a broader representation of undergraduates in Sri Lanka. Thus a more generalizable result could be obtained for the overall enterprising tendency levels of Sri Lankan undergraduates. Even though the study only identified differences in tendency levels of students pursuing different fields of study, the research does not answer the questions on how and why they differ. Therefore it is recommended to investigate further how and why students from different fields of studies show different enterprising potentials.

References

Aldrich, H.E and Waldinger, R. (1990) Ethnicity and Entrepreneurship. *Annual Review of Sociology*, Vol. 16, No. 1, pp. 111-135.

Ariyawansa, R. G. (2011) Employability of Graduates of Sri Lankan Universities. *Sri Lankan Journal of Human Resource Management*, Vol. 1, No 2.

Bessant, J. and Tidd, J. (2011) Innovation and Entrepreneurship. 2nd ed. s.l.:John Wiley & Sons Ltd.

Brenner, O. C., Pringle, C. D. and Greenhaus, J. H. (1991) Perceived fulfilment of organizational employment versus entrepreneurship: Work values and career intentions of Business College Graduates. *Journal of Small Business Management*, Vol. 29, No. 3, pp. 62-74.

Burns, P. (2012) "*Corporate entrepreneurship: innovation and strategy in large organizations*". Palgrave Macmillan.

Caird, S. (1990) What does it mean to be Enterprising?. *British Journal of Management*, Vol. 1, pp. 137-145.

Caird, S. (1991) Testing enterprising tendency in occupational groups. *British Journal of Management*, Vol. 2, No. 4, pp. 177-186.

Caird, S. (2013a) General Enterprising Tendency test.

Caird, S. (2013b) General Measure of Enterprising Tendency Test- Version 2 (GET2 Test). [Online]
Available at: http://www.get2test.net/

[Accessed 13 12 2017].
Caird, S. P. (1988b) Report on the development of measuring enterprising attributes.
Caird, S. P. (1993) What do psychological tests suggest about entrepreneurs?. *Journal of Managerial Psychology*, Vol. 8, No. 6, pp. 11-20.
Collins, O., Moore, D. and Unwalla, D. (1964) "The Enterprising Man. Ann Arbor": University of Michigan.
Cromie, S. (2000) "Assessing entrepreneurial inclinations: Some approaches and empirical evidence." *European journal of work and organizational psychology*, Vol. 9, No. 1, pp. 7-30.
Cromie, S. and O'Donoghue, J. (1992) Assessing entrepreneurial inclinations. *International Small Business Journal,* Vol. 10, No. 2, pp. 66-73.
Demirci, A. E. (2013) Cross-cultural differences in entrepreneurial tendencies: An exploratory view in Turkey and Canada. *International Journal of Entrepreneurship*, Vol. 17, pp. 21-40.
Denis, C. R., Ariyarathne, C. and Perera, C.(2016) A Study on the impact of Personality Traits of Entrepreneurial Capacity of Undergraduates of Faculty of Management Studies of Sabaragamuwa University of Sri Lanka.
Eken, I., (2017) *Relationship between Generations of Entrepreneurs and Entrepreneurial Traits* (Doctoral dissertation, University of the Incarnate Word).
Gibb, A., (1987) 'Enterprise Culture- Its Meaning and Implications for Education and Training'. *Journal of European Industrial Training* Vol.11 No.2, pp 2-38.
Gunawardena, L; Hemachandra, D; and Kodithuwakku S.S., (2018). Career Intention of Undergraduate Students: An Application of Theory of Planned Behavior. *IUP Journal of Entrepreneurship Development*, Vol. 15 Issue 1, p7-27.
Gure, G. S., 2017. Gender influence on the entrepreneurial tendencies and entrepreneurial attitude of university students. *International Journal of Physical and Social Science*, 7(8).
Hindle, K. and Rushworth, S. (2000) Global Entrepreneurship Monitor.
Holienka, M. and Holienkova, J. (2014) Enterprising Tendencies of Management and Psychology Students: Differences and Common Attributes. *Comenius Management Review*, 8(1), pp. 39-52.
Holienka, M., Holienkova, J. and Gal, P. (2015) Entrepreneurial characteristics of students in different fields of study: A view from entrapreneurship education perspective. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Vol. 63, pp.1879-1888.
Ibaraguen, C. and Cader, A. A. (2005) Youth Perceptions: Exploring Results from the Poverty and Youth Survey. Centre for Poverty Analysis, Issue 05.
Joe, V. (1971) Review of the Internal-External Control Construct as a Personality Variable. *Psychological Reports,* Volume 28(2), pp. 619-640.
Johnson, C., Marks, S., Mathews, M. and Pike, J., (1987) Key Skills: Enterprise Skills through Active Learning. G.B : Hodder & Stoughton Educational.
Johnston Jr, H. J. (2007) *Enterprising Tendencies of Guam-born Business Owners*, University of Phoenix.
McClelland, D. C. (1965) Achievement motivation can be developed. *Harvard Business Review*, 43(6), pp. 6-24.
McClelland, D. (1961) "The Achieving Society". 2nd Edition ed. Princeton: Van Nostrand.
McClelland, D., Atkinson, j., Clark, R. and Lovell, E. (1953) "The Achievement Motive". New York: Appleton-Century-Crofts.
McStay, D. (2008) "An investigation of undergraduate student self-employment and the impact of entrepreneurship education and previous entrepreneurial experience." *Theses*, p. 18.
Nishantha, B. (2009) Influence of personality traits and socio-demographic background of undergraduate students on motivation for entrepreneurial career: The Case of Sri Lanka.
Pallant, J. (2013) *SPSS survival manual*: A step by step guide to data analysis using IBM SPSS. London: McGraw-Hill (UK).
Palm, M. and Henderson, G. (2012) Business Education and Enterprising tendencies: A study of education as a factor in enterprising.
Rosa, P., Jayatilake W. and Kodithuwakku S. (1997) The Potential Supply of University Educated Agribusiness Entrepreneurs: A Sri Lankan Perspective. *Proceedings of the 42nd World Conference: Entrepreneurship The Engine of Global Economic Development*, International Council for Small Business Research, San Francisco, USA(P.21A24).
Samantha Kumara, P. A. P. (2012) Undergraduates' intention towards entrepreneurship: Empirical evidence from Sri Lanka. *Journal of Enterprising Culture*, Vol. 20, No.1, pp. 105-118.
Schumpeter, J. (1950) Capitalism Socialism and Democracy. New York: Harper.
Sethu, H. S. (2012) Study of entrepreneurial tendencies in Manipal University students based on GETT (General Entrepreneruial Tendency Test). *Voice of Research, an International Journal*, Vol. 1, No.2, pp. 78-83.
Shane, S. A., Locke, E. and Collins, C. (2003) Entrepreneurial Motivation. *Human Resource Management Review*, Vol. 13, No. 2, pp. 257-279.
Shane, S. and Venkataraman, S. (2000) "The promise of entrepreneurship as a field of research", *Academy of Business Reviews*, 25, No.1, pp. 217-226.
Stormer, F., Kline, T. and Goldenberg, S. (1999) Measuring entrepreneurship with the general enterprising tendency (GET) test: criterion-related validity and reliability. *Human Systems Management*, 18(1), pp.47-52.
Tiftik, H. and Zincrikiran, M. (2014) A Survey of Entrepreneurial Tendencies Candidate Young Entrepreneurs: Foundation University Sample, Journal *of Management Research*, Volume 6(2), pp. 117-200.
University Grants Commission, (2016) Admission to undergraduate courses of the universities in Sri Lanka. [Online]
Available at: http://www.ugc.ac.lk/downloads/admissions/Handbook_2016_17/HANDBOOK%20%202016-2017%20ENGLISH.pdf

[Accessed 1 1 2018].
University Grants Commission Sri Lanka, (2015) Sri Lanka University Statistics 2015. [Online]
Available at: http://www.ugc.ac.lk/en/component/content/article/1709-sri-lanka-university-statistics-2015.html
[Accessed 1 1 2018].
University of Peradeniya, [Online]
Available at: https://www.pdn.ac.lk/student/student.php
[Accessed 1 1 2018].
Van der Lingen, E. and Van Niekerk, G. (2015) Entrepreneurship Traits of Science, Engineering and Technology (SET) Students. *The Southern African Journal of Entrepreneurship and Small Business Management*, 7(1).
Van Niekerk, G. and Van der Lingen (2015). Does Management education affect the entrepreneurial tendency of students?, International Association of Management of Technology.
Weber, M. (1930) The Protestant Work Ethic and the Sprit of Capitalism. London: Allen and Unwin.
Weeratunge, N., (2010) Developing Youth Entrepreneurs: A viable youth employment strategy in Sri Lanka. In: R. Gunathilake, M. Mayer & M. Vodopivec, eds. The challenge of youth employment in Sri Lanka. Washington:World Bank, ©2010., pp. 167-198.
Weinstein, M. (1969) Achievement Motivation and Risk Preference. *Journal of Personality and Social Motivation*, Vol. 13, No.2, pp 153.
Young, D. (1983) If Not For Profit, For What? A Behavioural Theory of the Non-Profit Sector Based on Entrepreneurship.

Sustainable Business Practices Among MSMEs: Evidence from four Metropolitan Areas in Ghana

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Abstract: Pollution poses major health risks to man and other living creatures, especially in developing countries. Its sources include industrial emissions and improper waste by households and organisations. However, large firms have often been accused as the main actors of polluting water bodies, land and air. Despite this, some studies argue it is difficult to identify culprits for air and water pollution; hence, the need to analyse the business practices of MSMEs to determine their sustainability, since they contribute over 90% of businesses in developing countries. The study, therefore, looked at plastic pollutant, a major waste concern in Ghana. This is because, despite several government interventions in cleaning cities and towns of plastic waste; the problem still persists. Statistics indicate about 501,875 tons of plastic waste are generated annually, and it has created serious health and environmental risks such as the blocking of drains leading to flooding, the breeding of mosquitoes that spread malaria and the causing of severe aesthetic nuisance in terms of smell and appearance in communities. Using a mixed method, 500 MSMEs engaged in the production of Sachet Water in the Accra and Kumasi metropolis were sampled. Questionnaires and interviews were used to collect data. Data was analysed using descriptive and inferential statistics. The results showed that though MSMEs contribute significantly to plastic waste, they do not have any strategy for managing the waste generated. Furthermore, there is a map of complex network of actors in the plastic packaging chain, and therefore, it was concluded that the idea of plastic management policy should not target only sachet water producers. This study recommends that policy formulation aimed at dealing with this menace should target all actors in the plastic value chain including suppliers of plastic raw material, consumers of plastic packaged products, collectors of plastic waste as well as processors.

Keywords: Sustainability, Business Practices, Plastics, MSMEs, Metropolitan Areas

1. Introduction

For years, the issue of pollution has been considered a major issue in the environmental management literature. This is because, exposures to environmental pollution continue to pose major problems and health risks to society and its inhabitants; and these effects are said to be greatest in developing countries (Briggs 2013). Sources of pollution are reported to include industrial emissions, poor sanitation and contamination of air and water bodies (Briggs 2016) most of which are suggested to be generated by large companies (e.g. Anglogold, Exxon Mobile etc.). For example, carbon accountant Richard Heede apportions most of the blame for climate change to just 90 large companies (Starr 2016). Despite this, Blair and Hitchcock (2004) argue that identification of culprits for pollution especially that from air can be difficult; hence the question of whether micro, small and medium enterprises (MSMEs) play any major role in the whole pollution problem remains unanswered.

Perhaps the argument that MSMEs may in fact be worst polluters, at least in the case of developing countries like Ghana, can be made as these are found to contribute mostly to solid waste, specifically plastics. According to a study by Gambrah (2013) plastic waste as far back as 2010 constituted the second highest waste type (about 16.98% of solid waste) in the Accra metropolis and this is a worrying statistic considering the inability of plastic waste to decompose in comparison to the highest waste component in the region (i.e. organic waste).

Since 2010, news articles by Essien (2014), Kortei and Quansah (2016) and Lambert and Sabutey (2016) show that plastic waste not only continues to dominate the Ghanaian solid waste landscape (i.e. about 501,875 tons generated annually) but also has become a major challenge for government, policy makers. Although the plastic waste business has contributed to socio-economic development through job creation and the provision of household water security (Stoler et al. 2012), it also creates serious health and environmental risks such as the blocking of drains leading to flooding, the breeding of mosquitoes that spread malaria and the causing of severe aesthetic nuisance in terms of smell and appearance in communities (Gambrah 2012).

There is, therefore, a need to properly manage plastic waste so as to reduce its environmental impact. Efforts in this regard have focused on research into the use of policy making tools such as bans, the search for environmentally friendly alternatives and the engineering of genetically modified organisms to eat up

unwanted plastic wastes (Kotei and Quansah 2016) with limited understanding of who the culprits are and how MSMEs involved manage the situation through the value chain i.e. sourcing, usage, disposal and recycling. This identification of perpetrators among others is important to allow for targeted regulation and enforcement for effective results (Starr 2016).

The study, therefore, examined sustainable business practices in the management of plastic waste by MSMEs in the purified water industry in the selected metropolis in Ghana. Precisely, the study was to map out the plastic waste value chain in Ghana and identify key stakeholders involved and their role. Furthermore, it was to analyse the plastic waste value chain activities undertaken in-house by MSMEs in the purified water industry as well as analyse the sustainable business practices used by MSMEs in the plastic waste sector.

The rest of the paper is divided into five sections. Section two looks at the literature review, while the third section is devoted to the research methods used. Section four looks at the results and discussion and the conclusion and recommendations section are drawn in section five.

2. Literature Review

Corporate social responsibility maxim draws managers attention to the consequences of ignoring their environmental responsibility in this era of fierce global competition. The study was informed by the theoretical discussions on sustainable development and environmental management. Sustainable development operates on the principles of meeting present needs without compromising on the resources requirements of future generations. Sustainability has become the foundation for all socioeconomic and political development programmes at the local, national, regional and global levels. Indeed, the United Nations' Agenda 2030 provides the global framework for sustainable development as outlined in the 17 Sustainable Development Goals (SDGs). The subject of sustainable business practice is much more related to the targets in SDGs 3, 6 and 12. These targets emphasize on good health and wellbeing; clean water and sanitation as well as sustainable consumption and production. Sustainable business practices or the green business philosophy implies the organization engages in the production, distribution, consumption and post-consumption activities in an environmentally friendly manner. According to Rennie (2008), sustainable business is the process of assessing how to design products that will take advantage of the current environmental situation and how well a company's products perform with renewable resources.

At the country level, efforts have been made at integrating sustainability into development and how businesses carry out their operations. For instance, in 2016, a Harzardous and Electronic Waste Control and Management Act (Act 917) was passed by Parliament. The objective of Act 917 is to regulate and control electronic and other similar waste in Ghana. In 2013, the country introduced Environmental Excise Tax. The tax was intended raise funds to help in the recycling of plastic waste and collection in the country. Furthermore, there has been several forums and programmes in Ghana on waste in general and plastic waste in particular.

Yet the problem of plastic waste continuous to compound every year.

In their view, Jambeck et al. (2015) and Yang et al. (2018) posited that plastic waste pollution, particularly microplastics seem to have so much attention recently. Though this is true, plastic waste continuous to be the most common waste in countries like Ghana, despite all the effort at reducing it. Such efforts include collection and recycling of such waste. Amoako et al. (2018) explored a means of recycling sachet-water bags coco-nut hursk and found that it can be a good resource in the production of ceilings, partition boards and automobile interiors. Alemu and Dhanai (2018) found that cutting plastics into small strips and mixing with soil with different percentages, can help improve the properties of a problematic soil. Other studies that have explored the plastic waste menace include Jambeck (2017) who analysed the scale of plastic waste entering the coastal and oceanic waters around Africa. Furthermore, the issue that have been looked at in literature include quantifying both the volumes of packaged water consumed relative to household water requirements and associated plastic waste generated for three West African case study countries (Wardrop et al. 2017). In their study, Lineswala, Singh and Mishra (2017) focused on mass education and awareness generation on plastic waste management. Dzodzomenyo (2017) assessed the spatial distribution of regulated packaged water production in Ghana and found evidence to suggest that packaged water is transported shorter distances in Ghana.

From the previous works reviewed, there seem to be less attention focused on sustainable business practices and the role of the businesses involved in the production and the use of plastics in Ghana. Among the few studies that looked at sustainable business practices include Quartey et al. (2015). They looked at producer responsibility and management of products at end of life and proposed two theatrical recovery models that can be used to address the issue of sachet waste in Ghana. However, as a descriptive-qualitative research paper, they used only observation and existing literature on the subject matter. This is not adequate if one wants to understand the problem of plastic waste in Ghana. The current paper collects first hand data from the businesses in this sector.

Indeed, Quartey et al. (2015) raise a major issue of water quality and hence the growing number of MSMEs in the sachet and bottled water processing sector. Wardrop et al. (2017) opined that packaged water consumption is growing in lower and middle-income countries, but the magnitude of this phenomenon and its environmental consequences remain unclear. The packaged processing water sector is dominated by small and sometimes unformalized businesses. According to the National Association of Sachet and Packaged Water Producers (NASPAWAP), there are over 4,000 members, made up mainly of indigenous Ghanaian entrepreneurs (NASPAWAP 2016). However, given the widespread nature of their activities, especially in the towns and cities in Ghana, there is the possibility of the existence of many more unformalized businesses in the sector. This makes regulation of such entities difficult. Furthermore, the plastic waste problem is compounded by the mode of selling which is through the use of street vendors.

It must be noted that the problem of plastic waste in Ghana is not only created by sachet and bottled water, but also from plastic soft drink (soda) and carrier plastics (Arko-Achemfuor & Quan-Baffour 2015). According to Quartey et. al. (2015) plastics are used extensively in both food and water packaging industries because of their low bulk densities and inertness which make them convenient carrier materials with low risk of contamination. This has resulted in the large volumes of imports of plastics. It is estimated that over 10,000 metric tons of finished plastic products are imported annually into Ghana (Fobil 2000; Owusu-Sekyere, Osumanu & Abdul-Kadri 2013). However, the total volume of plastics in circulation at any point is largely influenced by the over 40 plastic manufacturing companies producing about 28,000 metric tons of assorted plastic products annually (Wardrop at al. 2017).

The paper focused on sachet and bottled water because it was observed that for every 10 pieces of plastics found in drains or on the street, between 7-8 pieces were from sachet or bottled water and in most instances, they were from small businesses.

From the review of literature, it was observed that there is a global effort at integrating sustainability in all socio-cultural, economic and political activities in line with the Sustainable Development Goals. Hence, this area has attracted a substantial research attention in recent times in developed countries. However, the situation is very different in some emerging countries like Ghana, where the issue of sustainability is yet to receive the attention of academics, researchers and policymakers. Furthermore, a survey of the literature has focused more on the problem of plastic waste and its impact and the issue of recycling by other actors. Such studies have not focus on the generators of such waste with respect to their knowledge of the problem and their extended producer responsibility. The paper helps fill this gap in the contest of Ghana.

3. Research Methods

The purpose of this study is to examine sustainable business practices in the management of plastic waste by MSMEs in the purified water industry. The study context was Ghana and in three metropolises (Accra, Cape Coast, Kumasi and Takoradi). These metropolises were selected because the MSMEs engaged in the water purification businesses in the country are concentrated in these cities. Due to the activities of illegal miners and other source of water pollutants in the country, majority of households consume sachet and bottled water. A 2015 Ghana Statistical Service(GSS) survey showed that packaged water in the form of 500ml filled bags or “sachets” is now widely consumed, with 43.1% of urban households reporting it as their main drinking water source in 2014 (GSS 2014 and Dzodzomenyo et al. 2017). This figure is expected to grow into the future.

Traditionally, Cape Coast have had water problem due to the effect of the sea and so people depend heavily on purified water. Furthermore, it is common to see on the streets and drains, plastic waste in these cities.

The paper employed mixed methods; the first objective that seeks to map out the plastic waste value chain in Ghana and identify key stakeholders is addressed primarily through a review of the theoretical and empirical literature on the topic. Secondly, the issue of analysing the plastic waste value chain activities undertaken in-house by MSMEs and that of assessing the sustainable business practices used by MSMEs were done based on primary data obtained from the field through the use of questionnaires.

The estimated population in Accra, Kumasi and Cape Coast Metropolis, according to Association of Sachet and Packaged Water Producers, was 2000 as at 2016. These are registered members. A sample of 322 MSMEs was selected for the study based on the Krejcie and Morgan (1970) sample size determination table. The questionnaire was made up both structured and unstructured questions. Some questions were on a rating scale of (1) least to (7) highest.

3.1 Measurement of variables

Variables used to measure sustainable business practices in MSMEs in the purified water industry were as follows:

Value chain analysis: Indicators used to measure this was extra levy on waste collection, plastic waste collection tax, designated collection centres, customer education on safe disposal, product packaging information, and alternative to plastic packaging.

Knowledge on sustainable business practices: Packaging of water, risk in take-back, going international, extended producer responsibility, socially responsible investment, and plastic waste processing business were the indictors used to measure this variable.

Knowledge on plastic waste: Waste as nuisance, waste decomposition, major sewage problem, presence of plastic waste, complain about plastic waste (exaggeration), and waste recycling and reuse were used to measure this variable.

Knowledge of regulations on plastic waste: Indicators such as plastic waste generation and disposal, registration of business, payment of penalty, tax on waste generation, and waste inspection were used.

3.2 Data collection and Analysis

Data was collected within a period of six months. Respondents were mainly owners or managers of MSMEs of Sachet and Bottled water businesses in the selected metropolis. Two hundred and three (203) questionnaires out of the 322 questionnaires were retrieved. This represents 63% response rate.

Data was analysed within the pragmatic philosophy using a mixed method approach. Issues on analysing stakeholders within the value chain was based on interpretative philosophy. Qualitative data was collected in the form of texts and images. This was analysed using themes. Means and percentages were used in analysing the quantitative data within the realism philosophy.

3.3 Ethical considerations

All the respondents were guaranteed anonymity and confidentiality in the reporting of the results of the study.

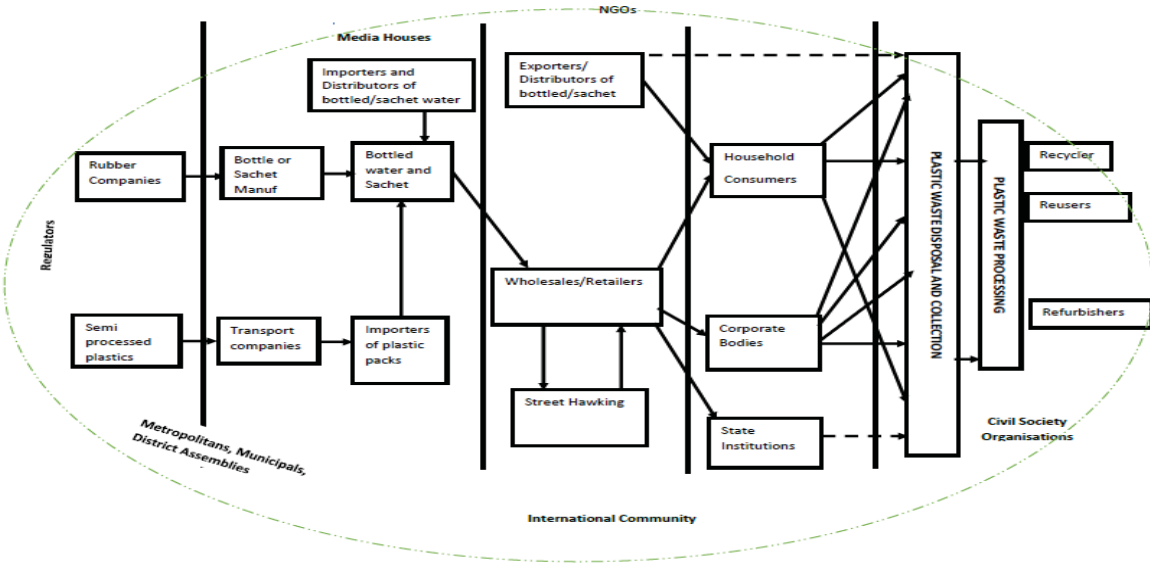
This was specified at the introductory part of the research instrument. Also, institutional policies and laws where the data were collected were adhered to and any governmental policy pertaining to this work was strictly obeyed. Finally, a strong respect for intellectual property was honoured. That is, both published and unpublished works were not used without permission and all references were credited and acknowledged accordingly.

4. Results and Discussion

4.1 Mapping the plastic waste value chain

The first research objective was to map out the plastic waste value chain, highlighting key stakeholders involved. To do this, existing literature on the subject matter was collected and analysed; and findings revealed that the plastic waste value chain comprised of complex web of activities which can be grouped into four main categories, namely; sourcing of raw materials, production of packaged purified water, distribution of packaged

purified water and plastic waste management. As shown in figure 1, the sourcing of raw materials category involves the processing and transporting of rubber and semi-processed plastics through transportation companies to plastic sachet and plastic bottle manufacturers well as importers of plastic packs for onward delivery to sachet and bottle water production companies. Once plastic packaging materials are received, production kicks off with the purification of water and its subsequent packaging by local packaged purified water manufacturers and importers and distributors of plastic sachet and bottled water. The distribution category of the plastic waste value chain involves the commercializing of purified packaged water which can be done either directly or indirectly through wholesalers and retailers (e.g. street vendor) to individuals, households, corporate bodies and state institutions. Further, the waste management category of the plastic waste value chain comprises the collection and disposal of plastic waste as well as its processing through channels such as recycling, reusing an refurbishing. While all of these activities take place, it is important to note that there are a host of other stakeholders such as regulators, metropolitans, municipals and district assemblies, international community, civil society, non-government organisations and media houses who influence or are influenced to practices within the industry.



4.2 Plastic Waste Activities Undertaken In-house

The second objective was to identify the plastic waste value chain activities carried out by MSMEs in the packaged purified water industry. To do this, responses were collected on the materials for packaging purified water and their sources, how packaged purified water is distributed and their strategies, if any, for waste management.

4.2.1 Material for packaging

Table 1 shows the frequencies and percentages of responses regarding materials used for packaging purified water among respondents. The results showed that 205 (82.0%) of the studied organisations used plastic sachets in packaging purified water for sale. This was followed by the use of plastic bottles as packaging material among 26 (10.4%) of the studied population. Additionally, glass jar and other materials were reported to be used by 5 (2.0%) and 14 (5.6%) MSMEs respectively for packaging purified water for sale. These results show that plastic sachets are a preferred packaging choice for MSMEs; thus, providing some explanation for why plastics constitutes the second highest waste type in some regions in Ghana (Gambrah 2013).

Table 1: Material for Packaging Water

	Frequency	Percent
Sachet	205	82.0
Plastic bottle	26	10.4
Glass jar	5	2.0
Others	14	5.6
TOTAL	250	100

4.2.2 Source of packaging material

Results in Table 2 show that 192 (89.9%) of responding institutions source their packaging materials from local companies while 15 (7.0%) of MSMEs imported packaging materials from manufacturers outside Ghana. Therefore, it can be argued that most of the businesses in the sample population were not actively involved in the sourcing of raw material category activities of the plastic value chain. Nevertheless, there is evidence that a small fraction i.e. 8 (3.7%) of MSMEs in the study did produce their packaging materials internally.

Table 2: Source of Product Packaging Material

	Frequency	Percentage
Imported	15	7.0
Locally Prod. (diff. firm)	192	89.9
Internally Produced	8	3.7
TOTAL	215	100

Table 3: Mode of Distribution

	Frequency	Percentage
Direct sale	188	44.2
Wholesalers	101	23.8
Retailers	136	32.0
TOTAL	425	100

4.2.3 Mode of distribution

Regarding mode of distribution, Table 3 indicates that while majority i.e. 188 (44.2%) of respondents reported to sell their products directly to their customers, 101% (23.8%) and 136 (32%) of responding institutions confirmed their use of wholesalers and retailers in commercializing their products. These results suggest consistent participation of studied MSMEs in the distribution stage of the plastic value chain and use of multiple modes of distribution as part of the process. Dzodzomenyo (2017) found evidence to suggest that packaged water is transported shorter distances in Ghana. This ensures effective distribution of sachet and bottled water.

4.2.4 Waste management strategy

As observed in Table 4, 159 (71.3%) of responding businesses did not have a strategy for managing their waste; thereby suggesting that majority of the studied MSMEs did not involve themselves actively in the waste management activities of the plastic value chain. Despite this, 22 (9.9%) and 17 (7.6%) of the studied institutions reported use of approaches such as recycling and take back systems respectively in managing their plastic waste. A further 8 (3.6%) mentioned use of practices such as waste collection for reuse and voluntary return through reward systems.

Table 4: Strategy for Managing Waste

	Freq	%
Reward for voluntary return of sachets/bottles	8	3.6
Collecting plastic waste for re-use	9	4.0
Own plastic waste management firm	8	3.6
Engagement in take-back of product pack	17	7.6
Recycling of plastic waste	22	9.9
Currently without a strategy	159	71.3
TOTAL	223	100

From the results, it could be deduced that a number of MSMEs within the sampled data, focused their efforts in the production and distribution stages of the plastic value chain with limited few undertaking all plastic value chain activities in-house. This partly explains why the problem of plastic waste persist in these metropolises.

4.3 Sustainable Business Practices of MSMEs

Furthermore, the paper examined sustainable business practices by MSMEs in the plastic waste sector. To do this, we collected responses on the knowledge and/or perception of owner managers on plastics, regulation, sustainable business practices, external support for plastic waste management and operational sustainability.

4.3.1 Nature of plastic waste

Table 5 gives the mean perception of respondents with regard to the nature of plastic waste. With a mean score of 3.08, it can be argued that respondents on average somewhat disagreed with the notion that plastic waste is not a nuisance. Similarly, the results revealed that respondents generally disagreed with arguments like the issue of plastic waste is an exaggeration, plastic waste are not everywhere as claimed and plastic waste does not constitute a major sewage problem; and these were evident with mean scores of 2.78, 2.42 and 2.31 for the arguments above respectively. Further, respondents, on average, strongly disagreed with statements posed regarding the decomposability and recyclability of plastic waste; thus showing that they knew that plastic waste did not easily decompose but could be recycled and reused. Overall, responses showed that respondents were knowledgeable about the nature of plastics and their impacts on society.

Table 5: Knowledge on Plastic Waste

Areas	N	Mean
Waste not a nuisance	203	3.01
Plastic waste Complaint (exaggeration)	203	2.65
Presence of plastic waste	203	2.32
Plastic waste not a major sewage problem	203	2.17
Plastic waste not recyclable	203	1.86
Plastic waste easily decomposes	203	1.61

4.3.2 Regulation of the plastic waste industry

Results summarized in Table 6 generally showed good understanding of regulations governing this industry among respondents. With means of 5.97 and 6.00, respondents confirmed their awareness of the need for their businesses to be registered and for waste inspectors to visit their business premises periodically.

Furthermore, respondents responded in much more affirmative with respect to their awareness of the existence of general regulation on plastic waste and disposal with a mean score of 4.66. The sanctions for poor waste management practices had a mean score of 4.14 and tax deductions for waste collection was 4.08.

Table 6: Knowledge of Regulations

Areas	N	Mean
Awareness of Registration of business	205	5.97
Visitation by Waste inspection	205	6.00
Awareness of Plastic waste generation and disposal	205	4.66
Familiar with Payment of penalty	205	4.14
Payment of Tax on waste generation	205	4.08

Table 7 provides two important issues on sustainable business practices with respect to going international and also plastics being the only means of packaging water. The analyses yielded mean scores of 4.62 and 4.67 respectively for two issues. This indicates the owner managers that participated in the study responded in the affirmative. From the results, it could be deduced that respondents had relatively little knowledge about alternative means of packaging water; and the fact that it is impossible to export sachet water to a number of countries.

Meanwhile, the question that if a business initiates a take-back schemes, it could negatively impact on the survival of a firm, had a mean score of 3.85. This implies the respondents perceived take back systems as inimical to their survival.

The question that sought to seek the understanding of the respondents with respect to their responsibility with respect to where their waste ends up had a mean score of 3.40. This score gives an indication that the respondents are not, overall, responsible to know where their waste ends up.

Table 7: Knowledge on Sustainable Business Practices

Area	N	Mean
Plastic as only means of Packaging water	205	4.67
Going international with plastic packs	205	4.62
Extended producer responsibility	205	3.85
Firms involved in take-back risk failing	205	3.40
Awareness of Social Responsible Investing	205	2.41
Awareness of plastic processing business	205	2.41

On respondents' awareness of plastic processing business and social responsible investing, the results showed a mean score of 2.41 for each of the constructs. The rather low mean value is an indication that respondents were aware of businesses that depended on waste plastic as main raw material. Secondly, the results showed, respondents were of the opinion that it is accurate for the perception of investors to shift towards business that are mindful of their environment.

4.3.3 External support for plastic waste management

From Table 8, respondents answered in the affirmative with respect to the question on the payment of extra levy to the assembly for waste collection. The analysis yielded a mean score of 4.16. The results imply respondents agreed paying extra to the assembly for plastic waste collection. This often comes in a form of levies and contributions. Furthermore, under the Environmental Excise Tax, businesses in this sector pay tax towards the management of plastic waste in the country. This is exemplified in the recognition of plastic waste collection tax by the respondents, although the mean score was low (3.20). Perhaps, this perception of respondents that they have paid funds to the assembly to manage their waste is the reason why they had little concern about where their waste ended up.

A mean score of 4.17 suggests a moderate agreement to the question of having adequate information on incentives for safe disposal of product pack. However, the respondents attested to the fact that not much is done by way of consumer education on safe disposal. This was confirmed by the low mean score (mean = 6.4) obtained in response to the question of whether they embark on campaigns to educate customers of safe disposal.

Table 8: External Support for Plastic Waste Management

Waste Management Actions	N	Mean
Extra levy on waste collection	205	4.16
Product packaging information	205	4.17
Plastic waste collection Tax	205	3.20
Customer education on safe disposal	205	2.64
Alternative to plastic packaging	205	1.94
Designated collection centres	205	1.54

With mean of 1.94, respondents were of the view they have not explored adequately, alternatives to plastic pack for water. This result confirms the earlier finding in Table 1, where it was observed that about 82% of respondents chose plastic as means of packaging water. Similarly, responses to the issue of designated collection centre attracted a mean score of 1.54.

4.3.4 Knowledge on operational sustainability

On knowledge of operational sustainability, respondents answered in the affirmative, indicating that their methods of operation were much more efficient and sustainable. This was shown in the higher mean score of 5.9. This suggests respondents were somewhat content with their current practices.

Table 9: Knowledge on Operational Sustainability

Areas	N	Mean
Anticipation of increasing demand	205	6.21
Operational efficiency and sustainability	205	5.90
Expect constant flow of raw material	205	5.51
Continuous profit with current processes	205	5.39
Introduction of stricter laws soon	205	4.02
Anticipate a little competition from abroad	205	4.02

Recording means of 6.21, 5.51 and 5.39, respondents in the main anticipate increasing demand for their products, constant flow of raw materials and continuous profits with current processes in the future respectively. The results showed respondents anticipation for future increased demand for sachet and bottled water. This is confirmed by a 2015 Ghana Statistical Service report that found 43.1% of urban households depended on sachet as their main drinking water source. Furthermore, the results showed respondents were certain about constant flow of raw materials. About 89% of respondents indicated they obtain their source of raw material locally. Moreover, respondents anticipate continuous profit with the current processes. The source of profit would come from the increased demand for purified water due to the high levels of contaminated drinking water in the country. However, this is only possible if the operational processes of these businesses are sustainable, especially as supply of sachet water increases with the increased number of businesses entering this least regulated sector.

Nevertheless, they acknowledge through mean scores of 4.02 and 4.02 respectively that competition with products from abroad and stricter regulation may be something they may have to deal with in the future, although their responds was not strong enough.

5. Conclusions and Recommendations

The plastic and plastic waste value chain is made up of complex network of actors. These actors include stakeholders within the primary and secondary environment of the sachet and bottled water businesses. These are made up of the relevant regulatory institutions, civil service organisations, international community, NGOs and the media constituting the players in the macroenvironment. The actors in the immediate environment include players in the down and up streams of the plastic value chain. From the current interactions as observed in the plastic ecosystem, there were much of open than closed loop or system.

The problem of plastic waste in the selected metropolis is as a result of massive utilisation of sachet and plastic bottle in the packaging of purified water. Furthermore, the source of product pack material is mainly from local manufacturers of plastics and from different firms.

Most MSMEs in the packaged water production industry employed mixed distribution strategy, although they did not have any clear strategy for managing waste generated as a result of their activities.

There was evidence that these MSMEs were knowledgeable about the nature of plastics and their impacts on society. They were aware of issues of sustainable business practices (including recycling and re-use) and aware of regulations in the sector. However, they did not feel responsible for the managing of plastic waste generated from their activities.

There is the need to introduce stricter laws that make businesses in this sector much more responsible for their waste. An extended producer responsibility policy should be introduced to make firms in the sector responsible for the end of life of their products in the society. Further, regulation should also be targeted at all the other stakeholders in the plastic waste value chain.

Revenue from taxes and levies collected from producers of plastics, sachet and bottled water should be used not only to clean-up these metropolises, but also to finance start-up projects in used plastics bags processing.

Through the use of their association, the sachet and bottled water producers should explore the options of packaging water using materials such as re-usable plastics and jars. They can also establish joint collection centre for plastics to provide adequate raw materials for businesses going into plastic waste processing.

There is the need to intensify the public education on proper disposal of plastic waste. This should involve all stakeholders in and around the value chain.

References

Alemu, C & Dhanai, A 2018, 'Geotechnical Engineering Applications of Waste Plastic Bottle', *Geotechnical Engineering*, vol. 5, no. 01.

Amoako, G, Mensah-Amoah, P, Sam, F & Sackey, SS 2018, 'Some Mechanical Properties of Coconut Fiber Reinforced Polyethylene Composite to Control Environmental Waste in Ghana', *Energy and Environment Research*, vol. 8, no. 1, pp. 1.

Arko-Achemfuor, A & Quan-Baffour, PK 2015, 'Addressing the plastic shopping bag menace in Ghana through education: the role of FM radio stations', *Environmental Economics,* vol. 6, no. 4.

Attah, M 2016, 'Is someone listening to the sachet water producers?'*, Ghanaweb,*

Blair, AM & Hitchcock, D 2004, *Environment and Business*. Routledge: London

Briggs, DJ 2003, 'Environmental pollution and the global burden of disease', *British Medical Journal,* vol. 8, no. 1, pp. 1-24

Dzodzomenyo, M, Dotse-Gborgbortsi, W, Lapworth, D, Wardrop, N & Wright, J 2017, 'Geographic distribution of registered packaged water production in Ghana: implications for piped supplies, groundwater management and product transportation, *Water*, vol. 9, no. 2, pp. 142.

Essien, F 2014, 'Plastic waste: a gagantuan environmental problem for Ghana', *Ghanaweb,* viewed on 5 February 2014, https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Plastic-waste-a-gagantuan-environmental-problem-for-Ghana-299666

Fobil, JN 2000, Municipal Solid Waste Characterization for Integrated Management in the Accra Metropolis, master's thesis, University of Ghana, Accra, Ghana.

Gambrah, PP. 2013, 'Plastic bag waste management using the knapsack model, case study; Trashy bags Accra', *International Journal of Scientific and Engineering Research*, vol. 4, no. 5, pp. 1913-1923.

https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Is-someone-listening-to-the-sachet-water-producers-428538.

Jambeck, J, Hardesty, BD, Brooks, AL, Friend, T, Teleki, K, Fabres, J, ... & Baleta, T 2017, 'Challenges and emerging solutions to the land-based plastic waste issue in Africa, *Marine Policy*.

Jambeck, JR, Geyer, R, Wilcox, C, Siegler, TR, Perryman, M, Andrady, A, ... & Law, KL 2015, 'Plastic waste inputs from land into the ocean', *Science*, vol. 347, no. 6223, pp. 768-771.

Kortei, NK & Quansah, L 2016, 'Plastic waste management in Ghana: a complex failure and consequences'*, Graphic online,* https://www.graphic.com.gh/features/opinion/plastic-waste-management-in-ghana-a-complete-failure-and-the-consequences.html.

Lambert, M & Sabutey, VK 2016, 'Ghana's plastic waste management problems: a global issue that needs local awareness, *Joy online*, 26 July, https://www.myjoyonline.com/opinion/2016/july-26th/ghanas-plastic-waste-management-problems-a-global-issue-that-needs-local-awareness.php

Lineswala, M, Singh, S & Mishra, S 2017, 'Mass Education and Awareness Generation on Plastic Waste Management', *SIES Indian Institute of Environment Management.*

Mishra, S, Srinivas, C, Singh, S & Savant, D (Eds) 2017, 'Current Perspectives in Sustainable Environment Management', *SIES Indian Institute of Environment Management.*

Owusu-Sekyere, E, Osumanu, IK & Abdul-Kadri, Y 2013, 'An Analysis of the Plastic Waste Collection and Wealth Linkages in Ghana', *International Journal of Current Research,* vol. 5, pp. 205–209.

Quartey, ET, Tosefa, H, Danquah, KAB & Obrsalova, I 2015, 'Theoretical framework for plastic waste management in Ghana through extended producer responsibility: case of sachet water waste', *International journal of environmental research and public health*, vol. 12, no. 8, pp. 9907-9919.

Rennie, E 2008, 'Growing Green, Boosting the bottom line with sustainable business practices', *APICS Magazine*, vol. 18, no. 2.

Starr, D 2016, 'Just 90 companies are to blame for most climate change, this carbon accountant says', *Science mag*, viewed 25 August 2016, http://www.sciencemag.org/news/2016/08/just-90-companies-are-blame-most-climate-change-carbon-accountant-says.

Stoler, J, Weeks, JR & Fink, G 2012, 'Sachet drinking water in Ghana's Accra-Tema Metropolitan area: past, present and future', *J. Water Sanit Hyg Dev.,* vol. 2, no. 24.

Yang, H, Ma, M, Thompson, JR & Flower, RJ 2018, 'Waste management, informal recycling, environmental pollution and public health, *J Epidemiol Community Health*, vol. 72, no. 3, pp. 237-243.

Micro-enterprises Supporting Regional Competitiveness in Post-mining Activities: The Case of Callio Pyhäjärvi, Finland

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Abstract: Many mining towns have faced or are about to face challenges in sustaining their region economically and appearing attractive while their mineral resources are exhausted and mining activities are closing down. It can be difficult to create jobs to replace those lost in the industry, and as a result, these towns appear bleaker and economically unattractive. This case study is part of a larger project, exploring different innovative solutions for exploiting the operational environment of Finland's Pyhäsalmi mine after mining operations end in 2019. A closed mine causes large maintenance costs. If a mine is located in core regions, alternative operations are easier to find, but a peripheral location in Northern Finland requires even more effort to maintain or to increase regional competitiveness. This paper discusses a case study on the business potential of geothermal technologies. The Pyhäsalmi mine is one of the deepest (known) mines in Europe. Extending over 1445 metres underground, it is located in Pyhäjärvi, a small town (with 5500 inhabitants) in the middle of Finland that is relatively well located in terms of national infrastructure and accessible transport. Experiments involving its existing facilities and infrastructure are already underway in the proposed Callio concept aiming reuse of mine premises, but new businesses and innovative solutions are still needed to overcome the costs of maintaining the Pyhäsalmi mine's underground facilities and lost jobs after mining operations cease. This paper concentrates on the business potential of geothermal energy from the viewpoint of small companies. It is based on interviews with experts and the results of workshops with micro-enterprises from March to June of 2018. The research focus is small companies' interest in exploiting the business potential of geothermal energy and the necessary steps to makthe e this potential into a reality, thus enabling regional competitiveness.

Keywords: micro-enterprises, geothermal energy, regional competitiveness, case study, periphery

1. Introduction

The mining industry has long had a positive impact on local economies by creating jobs in locations that are often peripheral; thus, such regions' economic competitiveness has been strongly dependent on mining activities. In contrast, mining towns are often associated with negative images of environmental degradation, pollution and old-fashioned working practices. All regions facing structural changes need to find innovative solutions to overcome economic, social and environmental challenges, but these obstacles affect smaller towns in peripheral locations much more severely; here, lost jobs are relatively high and difficult to replace (Harfst 2015). Indeed, this is the case in Pyhäjärvi, where the Pyhäsalmi mine has been operating since 1962, but the mine's underground operations will cease completely by 2019. With 216 employees, the Pyhäsalmi mine is the biggest employer in the town, and its closure will lead to a loss of 400 jobs via its subcontractors and service providers; this amounts to more than 20% of the employed population of the town. Furthermore, if the indirect impacts of this closure, such as transportation, logistics and services, are taken into account, an additional estimated 200 provincial jobs and 200 national jobs will be lost.

In deep mines such as Pyhäsalmi, inflowing mine water requires active pumping. If pumping does not continue after Pyhäsalmi's mine closure, the mine will gradually fill with groundwater. Just pumping this water out will cost approximately one million euros per year; thus, innovative solutions to cover the maintenance costs are needed. Furthermore, closing a mine is expensive, with legal requirements for mining companies including dismantling buildings and equipment, undertaking earthworks and monitoring closure activities (see Luukkonen 2018). Furthermore, substantial job losses will threaten the region's competitiveness. However, Pyhäjärvi's existing infrastructure provides good facilities for several activities that could support the local economy and replace lost jobs by using local skilled labour and expertise in new lines of work. How to look after the mining infrastructure once its current activities are finished is both an economic and environmental question. Communicating and interacting with the local community about these issues is an important part of the corporate social responsibility (CSR) of the mining industry (see Jenkins & Yakovleva 2006). As part of its CSR, the mining company, First Quantum's mineral Ltd., has surveyed its current Pyhäsalmi mine employees and examined their plans after the closure; the company found that many of its employees are thinking of starting their own businesses (Figure 1).

Even though its location is not the most peripheral by Finnish standards, the mine's small town is rural and does not have any special features that would attract large amounts of tourists. Overall, the region's population is decreasing, with almost 8000 inhabitants in Pyhäjärvi during 1980 and under 6000 inhabitants in 2010. As mentioned, the mine is the largest local employer, and most of the other companies operating in the region are small firms. In a recent survey targeting small- and medium-sized enterprises (SMEs) in Northern Finland, Hänninen et al. (2018) found that these companies were seeking growth either in domestic business (43%) or in terms of employees (35%), with one out of seven companies focused on growth in exports. Thus, in spite of their peripheral location, many of these small companies are aiming for international success; these kinds of companies are important for towns such as Pyhäjärvi, especially in times of structural change.

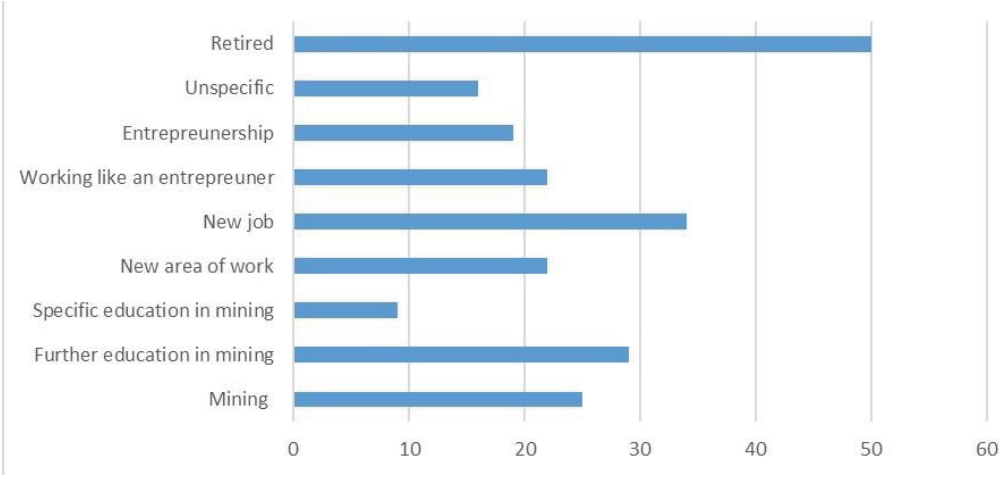

Figure 1: Future career plans of Pyhäsalmi mine employees as total number of answers (source: Luukkonen 2018)

The present research focus is on micro-enterprises' interest in exploiting the business potential of geothermal energy and the interventions required to make the potential a reality, thus supporting regional competitiveness. Regional competitiveness is defined here as 'the ability of a region to offer an attractive and sustainable environment for firms and residents to live and work' (European Commission 2018b). In this paper, a region is defined as a geographical area within a country and sharing common socio-economic and cultural elements. In this case, the region covers the town of Pyhäjärvi and its surrounding municipalities, all of which might benefit from using the mine facilities.

Previous studies in the region have pointed out that in the case of micro-enterprises, the entrepreneur's personal life and interests are the most significant factors when choosing a location; however, local demand and possibilities quide the entrepreneur's chosen line of business (Ala-Rämi 2007). Another study has found that a region's role in small companies is different from in larger firms; small companies are more likely to rely on tacit knowledge, local institutions and resources and to benefit from more complementarities in local networks and common learning (Tödtling & Kaufmann 2001). Becoming an entrepreneur is a significant opportunity to live in the most attractive region from a personal viewpoint, and, as can be assumed from the plans shown in Figure 1, is a way to stay in the region after the mining operations have finished. Those who aim to continue in mining are the ones who are willing to move because of work. The purpose of this paper is to discuss what kind of entrepreneurial opportunities geothermal energy can create in Pyhäjärvi but also what kind of interventions are needed to enable these opportunities.

2. Material and methods

This case study is part of a larger project, investigating different opportunities for innovative solutions and operations to exploit the operational environment of the Pyhäsalmi mine after mining operations cease in 2019. Callio is the name of a proposed new environment to replace the mine. The Pyhäsalmi mine is one of the deepest (known) mines in Europe with a temperature of +22°C year round. The present research is part of an on-going study about the business potential of geothermal technologies from the viewpoint of micro-enterprises, and it is based on interviews with experts, along with information gathered from workshops with firms during Spring and Summer of 2018. Future research includes business potential converted into numbers, but this paper concentrates on the regional aspects of exploiting geothermal energy. The research questions

are as follows: What kinds of business activities could exploit the possibilities created by geothermal energy? What else is needed to turn these possibilities into reality? These questions are explored through the competitiveness of the region, expressed in the following question: What are the actual and potential ways in which the micro-enterprise sector can take advantage of these business possibilities?

The town of Pyhäjärvi has a population of 5500. It is in the middle of Finland (see Figure 2) and is relatively well located in terms of national infrastructure and transport services, but the town in this sparsely populated region has suffered a decreasing population and increasing population age: the town's demographic dependency ratio (defined as the percentage of the working-age population) was 82% at the end of 2016. In the same year, the unemployment rate was 12.6%, which was less than in the county of Pohjois-Pohjanmaa (13.8%) but higher than the national average (8.1%) (Pyhäjärvi 2018). While the end to underground mining is inevitable, there has been a much effort to create a globally unique multidisciplinary operating environment, named Callio.

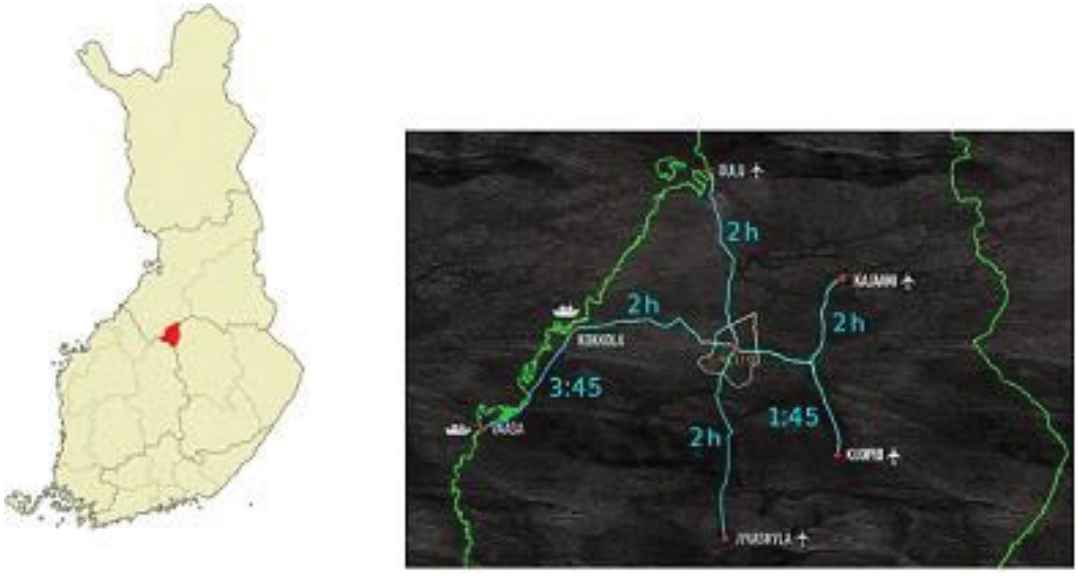

Figure 2: Location of Pyhäjärvi and driving distances to the closest towns (Callio 2018)

The mine and the surrounding brownfield area offer a diverse range of opportunities for both innovative projects and established operators. Experiments are already underway in Callio to use the existing mine facilities and infrastructure, but new businesses and innovative solutions are needed to overcome the costs of lost jobs and the maintenance of the underground facilities after mining operations cease. The Callio concepts (Callio 2018) include pursuing projects for business opportunities that could be partly put into practice by using geothermal energy:

1. Energy storage: pumped hydro energy storage located approximately 1400 metres underground;
2. Data centre: reliable and secured energy with the possibility for water cooling of the storage if needed;
3. Natural resources: bio energy terminal (i.e., forest biomass); growing plants, vegetables and mushrooms; raising fish; storing and aging cheese and liquors;
4. Research, development and innovation: a safe and stable operating environment for a diverse range of R&D and testing operations; new innovations in the fields of elementary particle physics, astrophysics/cosmology, geosciences and microbiology; mining, equipment service, rescue training and technology testing; conference facilities; leisure facilities.

The advantages of geothermal energy are manifold: 1) it is not dependent on the weather, so it provides warming and cooling energy year round; 2) the provided energy is 70–80% free of charge because the energy already exists in water; 3) it is produced near to where it is consumed, which is an advantage both economically but also ecologically; 4) it significantly decreases CO_2 emissions, although the amount varies a lot; 5) it can be formulated into efficient hybrids with bio and solar energy, as well as existing regional heating systems (Huusko 2016). In spite of the recognised advantages, geothermal energy technologies are still under development (Bleicher & Gross 2015). Furthermore, there are several regional patterns that have negative

effects on exploiting energy; some are geological, such as amount of energy sources and techniques possible to use, while some are more human-based, such as proximity to the end-users of energy. Nevertheless, technologies are an interplay of natural and technological elements, but even political conditions and organisational structures guide their development, applications and distribution (Bleicher & Gross 2015).

The data collected was via interviews and workshops that were carried out between February and August 2018; in this early phase of business potential mapping, the focus was on visioning and interest perception. There were five semi-structured interviews with key experts and policy makers, followed by the author's personal participation in one workshop on service design of underground laboratories, and one seminar with a specific focus on greenhouse experience in mine premises. Also, a benchmarking visit was made to Freiberg, where the geothermal energy use is more advanced; this visit enlightened and informed the context, possibilities and challenges in the Pyhäjärvi region for exploiting geothermal energy. This was followed by four workshops for companies or possible entrepreneurs who might be users or service or technology providers.

The participants of the workshops were told about potential and existing findings, but most of the time was used to discuss participants' ideas and questions. In this phase, when there are no exact amounts of energy and technique requirements, the collected information from needs of geothermal section in EU is important for motivation. It is not profitable to develop the required technological innovations or solutions for one location, but there is increasing interest in exploiting geothermal energy because of its eco-efficiency.

Concurrently, geological researchers are measuring and calculating existing amounts of energy and the best techniques for using it. After the geological researchers complete these estimations, the next phase of the project consists of calculating different business opportunities and how these may be translated into reality.

3. Results

There seems to be a large amount of ideas and interest in exploiting mine facilities, and there is even more interest in using geothermal energy, as the end use can take place just a few kilometres away from the mining location. Currently, pilot studies are investigating underground greenhouses (660 metres with a constant temperature of +18°C); even when it is -50°C outside, these facilities could be used for growing. However, UV light and choosing the right depths in terms of temperature and moisture are challenging. There are also plans to pilot fish farming; these are promising, since fish do not need light generation for growth.

Geothermal energy can also be used for cooling purposes and other condition optimisation such as moisture or light. Yet ideas on how to use the energy and the facilities vary from more traditional ideas, such as creating a testing environment for an ongoing neutrino experience, or mine rescue training, to more innovative ideas, such as using the facilities for spas, adventure parks, maturing areas for cheese or whisky, and housing of the elderly. Many stakeholders are awaiting the results of geothermal energy collection methods research, as these will not only guide which technologies are needed but reveal which methods for harnessing the energy are more cost-efficient. It is already known that the water temperature in the Pyhäsalmi mine is rather low (20–40 degrees), needing the pump to heat it before being used; therefore, companies offering heat pumps or water solutions are more interested in this phase than potential end users because it is not cost-efficient to pump the water to use in the town centre, four kilometres away from the mine. Furthermore, the mine premises are not considered an attractive environment, but it is possible to take water 500–1000 metres away from the mine location, close to the lake area, where the scenery is attractive.

Although geothermal energy cannot completely solve the problems involved with closing a mine, it can support large projects such as energy storage (based on pumped hydroelectric energy, closed water circulation and existing mine infrastructure) and a data centre (for keeping data safe). Geothermal energy provides possibilities for micro-enterprises by offering low-cost opportunities without requiring large investments—it could even help companies to break into global markets. The EU has recognised the potential of geothermal energy, as there is a great deal of interest in finding green solutions to replace coal power and other unrenewable power sources (European Commission 2018a). Therefore, it is important to find companies and individuals interested in starting businesses and to explore the advantages and limitations of these businesses using the mine's infrastructure and geothermal energy. Using the mine facilities by collecting existing geothermal energy with little cost is both an ecologically and economically sustainable solution. In spite of extensive ideas and expectations, most interviewed experts and entrepreneurs seem to be very timid in their

hopes, since several issues are creating uncertainty. It seems that all the different possibilities require either governmental support of the so-called key company to take the lead.

As mentioned, geothermal energy is a low-carbon and inexpensive form of energy, but its exploitation is in the very early stages in Finland. However, geothermal energy is already widely used with growing interest in the EU region for the reasons mentioned above. Internationally strong networks are essential to renovate and strengthen business in the region, and the innovation system of North Ostrobotnia is recognised in the Regional Strategic Plan (Council of Oulu Region 2018). Energy knowhow and technologies related to energy are defined as growth sectors. Increasing low-carbon production and distribution to control global change are the focus of regional strategy, and renewal energy sources in particular are not only seen as important for the task but also open up new business opportunities. In the regional energy strategy, the aim is to decrease greenhouse gases by 20% by 2021. Climate strategy aims for the region to be energy self-sufficient, but multipolar solutions and decentralisation are also priorities. In regional energy strategy, geothermal energy is increasing, especially in sparsely populated parts of the region. Furthermore, the Energy Ministers of Nordic Countries have agreed to strengthen Nordic global leadership on clean energy innovation and deployment (Government Offices of Sweden 2018).

If companies can recognise that the possibilities discussed in this paper are not only tied to energy resources from the mine but are pilot cases that open up possibilities to reach European markets and networks, this makes efforts in technological innovations more profitable. As part of this regional challenge and geothermal energy project, the region has joined in a larger European Smart Specialisation network collaboration, which has prepared a project aiming to improve policy instruments through new projects being supported, where the best practices with more advanced exploitation of geothermal energy would be exchanged with North Ostrobotnia's technologically strong knowledge. Such projects would be implemented as part of major international research and development centre activities of CallioLab, which ties regional authorities and policy makers, researchers and SMEs together.

Collaboration and learning from other partners' regions and their best practices would support management of local structural change programmes to support use of geothermal energy. The region of North Ostrobotnia aims at supporting successful business activities and international competitiveness and networking with research institutes and the private sector. Furthermore, this is an important means to tackle structural change in the Pyhäjärvi region, where many jobs and businesses are endangered due to the closing down of mine operations. One of the regional (RIS3) focus areas involves clean technologies, including energy, but also the ICT and software sector, including integration with businesses in different fields. The choices made in Oulu Region´s smart specialisation have taken into account the structure of the region´s enterprises and industry, areas of special expertise, research infrastructure, international position, national innovation policy and the region´s strengths and possibilities.

SMEs in the region of North Ostrobotnia are not well aware of the possibilities and challenges of geothermal energy, and the growing exploitation raises new social and environmental concerns, often closely linked to technological constraints. However, the preliminary numbers are promising: there is a large potential for renewable green energy, and around the mining infrastructure, pre-existing boreholes have already created an estimated ten cubic metres of reserve space. However, it is important to maintain communication between the researchers and the SMEs and individuals thinking of starting new businesses in the region, since they have differing viewpoints and their local and even tacit knowledge can open up new innovative solutions and technologies. Regarding technology, there is still a strong concentration of expertise in close proximity in the region of Northern Finland; thus, new technology, networks or knowledge could be the key to renewing the existing geothermal energy solutions, generating new business opportunities and contributing to regional competitiveness (Tödtling & Trippl 2013). Small firms might be more open to experiences and testing new solutions if they are supported by different funding possibilities and regional programmes, ensuring that regional projects play a large role in generating new information about future needs and possibilities.

There is no point in innovating if nobody is interested in putting these ideas into practice. One major challenge is the traditional perception associated with mining towns: that they are bleak and dirty. There is much work to be done to make these areas attractive to new inhabitants. Green and inexpensive energy is interesting to those who are already used to mine facilities, and a group of current mine workers are thinking of becoming entrepreneurs. Most of these people have been working for the mine for at least ten years; they live locally

and are willing to stay. They have good ideas about new uses for the facilities and might possess crucial information and ideas based on their experience. In relation to this, Roberts et al. (2006) concluded the following:

> *If the companies can find ways to ensure regional economies sustainable and competitive is a key challenge for business, communities and governments, at both the regional and national level. Business competitiveness is a major contributor to regional economic development. Firms can also have a significant impact on progress towards sustainable development. Whether this is positive or negative depends on how responsibly they operate.*

4. Discussion

This research aims to illustrate just some of the possibilities that geothermal energy creates, as well as the use of the Pyhäsalmi mine facilities and surroundings after underground mining operations end. Research into different techniques and energy potential is on-going, but possible sectors and interest of micro-enterprises have been mapped. The focus of this paper is not to give a detailed description of the potential of geothermal energy but to pinpoint possibilities that could attract micro-enterprises and elucidate why these companies are important for regional competitiveness.

Geothermal energy and its use inside mine facilities and the surrounding land create different kinds of business opportunities for micro-entrepreneurs. Therefore, geothermal energy should be seen as one of the strengths of Pyhäjärvi and the surrounding region. Supporting and encouraging current and future micro-entrepreneurs in the region can be regarded as a smart specialisation and an efficient way of supporting regional competitiveness. Low-carbon energy strategies should be implemented in collaboration with companies, local people and regional actors. Policies supporting SMEs and entrepreneurship should be developed to recognise the possibilities of geothermal resources, and geothermal energy should have more emphasis in the strategies and programmes providing funding to incentivise (i.e., developing innovative solutions, piloting or demonstrations).

Geothermal energy provides possibilities for micro-enterprises by offering low-cost opportunities without requiring large investments and could even help companies to break into global markets. The EU has recognised the potential of geothermal energy, as there is a great deal of interest in finding green solutions to replace coal power and other unrenewable power sources. Regarding technology, there is still a strong concentration of expertise in close proximity in the region of Northern Finland; thus, new technology, networks or knowledge could be the key to renewing the existing geothermal energy solutions, generating jobs and new business opportunities and contributing to the project.

Regional competitiveness is often measured in terms of economic outcomes and the potential means for enhancing it. In this case, the region is not globally innovative and will not be attractive to the capital or to creative talent. However, by identifying both the growth potentials and constraints of the region, it is possible to better utilise its existing resources—natural, historical, intellectual, cultural and social—to find innovative and entrepreneurial solutions, enabling those people attracted to the region to make a living. In the case of this peripheral, less favoured region, micro-entrepreneurs are already supporting regional competitiveness by slowing job loss and stabilising the population, turning structural change into a positive possibility both ecologically and economically.

There are clear challenges in the case of the Pyhäsalmi mine: the population in the region is sparse and less educated than the national average, and jobs provided by the mining company have been important. Rural municipalities surround the town, and there are no unique attractive features except for the mine facilities.

The geothermal energy potential from the mine is already known to differ from central European sites because of different bedrock and because the temperature is lower; however, the depth and extraordinary infrastructure, together with local tacit knowledge and inhabitants' commitment to stay in the region, provide the possibility for economic growth and innovative development. The potential for real business activities requires both out-of-the-box entrepreneurial thinking and the support of the public sector and regional authorities.

Declaration of interest statement

We the undersigned declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere. We wish to confirm that there are no known conflicts of interest associated with this publication, and there has been no significant financial support for this work that could have influenced its outcome. We confirm that the manuscript has been read and approved by all named authors, and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

References

Ala-Rämi, K. (2007) "Communication and Distance in Collaboration between High-technology Enterprises in Northern Finland", European Planning Studies Vol.15, No.8, pp. 1047-1062.

Bleicher, A. & Gross, M. (2015) "User motivation, energy prosumers, and regional diversity: sociological notes on using shallow geothermal energy", Geothermal Energy, Vol. 3, No. 12.

Callio (2018) "Mine for business, Callio, Pyhäjärvi", [online], www.callio.info

Council of Oulu (2018), "Regional Strategic Plan and Regional Programme", [online], https://www.pohjois-pohjanmaa.fi/regional_planning/regional_strategic_plan_and_regional_programme

Government Offices of Sweden (2018) "Energy ministers want to strengthen Nordic leadership in global energy transition", [online], https://www.government.se/press-releases/2018/05/energy-ministers-want-to-strengthen-nordic-leadership-in-global-energy-transition/

European Comission (2018a) "Geothermal energy – new report analyses the sector", [online], https://ec.europa.eu/jrc/en/news/new-report-analyses-geothermal-energy-sector

European Comission (2018b) "European Regional Competitiveness Index", [online], http://ec.europa.eu/regional_policy/en/information/maps/regional_competitiveness

Harfst , J. (2015) Utilizing the past: Valorizing post-mining potential in Central Europe. In: Excavation Industries and Society, Vol. 2, No. 2, pp 217–224.

Huusko, A. (2016). " Geoenergia – lähienergiaa", Kokkola material week 2016, energy, oral presentation.

Hänninen,K., Kauppila, O. and Muhos, M. (2018) " Pohjois-Suomen yritysten kasvutekijät", Oulun yliopisto, Kerttu Saalasti Instituutin julkaisuja 1/2018, Oulu, Finland.

Jenkins, H. & Yakovleva, N. (2006) "Corporate social responsibility in the mining industry: Exploring trends in social and environmental disclosure", Journal of Cleaner Production, Vol. 14, pp. 271- 284

Luukkonen, K. (2018) "Pyhäsalmi mine: History, present, and future", Presentation in workshop, Pyhäjärvi Energy Storage in Mine Event, [online], http://www.nihak.fi/fi/pyhajarvi-energy-storage-mine-event-tapahtuma-helsingissa

Tödtling, F. & Kaufmann, A. (2001) "The role of the region for innovation activities of SMEs", European Urban and Regional Studies, Vol. 8, No. 3, pp. 203-215.

Tödtling, F. & Trippl, M. (2013) "Transformation of regional innovation systems: From old legacies to new development paths", In Cooke, P. (eds.): Reframing Regional Development, Routledge, London, pp. 297 -317.

Strategic Entrepreneurship in Enhancing Resources and Innovation in England – Case Revisited

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Abstract: This paper concerns the use of strategic entrepreneurship as a theory vehicle for making policy, but most importantly for supporting operational capacity of voluntary organisations in the South-West of England. Ten years ago, the voluntary sector was rich in cash, regulation was improving, fundraising had come to peak and the doors to public services were open. Today however, residents' welfare needs have increased in a rather desperate fashion and the anticipated public funds are not as high as they used to be. Consequently the voluntary sector needs to generate new ideas in competing for fundraising that can support current and future operational financial, human and other resources, as well as organisational innovation features that could potentially boost the sector's organisational capabilities again. The first objective of this paper is it is to identify and analyse how resources and innovation as core theory tools of strategic entrepreneurship can impact upon the entrepreneurial performance of voluntary organisations in the South West of England. Secondly, it is to describe and analyse the ability of the voluntary sector to work in an innovative manner and support consequent actual outcomes for those who are affected. Methodologically, an inductive approach has been adopted and qualitative research is implemented using semi-structure interviewing and collection of secondary data. The aim for using interviews is to explore and analyse the importance of the strategic entrepreneurship in practical terms, its application to every-day operational activities of voluntary organisations. Contribution-wise this is a really novel area of research that aims to provide both academic and empirical insights on the dynamism and usefulness of entrepreneurship for the strategic endeavours of organisations. Moreover, it is anticipated that the field of voluntary sector will help in providing appropriate findings that could serve significantly the purpose of this research.

Keywords: Strategic Entrepreneurship, Resources, Innovation, South West of England

1. Introduction

In recent years Strategic Entrepreneurship has been considered as the amalgamation of strategy with entrepreneurship, two subject areas differentiated from each other. Within the new subject area under construction a series of assorted elements could be considered: action motivation; common mind-set, shaped culture, leadership style and innovation. It could thus promote opportunity recognition, market positioning and resource allocation for the sake of wealth creation (Tsai and Lei, 2016). In this respect, the voluntary sector, as a potential field for applying strategic entrepreneurship, seems to have the prospect for exploring the above aspects in a manner that could contribute towards the support of local residents' well-being. Having said this, this is a formidable effort because of the multiple issues facing the sector. For example, the Indices of Deprivation Health Deprivation and Disability Domain (HDD) has indicated that there are some areas within Bournemouth Borough council – the geographical jurisdiction used in this paper - that are considered to be within the bottom 20% nationally in terms of residents' health. In addition to current health inequalities across the Borough, it is anticipated that Bournemouth will exceed the national average for its proportion of elderly residents. The proportion of people aged 65 and over in the UK is projected to rise from 16% to 23% between 2008 and 2033 as life expectancy increases. These are issues that need solutions in which strategic entrepreneurship could contribute in a fit-for-purpose manner.

One would argue that it is perhaps too complicated to synthesise a clear picture about implementation of strategic entrepreneurship into the field of the voluntary sector. Nevertheless, the objectives of this paper are twofold: a) The paper is a continuation of the one that was presented two years ago attempting to describe the narrative of a voluntary sector that has the ability to work in an innovative manner and support consequent actual outcomes for those who are affected. b) To identify and analyse how resources and innovation as core theory tools of strategic entrepreneurship can impact upon the entrepreneurial performance of voluntary organisations in the South West of England. To this extent some important research questions arise: a) what would define this process of entrepreneurship within the sector? b) In consequence, what type of entrepreneurial framework could be particularly applicable for the South West of England; and c) Is the voluntary sector really prepared to cope with these aspects that it has never really had the operational ability to undertake previously? Some difficult questions in here that need answers even those based upon initial research findings, as this paper explains in the next sections.

2. Theory

2.1 Strategic Entrepreneurship in leading the way

It has been very difficult to identify the intersection between strategy and entrepreneurship (Meyer et al, 2002) despite the fact that indirectly strategic management considers entrepreneurship as a subset of strategy (ibid.). In applying this assumption to current circumstances of the voluntary sector in England this is the underlying theoretical assumption of this paper: that evidence of application of strategic entrepreneurship can be found within it and not only this. Kantour (2016) contends that in terms of conceptualisation, strategic entrepreneurship involves alignment with other aspects such as sustained regeneration, organizational rejuvenation, and strategic renewal. Wickham (2006) goes a step further by arguing that strategy assists entrepreneurship by defining organisational heuristics that appear to be vital when an entrepreneur needs to analyse a situation and make decisions.

It comes as a consequence then that strategic entrepreneurship can contain opportunity and advantage-seeking actions and intends to achieve maximum organisation performance. Although small organisations are efficient in discovering opportunities they are not as effective in maintaining advantages from those opportunities because of operational inefficiencies related to their small range of abilities. On the other hand, large organisations are perhaps more successful in developing advantages (and furthermore competitive ones) compared to small organisations, but they are perhaps less able to explore new opportunities (Ireland et al, 2003). According to Chesbrough (2003). The overall opportunity-seeking actions' success depends on how an organisation integrates existing knowledge with new, more precisely; opportunity-seeking action is fundamentally a learning process, that the organisation gathers information from outside to increase its own knowledge base (March 1991). Thus creating an improved knowledge base allows an organisation to increase a competitive range important for operational success, (Ketchen et al, 2007). Ireland et al (2003) argue that strategic entrepreneurship has the distinctive and unique construct through which organisations are able to achieve advantages via learning. Entrepreneurship is linked with actions in generating newness and strategy is linked with long-term development of the organisation. This is a very important proposition for organisations of the likes of the voluntary sector which need learning desperately in order to innovate and succeed. The theoretical manner their performance is affected when seeking innovation and success will be explored in the next section.

2.2 Particular Performance Aspects Arising from Strategic Entrepreneurship

The impact of strategic entrepreneurship with respect to performance of entrepreneurial activities brings up some important issues. According to Kuratko and Audretsch (2009), when an entrepreneurial idea is first applied, it involves a higher level of risk. For this reason, risk, risk taking and/or risk management can be identified as core aspects for strategic entrepreneurship. Managers' propensity to take risks is inexorably connected to how they perceive it and deal with it. The decision maker such as managers, directors or the person who is in charge of a voluntary organisation form some beliefs about future outcomes while estimating riskiness of a decision. In this manner perceived risk of the situation can also be filtered based on the experience of the decision maker (Macko and Tyszka, 2009).

From an evaluation point of view, risk assessment could be seen as paramount for entrepreneurship because it allows for determining decisions that are normally vital for the future of entrepreneurial actions. It could be argued then that ranking risks could well work as method for measuring their worth once they have been identified. This can be done by considering the consequence and probability of each risk – as for example high, medium or low for their needs.

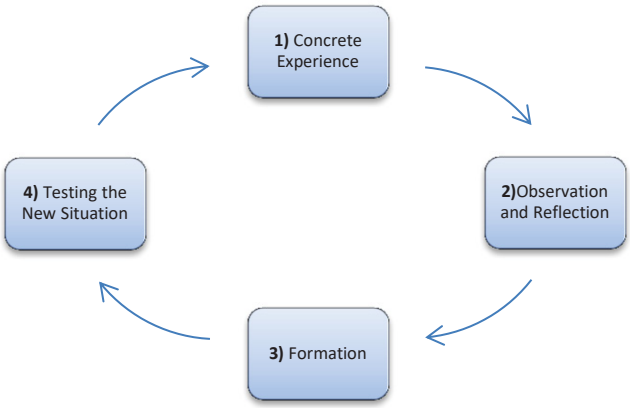

Figure 1: Learning organisation (Source: Lynch, 2015, p. 563 and adapted from: Kolb, 1984)

It has been argued that a way for estimating development of opportunities and thus attempting to decrease risk could be done via the approach of the *learning organisation*. A learning organisation is regarded as having the capacity to assess risks. This approach derives its importance from the ability to maintain constant entrepreneurial activity via a cycle of specific actions. It is an adaptation of David A. Kolb's "*Cycle of Experiential Learning*" analysis as it can be shown in Figure 1:

1. **Concrete experience:** The cycle starts with what could be called the concrete experience. This means that individuals or people who are involved with entrepreneurial activities such as researchers and other participating teams can start with some sort of prior knowledge such as technical entrepreneurial breakthrough (Kolb, 2014).
2. **Observation and Reflection:** The experience that has been discussed by the parties involved is then observed and reflected. At this stage plenty of questions can be asked for the sake of the observation and the communication channels are opened to the other members of the organisation (Kolb and Kolb, 2005).
3. **Formation:** It replaces abstract conceptualisation with formation by introducing routines in a particular structure (Kolb et al, 2001). The formation of the organisation is made based on experience acquired.
4. **Testing the new situation:** It involves active experimentation with testing the new situation, at this latest stage. This part can be the final stage for the learning organisation cycle which identifies how well developed the new structure is.

In a nutshell, identification of risks makes the entrepreneurial organisation able to confirm its performance effectiveness. Within this context, resources and innovation are regarded as important for making things happen (accepting that this is not an exhaustive list of elements). The theoretical underpinnings of these two terms are explored in the next section.

2.3 Areas for Enhancing Strategic Effectiveness

2.3.1 Resources

Resources can be identified as the organisation's assets which are tied semi-permanently to the organisation (Maijoor and Witteloostuijn 1996). They can comprise of: organisational, commercial, physical, financial, human and technological assets which are used by the organisations to produce, improve and deliver products or services for their customers (Barney, 1991). In resource-based view theory, the resources are classified as tangible, which are physical and financial and intangible which are knowledge, skills, experiences or the employees or volunteers and reputation, brand name procedures of the organisations (Wernerfelt, 1984).

Seeking competitive advantage that can come via exploitation of opportunities, as per the analysis above is its core contribution. Not every organisation though can reach competitive advantage, a point that can find its application to the voluntary organisations that do not normally possess capacity to deal with their resources effectively. It is entrepreneurship then that comes in, in order to support the creation of opportunities in which effective use of resources could make for the potential development of competitive advantage.

Entrepreneurship can then inform application of a resource-based view model by highlighting alternative uses of resources that are normally developed via primarily heterogeneous factors (Gries and Naude, 2011).

According to Acs and Szerb (2009), entrepreneurial attitudes, abilities and goals are also significant resourcing fundamentals. Moreover, it is the organisation's unique resources which are different from its competitors that contribute to the organisation's sustainable competitive advantage (Alvarez and Busenitz, 2001).

Heterogeneous resources are a common feature of both entrepreneurship and resource-based view. The main focus of heterogeneity in entrepreneurship is that belief that organisational resources can be of value no matter their quantity. In addition, the main focus of heterogeneity in resource-based view is the resources themselves. In other words, the resource-based view model and entrepreneurship adopt exactly the same unit of analysis which is the effective use of resources for an effective performance of an organisation (Alvarez and Busenitz, 2001; Barney, 1991).

2.3.2 Innovation

Innovation is identified as the application of new ideas or designs to the processes, products or other aspects of the activities of an organisation, that lead to increased value. This value can be explained in a broad way to include higher added value for the organisations themselves and also be beneficial for consumers or other organisations (Kuratko and Hodgetts, 2007). According to Schumpeter, "*carrying out innovations is the only function which is fundamental in history*". He also defined innovation as the motor of economic change that sets an important role of entrepreneurship in innovation (Schumpeter, 1939, p.102).

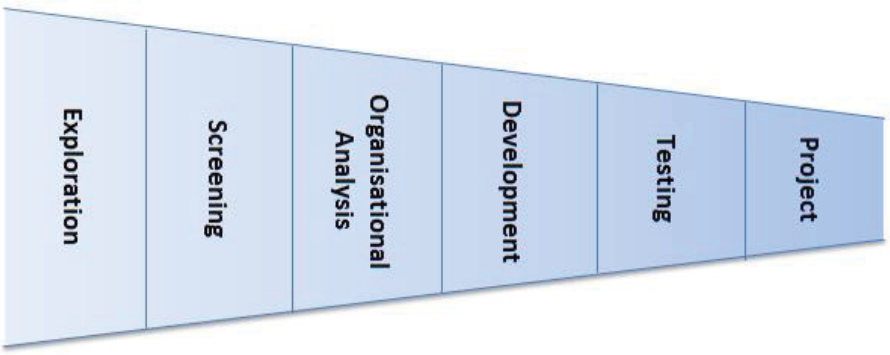

Figure 2: Evaluation of strategic entrepreneurship ideas (Source: Lynch 2015: p. 568)

There is a need to have a range of ideas in order to promote entrepreneurial innovation. Figure 2 shows the different stages to be followed in evaluating ideas that would lead to their actual "real-life" application and it seems that the voluntary sector fits within this context. It is not more than a "road map" on how an entrepreneurial idea can be presented in a way that reflects strategic purpose and of course produces "real life" outcomes. These parts are as it follows:

1. *Exploration*: The exploration part has close links with learning organisation cycle which was defined earlier. In this part, the idea which has been accepted as worth exploring will move into screening part.
2. *Screening*: Scrutiny takes place in here and potentially successful ideas will move into business analysis stage.
3. *Organisational Analysis*: Some good ideas which will not be able to generate adequate strategic opportunity or added value will be eliminated further (Lynch, 2015).
4. *Development:* Ideas that are favoured in the previous stage will be developed as experimental service or product for the organisation. Due to impossibility without practice, some ideas may still fail in this stage (Lynch, 2015).
5. *Testing*: The product or service which was developed in the previous stage will be tested against acceptance by potential customers/users.
6. *Project:* At this final stage, the idea that gained a status of attractiveness will be pursued as a strategic tool in the form of a project.

Innovation is dependent and constructed based upon criteria that determine usefulness of social activities within a sector such as the voluntary one. It is not suggested that by investigating entrepreneurial resources

and innovation no other elements of entrepreneurial work need to be looked at. The core reason relies upon their usefulness with respect to their role for shaping relationships between different actors in the sector such as funders, managers, staff and the other stakeholders (Chew and Lyon, 2012). These relationships and the way an effective organisational performance can be examined within the voluntary sector in the South West of England are the focus of the remainder of the paper.

3. Policy Context

3.1 The Voluntary Sector in the South West of England as a Context of Applying Aspects of Strategic Entrepreneurship

The voluntary sector in England has been paramount for re-evaluation of social policy in the last 20 years that gave it an emerging new role (Bussel and Forbes, 2002). In this context, it has an important role to play in supporting statutory services in the planning, response and recovery phases of emergent issues that reflect otherwise governmental policies (Cabinet Office, 2011). Delivery of services appears more and more as a way of increasing the organisational capacity of the sector. This capacity can provide an accessible and effective response to the community, the development of which voluntary organisations are formed to warrant (ibid.).

The voluntary sector in England became a considerable part of the economy with the income of £40.5 billion and spending with £39.3 billion, accounting for 97% of the sector's overall income (NCVO 2015). It has been estimated that 21.1 million people officially volunteered at least once in 2014 and 13.8 million officially volunteered regularly regarding voluntary community activities in 2014 (NCVO 2015). Consequently, voluntary sector particularly charities and foundations can play big part in the third sector. Horne (1998, p.156) suggests that cooperation between charities and businesses is important and needs to prevent potential conflict. He also stated that the mission of charities is "*to generate as more money as possible without compromising its charitable aims*". Nevertheless, charities' aim is not entirely to earn money but also to create correlated functions such as recycling of goods, raising awareness of charitable cause and fundraising (Horne, 1998).

In order to manage the variety of work for charitable cause, the numbers of voluntary organisations have significantly increased leading to larger competition for limited human and financial resources (Bussel and Forbes, 2002). The growing number of charities in the voluntary sector can be explained due to the removal of the direct public funding previously undertaken by the government: mainly in education, health care and social care (Chew, 2006). Current governmental strategic review about the voluntary and non-profit sector has been strengthening the compactness of relationships between voluntary and public sectors in delivery and shaping the policy of public services in the UK. However, those governmental changes have put massive pressures on the sector. This pressure has to do with managing operations as long-term strategy in conjunction with short-term survival needs for charitable causes (Chew 2006). Even though volunteering levels are high, there are signs that these levels may have reached a peak point, so for this reason, voluntary organisations struggle lately to employ from a decreasing pool of volunteers (Bussel and Forbes, 2002). Kendall and Knapp (1996, p.253) define the UK.'s voluntary sector changing competitive landscape as the '*new competitive climate*'. The growing number of voluntary organisations entering the sector combined with a blurring of the boundaries between public and private sectors are likely to increase the competition for further resources (NCVO 2015; Chew 2006). The issues mentioned above might fail to satisfy customers' needs in the future. This makes it very difficult to do in their move into commercialism. For instance, the 'trading up' of charity retailing can be off putting to some of these customer segments (Broadbridge and Parsons, 2003). Moreover, Whithear (1999) found some substantial differences between paid staff of voluntary organisations in comparison with those who work as volunteers.

In a nutshell, it could be argued that the sector appears to have offered appropriate space for entrepreneurial activities that could be implemented under the view of strategic planning and execution. In addition, it has been given a new role to play with regard to public services that traditionally the governmental sector was responsible for, as a new public service delivery' organisation. Having said this, the level of preparation for this role is not always adequate which creates a sense of lack of structure and inability for fit-for-purpose state.

4. Methodology

The methodology used in the present study is focused on an exhaustive kind of *secondary search* of experiments and entrepreneurial initiatives that take place in the context of South West of England, mainly via information available by governmental, voluntary and other relevant documents, the media, and academic

sources (electronic mainly but also hard copy ones). The number of sources of this kind has exceeded 100. This preliminary step is of particular importance in this study, firstly because so far there has not been a systematisation of major stakeholders involved in the academic context, regarding, for example, the number of entities, the statute assumed, the continuous mission, the focus of intervention regarding non-formal learning for entrepreneurship, existing partnerships, among others.

At the same time a number of *one-to-one semi-structured interviews* were used - 25 of them – with voluntary sector officials and activists. These took place between October 2017 to May 2018 in the conurbation of Bournemouth, Poole & Christchurch, Dorset in the South West of England. The primary data provided was analysed via *content* but also *discourse analysis*. The aim was to analyse the relationship between specific voluntary organisations and their key supporters as per the learning organisation framework presented in section 2.2. Finally, a *case study strategy* was employed that explored, but most importantly explained circumstances of impact of strategic entrepreneurship to the voluntary organisations in the South West of England.

5. Findings – Discussion

5.1 Evidence about Strategic Entrepreneurship' Application for the Voluntary Sector

The initial research findings refer almost exclusively to the voluntary organisations in the Bournemouth geographical jurisdiction, Dorset – which expands in the middle of the South West of England. The 2011 Census showed the population of Bournemouth to be around 183,500 residents. The mid-2013 estimate was 188,700 and it is predicted to reach 225,000 by 2037. The largest proportion of the population is White British 83.8% with a 16.2% minority ethnic population. Bournemouth has a relatively young population, with above national average proportions of adults under 34. In recent years the birth rate has risen which is leading to increasing numbers of under-fives (Bournemouth Council for Voluntary Service, 2016).

The voluntary sector in Bournemouth is very diverse; some of the facts are as follows:

- There are about 370 registered charities in the borough with a total income of more than £65 million a year;
- Two thirds of registered charities and 88% of all voluntary and community groups have an income of less than £100,000 a year;
- Nearly two thirds of registered charities do not receive any state funding;
- 8,500 volunteers work for registered charities delivering about 1.5 million hours of unpaid labour per year contributing about £20.5 million a year to the local economy (Bournemouth Council for Voluntary Service, 2016).

There is an increasing entrepreneurial activity in the area considering the economic and social situation of the town, especially in areas where voluntary work has been seen as thriving. Health is one of these areas of development within the voluntary sector. Improving the health of Bournemouth's residents has not only a social impact, but also an economic incentive: saving on the cost of treating preventable illness (Bournemouth Borough Council, 2012). Voluntary organisations that have been supported by the council such as Live Well Dorset or Drugs & Alcohol Action Team work in an entrepreneurial way which "*helps to make a difference and change lifestyle and habits for the better*" (LiveWell Dorset, 2016).

Most of all, it is this unique experience that an entrepreneurial education can offer. According to the representative of one of the most prominent social enterprises in the town:

> *"…I think our uniqueness is about the way we do it so I think that's unique quality about this organisation. I think that we are always as an organisation prepared to go the extra mile where as an organisation if you talk to all my teams, you will find people very committed to the work that they do"*

Table 1: Initial findings about application of strategic entrepreneurship in the South West of England

Strategic Entrepreneurship and Learning Organisation Process		
	General aspects	***Initial Evidence in the South West of England (Bournemouth jurisdiction)***
***Concrete experience*:**	Individuals or people who are involved with entrepreneurial activities can start with some sort of prior knowledge such as technical entrepreneurial breakthrough (Kolb 2014).	Increased ability by a wide number of voluntary organisations of all sizes that have been pursuing entrepreneurial activities with a strategic purpose and most of all uniqueness
	General aspects	***Initial Evidence in the South West of England (Bournemouth jurisdiction)***
***Observation and Reflection*:**	The experience that has been discussed by the parties involved is then observed and reflected (Kolb and Kolb 2005).	Not sufficient observations and reflections have been noted as this is a novel process for the Bournemouth Area
***Formation*:**	It replaces abstract conceptualisation with formation by introducing routines in a particular structure (Kolb et al. 2001). The formation of the organisation is made based on the experience.	Tentative attempts to promote conceptualisation of strategic entrepreneurship in a more formatted structure. The role of the borough council is still regarded as very significant
***Testing the new situation*:**	It involves active experimentation with testing the new situation. This part can be the final stage for the learning organisation cycle which identifies how well developed the new structure is.	An assorted number of entrepreneurial activities in certain areas such as health can be defined with a mixed rate of success.

Moreover, strategic identification becomes part of voluntary sector routine operations as one representative of a large-scale local voluntary organisation claimed:

> *"Our professional aims are clear. We're here to help re-invest the skills and experience of people used to dealing with life's challenges - and to open up opportunities they might otherwise miss. It is our mission to provide high quality services for the benefit of the community whilst finding new and innovative means of generating income"*

Furthermore, another representative contended regarding the value of the service provided:

> *"There is a social value act and any new sort of providers coming into an area need to meet that social value act requirement, so it is built into all of our tender processes and that is not about making a service better necessarily, it is also about the impact that, that service is going to have on the community"*

Aspects of strategic entrepreneurship are widely evident in Bournemouth and the whole South West of England, despite the fact that they appear not well connected in a strategically holistic manner, which could contribute to long-term standing and continuity. As a representative of a nation-wide voluntary name put it:

> *"…it this discrepancy of ideas within the sector that might enhance opportunities of learning and minimise risk existence, however it does not set conditions for effective performance".*

Having said this, according to another participant there is a realistic view about what are the parts of the voluntary organisations that need support more than others, with health being the prominent one because of the drug issues in the conurbation.

6. Conclusion – Case Revisited

The aim of this paper was to identify strategic entrepreneurship as a vehicle for supporting the operational capacity of the voluntary sector in the South West of England. Based on a revisited point of view about how

this works – about two years after - it could be argued that: a) no substantial change has been made however there is a more pragmatic view about the situation of the sector and what are the areas that really need support through directed funding; b) Governmental agencies and local authorities still play a significant role with regard to services which would otherwise be delivered by the voluntary sector; c) most importantly – according to a participant from the health sector – the voluntary sector by nature can "*produce innovation, as people there are good in coming up with innovative ideas and being able to implement them very quickly*". This perhaps indicates that voluntary organisations have been in a process of establishing processes of learning and minimising risks, which was not the case before. This might well indicate that strategic entrepreneurship, as the combination of pragmatism and innovation can have an effect in every-day life within a sector that increasingly demands its fair share in the policy arena.

References

Acs, Z. J., Szerb, L., 2009. The global entrepreneurship index (GEINDEX). Foundations and trends in entrepreneurship, 5(5), 341-435.

Alvarez, S. A. and Busenitz, L. W., 2001. The entrepreneurship of resource-based theory. Journal of management, 27(6), 755-775.

Barney, J. B., 1991. Firm resources and sustained competitive advantage. Journal of management, 17(1), 99-120.

Bournemouth Borough Council, 2012. Bournemouth Local Plan: Core Strategy. Planning Policy Team

Bournemouth Council for Voluntary Service, 2016. Facts about Bournemouth: April 2015 [on-line][assessed: 07 June 2016] [URL: http://www.bournemouthcvs.org.uk/FactsAboutBournemouth.asp]

Chesbrough, H., 2003. Open Innovation: The New Imperative for Creating and Profiting from Technology. Harvard Business School Press: Cambridge, MA.

Chew, C. and Lyon, F., 2012. Innovation and social enterprise activity in third sector organisations. Third Sector Research Centre Working Paper Series, 83.

Gries, T. and Naude, W., 2011. Entrepreneurship and Human Development: A Capability Approach. Journal of Public Economics, 95, 216-224.

Ireland, R. D., Hitt, M. A. and Simon D. S., 2003. "A Model of Strategic Entrepreneurship: The Construct and Dimensions", Journal of Management, 29(6), 963-989.

Kantour, D. 2016. "Strategic entrepreneurship: mediating the entrepreneurial orientation-performance link" Management Decision Vol. 54 No. 1, 24-43

Ketchen, D. J., Ireland, R. D. and Snow, C. C., 2007.Strategic Entrepreneurship, Collaborative Innovation and Wealth Creation. Strategic Entrepreneurship Journal, 1: 371-385.

Kolb, A. Y. and Kolb, D. A., 2005. Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. Academy of management learning & education, 4(2), 193-212.

Kolb, D. A., 2014. Experiential learning: Experience as the source of learning and development [online], 2nd Edition, Pearson Education Inc.

Kolb, D. A., Boyatzis, R. E. and Mainemelis, C., 2001. Experiential Learning Theory: Previous Research and New Directions. Perspectives on Thinking, Learning, and Cognitive Styles, 1, 227-247.

Kolb, D.A., 1984. Experiential Learning: Experience as the Source of Learning and Development [online], 1st Edition, Pearson Education Inc.

Kuratko D. F. and Hodgetts R. M., 2007. Entrepreneurship Theory, Process, Practice. 7th Edition. Thomson-South Western.

Kuratko, D. F., and Audretsch, D. B., 2009. Strategic entrepreneurship: exploring different perspectives of an emerging concept. Entrepreneurship Theory and Practice, 33(1): 1-17.

LiveWell Dorset, 2016. Welcome to LiveWell Dorset. [on-line] [assessed: 08 June 2016] [URL: http://www.livewelldorset.co.uk/index.html]

Lynch, R. L., 2015. Strategic Management [online]. 7th Edition, Pearson Education Limited: Harlow.

Macko, A. and Tyszka, T., 2009. Entrepreneurship and Risk Taking. Applied Psychology: An International Review, 58(3), 469-487.

Maijoor, S. and Van Witteloostuijn, A., 1996. An empirical test of the resource-based theory: Strategic regulation in the Dutch audit industry. Strategic Management Journal, 17(7), 549-569.

March, J. P., 1991. Exploration and exploitation in organizational learning. Organization Science, 2: 71-87.

Meyer, G.D, Neck, HM, Meeks, MD, 2002. The Entrepreneurship-Strategic Management Interface. in Hitt, M. A., et al 2002. Strategic Entrepreneurship: Creating a New Mindset. 1st edition. Blackwell Publishers Ltd.

Schumpeter, J. A., 1939. Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process. McGraw-Hill.

Tsai, I-C & Lei, H-S, 2016. The Importance and Satisfaction of Collaborative Innovation for Strategic Entrepreneurship. Eurasia Journal of Mathematics, Science & Technology Education, 12(3), 569-582

Wernerfelt, B., 2013. Small Forces and Large Firms: Foundations of the RBV. Strategic Management Journal. 34, 635-643.

Wickham, P. A., 2006. Strategic Entrepreneurship, 4th Edition. Harlow: Financial Times Prentice Hall.

Yin, R. K., 2003. Case-Study Research: Design and Methods. 3rd Edition. Applied Social Research Methods Series, 5, SAGE publications, CA.

Developing a Model of Film-Induced Slum Tourism Motivations: an Exploratory, Qualitative Approach

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Abstract: Film tourism encompasses visits to places whose attractiveness is related to audio-visual products (films, tv-series, soap operas…). There is a wide range of studies acknowledging those products' potential to influence destination image, visit motivations, and, consequently, tourist arrivals to the depicted places. Destination managers and tourism entrepreneurs have increasingly made efforts to capitalise on this potential. In academia, the phenomenon has motivated a growing body of work on the relationship between cinema and tourism. The literature suggests that even films that portray destinations under a bad light can increase motivations to visit them. Such conclusions, strengthened by several real-world cases, imply that films might play a special role in inducing motivations for slum tourism, which is described as tourism to which poverty is part of the attraction. Slum tourism has received little academic attention from the perspective of tourism studies, and research on film tourists' motivations is particularly scarce. The few indications available in the literature are either initial insights or assumptions and premises subjectively made by their authors. In this context, the present study aims at developing a model including the dimensions of slum tourism motivations, and the film elements that act as their determinants. To this end, an exploratory, qualitative approach was employed, based on the empirical data collected with the participation of tourists visiting the favelas of Rio de Janeiro. Results show that slum tourism motivations include Learning motivations and Experiential motivations as push factors, and that each of those dimensions is affected by two categories of film pull factors: Place & Personality, and Performance. The model is expected to work as an innovative tool for increasing destination attractiveness, and the effectiveness of managerial practices. In addition, it constitutes a first step towards a structural analysis of slum tourism motivations and their film determinants. The present investigation thus provides relevant theoretical and managerial insights, as well as important avenues for future research.

Keywords: favela, film tourism, innovation, Rio de Janeiro, slum tourism, tourist motivations.

1. Introduction

Tourist visits to destinations or attractions directly or indirectly motivated by audio-visual products, or including activities related to the cinema world, have been conceptualised as film tourism. Recent studies have shown that even films that portray destinations under what could be considered a bad light might awaken viewers' curiosity, and consequently, create or increase visit motivations (Loureiro & de Araujo, 2015; Shani, Wang, Hudson, & Gil, 2009). This suggests that films potentially fuel motivations to slum tourism, which is described as tourism to which poverty and associated signifiers are a central point and part of the attraction (Frenzel, 2017). Most of the extant literature on slum tourists' motivations comes from the fields of geography and social studies, while studies adopting a practical tourism management approach are still limited.

Moreover, the few indications regarding slum tourist's motivations in the literature lack empirical scrutiny.

Aiming at filling these gaps in the literature, the present study proposes a theoretical model of slum tourism motivations dimensions, and the elements of films that act as their determinants. To this end, an exploratory, qualitative approach was adopted, and the tourist activity carried out in the *favelas* (originally informal settlements mostly inhabited by the poor) of Rio de Janeiro was chosen as research setting. Such decision is justified by the *favelas* being one of the most expressive examples of slum tourism worldwide. Additionally, Rio's *favelas* are a slum tourism case in which audio-visual products, particularly feature films, allegedly play a significant role. Data was collected directly from tourists visiting the *favelas* via semi-structured interviews that covered topics regarding their motivations to visit such places and the potential role of audio-visual products.

Results show that slum tourism motivations can be conceptualised according to two main dimensions:

Experiential motivations and *Learning motivations*. The film determinants to those motivations fall into Macionis's (2004) 3 P's approach (*Place, Personality* and *Performance*), with the necessary adaptations to contextual nuances. Moreover, hypotheses have been developed regarding the effect of each film determinant on each slum tourism motivation dimension. These findings provide an original theoretical

contribution, since no previous attempt to structurally address slum tourism motivations has been found in the literature. Also, the role of cinema in creating or increasing those motivations has not been previously addressed either. In terms of managerial implications, the study's results provide useful insights to destinations where the slum-tourism phenomenon is a reality, especially those in which its attractiveness is associated with cinema. Moreover, tourism entrepreneurs involved in slum tourism activities, such as tour organisers and hostel managers, can also benefit from a better understanding of their target market's motivation. In order to provide more concrete guidelines, however, the model should be calibrated and tested from a quantitative approach in further studies.

2. Theoretical overview

2.1 Film tourism motivations

A seminal contribution to film tourism motivations was provided by Macionis (2004), who proposed a differentiation between *Place*, *Personality* and *Performance* (the 3 P's outline) as film elements potentially attracting viewers to the depicted destinations. In this context, *Place* refers to the location attributes, scenery and destination attributes; *Personality* relates to the film's cast, characters and celebrities; and *Performance* consists in the film's plot, theme and genre. This conceptualisation builds on the push-pull approach, originally proposed by Dann (1982), according to which, tourists' motivations are the sum of push factors, referring to their own needs and wishes; and pull factors, that is, destination attributes that potentially satisfy those needs and wishes. In this context, the 3 Ps are pull factors through which destinations portrayed in films might appeal to viewers. Accordingly, Macionis (2004) proposes a list of film tourists' internal drivers (push factors), which include: ego-enhancement; fantasy or escape; status/prestige; search for self-identity; or vicarious experience, which are potentially fulfilled by the film tourism experience.

This list of film tourism push factors was further refined by Macionis & Sparks (2009), and then employed, along with the 3 sets of pull factors, by most subsequent studies on film tourists' motivations (Meng & Tung, 2016; Oviedo-García, Castellanos-Verdugo, Trujillo-García, & Mallya, 2016; Rajaguru, 2013; Rittichainuwat & Rattanaphinanchai, 2015; Suni & Komppula, 2012), which also provided their contributions and adaptations to each particular context. Such body of literature is however still narrow, especially when considering the specific context of film-induced slum tourism, as, to our best knowledge, no study has addressed the role of films on viewers' motivations to this particular type of tourism. In this vein, the 3 Ps outline will be employed in the present study, alongside the context specific push factors of slum tourism motivations.

2.2 Slum tourism motivations

Slum tourism has been described as tourist visits to poor areas with the goal of experiencing the place where poor people live (Whyte, Selinger, & Outterson, 2011), or simply as tourism to which poverty and associated signifiers are a central point and part of the attraction (Frenzel, 2014). The practice is also commonly referred to as "poverty tourism". In academia, however, "slumming" and "slum tourism" are more broadly accepted, since, as suggested by studies in three major slum tourism destinations - Brazilian *favelas* (Freire-Medeiros 2011), Indian slums (Dyson 2012; Meschkank 2011), and South African Townships (Dyson 2012) - slum tours offer alternative observational schemes (Rolfes 2009), and typically aim at deconstructing poverty as the main association to such places.

Regarding the motivations of tourists engaging in such type of tourism, contributions in the literature are limited to some initial insights from studies with a different focus, typically from a sociological stance. For instance, Frisch (2012) and Dyson (2012) argue that authenticity is a central aspect of slum tourism motivations. A bolder statement is made by Mendes (2010), who links slum tourism in India to a fascination with the spectacle of poverty. Mendes' (2010) study, however, does not include any empirical component.

Freire-Medeiros (2007, 2009) conceptualises Rio de Janeiro's *favela* tours as reality tours, which can be viewed as "social tours" or "dark tours". In this context, social tours are based on participation and authenticity, and engaged in by tourists who are willing to help locals through their visit; while dark tours sell commoditised poverty and misery, attracting visitors with a voyeuristic desire to gaze upon the poor. Such classification, however, is not the result of empirical research on this topic. Instead, it is included as part of the characterisation of the object of research, which consequently, was conducted based on the subjective assumption that her conceptualisation was correct.

Analogous to Freire-Medeiros, (2007, 2009), Williams (2008) argues that *favelas* became a draw for foreign tourists due to the fascination with the drug culture as portrayed in *City of God* (2002), combined with a charitable, if not voyeuristic, desire to gaze upon disadvantaged communities. Such statement also implies a relevant role of cinema in generating slum-tourism motivations, which is also suggested by Freire-Medeiros (2006, 2007, 2011), Meschkank (2011), Privitera (2015), and Diekmann & Hannam (2012). In this context, the present work aims to further investigate this supposedly relevant connection.

3. Method

Bearing in mind the present study's goals, a qualitative approach was adopted. Impressions on slum tourism motivations, as well as the role of films and other audio-visual products on generating those motivations, were collected from tourists during their visits to the Rio de Janeiro's South Zone *favelas*, namely: Rocinha, Vidigal, Morro da Babilônia and Santa Marta. The selected favelas are the ones with the most relevant tourist activity.

Rocinha is the biggest favela in Rio, with over 700.000 inhabitants, and was the first to receive tourists, still in the 80's. Vidigal, its close neighbour, has a vibrant art community and is on the path to mountain trails, which attracts many visitors. Babilônia has a privileged location and many viewpoints, which attracted several favela-themed hostels. Finally, Santa Marta, the new, paradigmatic, touristic favela (Freire-medeiros, 2016), attracts tourists due to its favourable location and infrastructure, which includes a cable car and a tourist information office. Its attractiveness is also related to the shooting of Michael Jackson's 1996 video clip *They don't care about us*, and of the film *Fast Five* (*Fast and Furious Franchise* – 2011).

Data was collected through semi-structured interviews. The interview guide (see Appendix) aimed at serving as a general navigation tool, just to remind the researcher about key topics to be explored, while allowing for adaptations to each interviewee, such as changes is the order of questions, and the addition of new questions aiming at obtaining more details about particular topics. The guide was based on insights provided by previous studies and aimed at inviting tourists to talk about their motivations to visit the *favela,* as well as whether and how those were related to films. In order to generate additional insights, visitors were also asked about their previous image of the *favela* and their experiences during their visits.

The interview guide was pre-tested via video-conferences with tourists who had previously participated in favela tours. Participants were first contacted via *Facebook* groups, and then asked to participate in the interviews through *Skype*. The pre-test interviews were recorded and then re-listened in order to allow for the identification of points that should be restructured. During the field research, 54 tourists were interviewed amongst the four mentioned favelas. The interviews were also recorded, so they could be later analyzed in detail.

The collected material was examined through both within-case and cross-case analysis (Eisenhardt, 1989; Miles & Huberman, 1994), both carried out through categorical content analysis, which consists in the dismembering of the text in units, or categories, according to pre-established criteria (Bardin, 2000). Such technique was carried out with the aid of the *QSR NVivo 11* software, which allows the codification of content into categorical nodes. The coding resulted in nodes structures that helped with the process of analysing tourists' discourses with reference to the reviewed literature. The development of the proposed model was then based on such analysis.

4. Results

The analysis of tourists' impressions resulted in two main nodes: "Slum tourism motivations" and "Film determinants". In contrast with Freire-Medeiros's (2007, 2009) categorisation, according to which *favela* tours can be either *social* or *dark*, many other motivational items were found. *Dark* and *social* motivations were indeed present, however, rather than two major dimensions, they represented components within two bigger dimensions: *Experiential motivations* and *Learning motivations*.

Social motivations were mentioned significantly more often than dark motivations, and included a group of four items, which, alongside two additional items, account for the *Learning motivations* dimension.

Experiential Motivations, in turn, include nine items, amongst which, *Dark motivation*. It must be noted that assertive mentions to *Dark motivations* were rare within participants' answers, thus, the item's inclusion relies more heavily on previous literature. Slum tourism motivation items are detailed in

	Experiential motivations	
Novelty	A new or unfamiliar experience.	"… it seemed like something new and exciting, that I'd never done before…"
Film-induced specific (FIS)	Slum tourists' motivations related to specifically seeing something they saw on a film or other audio-visual product.	"the really stereotyped vision from like, the film "Cidade de Deus"".
Escape	The act of fleeing from one's routine.	"I really wanted to experience something else than what I'm used to in Belgium."
Artistic	Motivations related to music, graffiti, theatre and other art forms.	"… they have a lot of creativity here, a lot of art, artists, music, graffiti, theatre…
Experience a different environment (EDE)	Motivation related to physically being in a new and unfamiliar place with particular characteristics.	"…how the landscapes looked like, the structures the buildings…"
Culture and interaction (C&I)	Tourists' desire or need to interact and gain knowledge about the culture and way of life of locals.	"Being in touch with the community."
Search for authentic experiences (SAE)	Visitors' desire to experience something genuine and spontaneous, rather than planned and prepared for tourist consumption.	"the motivation was kind of, trying to (…) meet somebody and maybe find out what the actual real favela is like..."
Experience more than regular tourists (EMRT)	Tourists' desire to see and experience what most tourists, and often even the residents, do not.	"Because it was (…) a part of Brazil that not everyone sees, because normally they stay in Ipanema, *Copacabana*, Leblon."
Dark motivation (DM)	Tourists' desire to visit a slum due to the thrill achieved through being in a place associated with violence; or with a voyeuristic gaze upon the poor.	"Also, violence. (…) just, even being here (…) with, like, the police walking around with AK47s (…) it's quite… interesting."

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Table 1: Slum tourism motivation dimensions' items

Item	**Definition**	**Examples of mentions by interviewees**
	Learning motivations	
Confronting media (CM)	Visitors' desire to confront the image portrayed by media with their first-hand experience.	"…because I don't trust what movies say, right? I don't trust what the news say, (…) I wanna go there myself and experience."
Gaining insight (GI)	Tourists' desire to learn about and understand broader social-economic issues of a city or a county through a visit to its slums.	"For me, to see where 20% of the population live in Rio."
Interest in reinvested profits (IRP)	Tourists' interest about whether the profits from tourism are reinvested in the community.	"… the money goes to people who live there which (…) is nice."
Interest in social projects (ISP)	Tourists willingness to learn about the social projects that aid dwellers.	"… because I know that there are a lot of social projects here and that's what I really want to do."
Improve inhabitants' life conditions (ILC)	Visitors willingness to learn about ways in which locals' life conditions could be improved.	"Just to see if they're not able to do it themselves (…) What could, maybe, other countries do to help as well."
Learning and empathy (L&E)	Visitors' desire to learn about locals' life and see things from their point of view.	"…the government doesn't care about people who live here, (…) I want to know how they survive. (…) some people are really suffering in the favela…"
	Experiential motivations	
Novelty	A new or unfamiliar experience.	"… it seemed like something new and exciting, that I'd never done before…"
Film-induced specific (FIS)	Slum tourists' motivations related to specifically seeing something they saw on a film or other audio-visual product.	"the really stereotyped vision from like, the film "Cidade de Deus"".
Escape	The act of fleeing from one's routine.	"I really wanted to experience something else than what I'm used to in Belgium."
Artistic	Motivations related to music, graffiti, theatre and other art forms.	"… they have a lot of creativity here, a lot of art, artists, music, graffiti, theatre…
Experience a different environment (EDE)	Motivation related to physically being in a new and unfamiliar place with particular characteristics.	"…how the landscapes looked like, the structures the buildings…"
Culture and interaction (C&I)	Tourists' desire or need to interact and gain knowledge about the culture and way of life of locals.	"Being in touch with the community."
Search for authentic experiences (SAE)	Visitors' desire to experience something genuine and spontaneous, rather than planned and prepared for tourist consumption.	"the motivation was kind of, trying to (…) meet somebody and maybe find out what the actual real favela is like..."

Experience more than regular tourists (EMRT)	Tourists' desire to see and experience what most tourists, and often even the residents, do not.	"Because it was (…) a part of Brazil that not everyone sees, because normally they stay in Ipanema, *Copacabana*, Leblon."
Dark motivation (DM)	Tourists' desire to visit a slum due to the thrill achieved through being in a place associated with violence; or with a voyeuristic gaze upon the poor.	"Also, violence. (…) just, even being here (…) with, like, the police walking around with AK47s (…) it's quite… interesting."

Regarding the role of films, the most frequently mentioned were *City of God* (2002), *Fast Five* (2011) and *Elite Squad* (2007 and 2010). Other audio-visual products mentioned were music videos, mainly Michael Jackson's *They don't care about us*, and Brazilian soap operas. Film determinants were conceptualised within Macionis's (2004) 3 Ps outline, with the necessary adaptations on the items, due to the specifications of films shot in *favelas*. Results suggest that, while *Place* and *Personality* attract visitors mostly through an hedonistic appeal, embeebed in contemplation and adventure, *Performance* elements tend to appeal to viewers by creating empathy with locals. Therefore, in order to adapt the original conceptualisation to the examined settings, *Place* and *Personality* were considered a single determinant (*Place & Personality*), while *Performance* alone represented a second one. Film determinants are detailed in Table 2.

Table 2: Film determinants' items

Item	**Definition**	**References**
	Place & Personality	
Landscapes	Landscapes portrayed in the film and other audio-visual products.	"…the image of the houses, on the hills, the Little streets."
Item	**Definition**	**References**
Scenery	Films' and another audio-visual products' scenery.	"I only remember *Fast and furious* (…) They jumping around the houses like (…) that's cool"
Cultural attractions (CA)	The cultural attractions portrayed in films and other audio-visual products.	"…the place, the typical parties of the favelas, for example"
Friendly characters (FC)	Characters in films and other audio-visual products who appeal to viewers due to their friendly personality.	"People were friendly, (…) it's kind of micro-economy, solidarity."
Way of life of characters (WLC)	Characters' appeal to viewers due to their different lifestyle.	"…portrays the every-day life, right? The routine (…) people going up and down, (…) the language, the slangs, people's clothes, the food they eat, the music to which they listen…".
Hard working characters (HWC)	Characters' appeal to viewers due to them being hard working.	"It is a community, right? Of people who work, of hard-working people."
	Performance	
The suffering and poor conditions faced by characters (SPC)	Films' and other audio/visual products' display of people submitted to suffering and poor living conditions	"…extreme poverty, (…) living just next to very wealthy people, but in (…) very poor conditions."
The violence portrayed by the films (VPF)	Films' display of violence, potentially instigating viewers to confront such reality with their first-hand experience	"lots of guns, that's what you see in the films, actually."
The experiences lived by characters (ELC)	Experiences in general portrayed in films	"(…) they live in such conditions (…) they pass through lots of things…)

Having the items of slum tourism motivation dimensions and their film determinants been addressed, the next chapter deals with the proposed relationships between those variables.

5. Model proposal

Experiential motivations include *SAE*, which refers to visitors' desire to experience something genuine and spontaneous, rather than planned and prepared for tourist consumption; and *EMT*, which refers to visitors' desire to see and experience what most tourists do not. The items of *Place & Personality* offer potential fulfilment for those desires, for example, through unique landscapes. Besides, *Cultural attractions*, which is also included in *Place*, potentially affects the *Artistic* motivation. Accordingly, character-related items can also potentially affect such motivations. For instance, *Friendly characters*, *WOL*, and *HWC* arguably influence viewers' desire or need to interact and gain knowledge about the culture and way of life of locals, on which consists the item *Culture/interaction*, included in *Experiential motivations*. In this context, H1: The effect of *Place & Personality* is positively associated with *Experiential motivations*.

Accordingly, the items included in *Performance* sensitise spectators to the life conditions faced by the characters, and consequently, by the population of *favelas*. This is particularly applicable to the *SPC*, as well as

to *ELC*, since those experiences are mainly related to suffering. This sensitising aspect is a relevant facet of many of the items encompassed by learning motivations, such as: *ISP*, *ILC*, *IRP,* and *Learning and empathy*.

These items refer to visitors' desire to contribute to the improvement of life conditions in the visited community, which is arguably affected by the sensitising effect of the mentioned *Performance* items. Therefore, H2: The effect of *Performance* is positively related to *Learning Motivations*.

The experiences of characters in films and soap operas also motivate viewers to visit the locations. In the case of the *favelas* as film locations and tourist attractions, those elements influence tourists' desire to experience the unique landscapes and cultural environment of such places; as well as to flee from their own routine and fulfil an adventurous endeavour, by experiencing what "regular tourists do not". In this context, the items *Novelty*, *Escape,* and *EDE* are probably affected by *Performance* in general. Moreover, *SAE* and *EMT* are arguably affected by *The experiences lived by the characters*, their life conditions and the context of violence, which contrasts with how Rio de Janeiro is promoted to conventional tourists, and awakens the desire for the authentic and "non-touristy", as expressed by many interviewees. Thus, H3: The effect of *Performance* is positively related to *Experiential motivations*.

Finally, although, for analysis purposes, *Experiential* and *Learning motivations* are conceptualised here as two distinct constructs, they are intrinsically connected, as the learning comes from the first-hand experience. The proposal of two distinct dimensions lies in the belief that some tourists are motivated by the experience *per se*, and thus are moved more by the items encompassed by *Experiential motivations*; while others are interested in those experiences as a way of gaining knowledge, and thus, are more affected by the items of *Learning motivations*. However, *Experiencing* and *Learning* are far from being two totally distinct motivations, and the latter is arguably affected by the former. Therefore, H4: *Experiential motivations* are positively related to *Learning motivations*.

Having the potential causal relationships between the observed variables been hypothesised, the proposed model, including the addressed hypotheses, is represented in Figure 1.

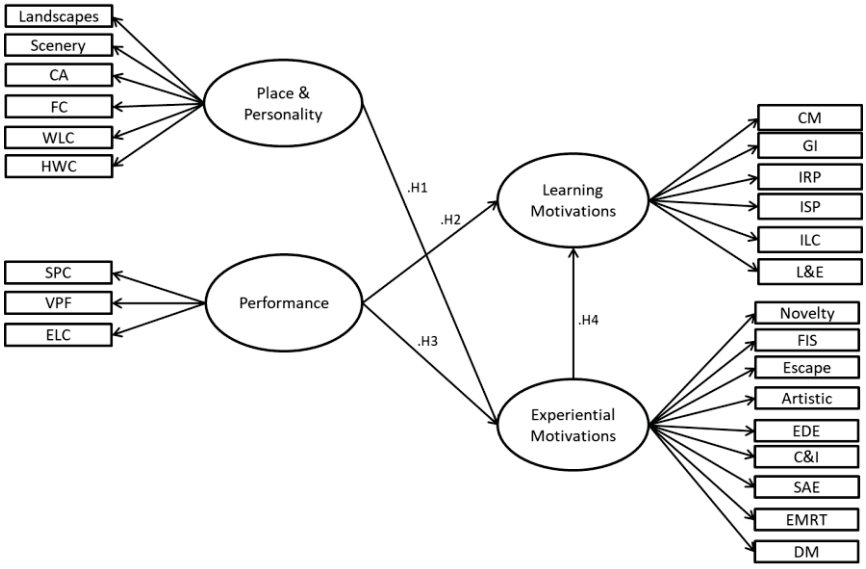

Figure 1: The proposed film-induced slum tourism motivations model

6. Conclusion

The present study's results suggest that slum tourism motivations are the sum of *Learning motivations* and *Experiential motivations*, while each of these dimensions is influenced by one or both of the following film determinants: *Place & Personality* and *Performance*. In this context, our results differ from Freire-Medeiros (2007, 2009), who categorises *favela* tours as reality tours, which can be either *social tours* or *dark tours*, according to participants' motivations. *Social* and *Dark* motivations were indeed found in the present study, but as part of bigger dimensions, rather than being dimensions themselves. Although Freire-Medeiros (2007, 2009) carried out field research, including interviews with tourists and participant observation, there are

several reasons why the present study's conclusions about slum tourists' motviations can be considered more accurate. First, Freire-Medeiros's (2007, 2009) goal was not to conceptualise slum-touists' motivations, but to observe how the *favela* became a touristic space, from a geographical point of view, focusing on spatial dynamics. Therefore, the data collection and analysis approach did not prioritise such variable. Moreover, the mentioned conceptualisation is not included in the study's results, but as part of the characterisation of the object of study. Thus, rather than providing the necessary empirical scrutiny, Freire-Medeiros' (2007, 2009) research was conducted based on the subjective premise that such conceptualisation was true.

Other previous indications in the literature regarding slum tourists' motivations are also subjectively made by their authors in the absence of empirical scrutiny, such as Mendes's (2010) statement regarding slum tourism and the fascination with the spectacle of poverty. The remaining are initial insights from studies with other main goals, such as those provided by Frisch (2012) and Dyson (2012), who suggest that authenticity is as a main element of slum tourism motivations, which has been reinforced by the present study. Therefore, this research's results provide a relevant theoretical contribution, as they represent a first step to achieve an in depth understanding of slum tourists' motivations, by identifying its dimensions. In addition, the present study is also a first attempt to assess the role of film determinants in slum tourism motivations.

From a practical standpoint, the results provide useful managerial implications for destinations where slum tourism is a reality, especially for those where movies play a relevant role, like the observed case of Brazilian *favelas,* as well as Indian slums. Aware of the film pull elements that effectively attract slum tourists, destination managers could work together with film makers in order to prioritise films that highlight them.

Depending on whether slum tourism is perceived as beneficial in a particular area, such partnerships could also be used to avoid the portrayal of those elements, or even try to depict specific ones, in order to attract a particular slum tourist profile, considered more in line with the destination's goals. For instance, a destination manager might consider slum tourists driven mostly by *Learning motivations* more suitable to the destination's goals, and thus, prioritise films that depict elements that attract this specific type of slum tourist. In the case of Brazil, such work could be done through communication and partnerships with the Ministry of Culture, since it works as the manager of tax wavier mechanisms that finance most national films that reach global audiences, including all the previously mentioned national movies.

An additional managerial implication refers to tourism entrepreneurs involved in slum tourism activities, especially in Rio de Janeiro, such as *favela* tours and hostels. Knowing what slum tourists are interested in, they will be able to innovate by tailoring the tours to visitors' motivations and promote accordingly. Moreover, the tour operationalisation can also be managed aiming at reflecting the values the study suggests slum tourists seek in such tours. In terms of *Experiential motivations*, the following actions are advisable: having partnerships with local guides (in the case of outsider companies – those that are not owned and managed by locals) in order to maintain tour authenticity; promoting and executing tours bearing in mind the visitors' desire to experience things that are not "touristy"; and featuring houses and landscapes on the promotional material. Implications from *Learning motivations* include: operationalising and promoting tours as educational; approaching broader socio-economic issues regarding the *favelas* during the tours; informing the fact that part of the profits is reinvested in the communities; and building tours' value chain in order to make it as local based as possible, that is: including local guides, meals in local restaurant or even locals' houses, and partnerships with local shops, NGOs and social projects.

Finally, the present work has some limitations, which in turn, present avenues for further research. The main shortcoming is inherent to the qualitative nature of the study, i. e., the proposed model results exclusively from the interpretation of tourists' discourses. In order to have an acceptable level of reliability, the model needs to be calibrated and tested, and this process should be grounded on quantitative data. In this context, applying a quantitative survey based on the proposed model in order to test it through techniques such as Structural Equations Modelling is a fertile task for further research.

References

Bardin, L. (2000). Análise de Conteúdo. Lisboa: Edições 70.

Crompton, J. L., & McKay, S. L. (1997). Motives of visitors attending festival events. Annals of Tourism Research, 24(2), 425–439. http://doi.org/10.1016/s0160-7383(97)80010-2

Dann, G. M. S. (1982). Tourist motivation: An Appraisal, 8(2), 187–219.

Eisenhardt, K. M. (1989). Building theories from case study research. Academy of Management Review, 14(4), 532–550. http://doi.org/10.2307/258557
Freire-Medeiros, B. (2007). A favela que se vê e que se vende: Reflexões e polêmicas em torno de um destino turístico. Revista Brasileira de Ciências Sociais, 22(65), 61–72.
Freire-Medeiros, B. (2009). The favela and its touristic transits. Geoforum, 40(4), 580–588. http://doi.org/10.1016/j.geoforum.2008.10.007
Freire-medeiros, B. (2016). A pobreza turística no mercado da pacificação: reflexões a partir da experiência da Favela Santa Marta. Caderno CRH Online, 29(78), 571–586. http://doi.org/http://dx.doi.org/10.1590/s0103-49792016000300010
Frenzel, F. (2014). Slum Tourism and Urban Regeneration: Touring Inner Johannesburg. Urban Forum, 25(4), 431–447. http://doi.org/10.1007/s12132-014-9236-2
Frenzel, F. (2017). On the Question of Using the Concept "Slum Tourism" for Urban Tourism in Stigmatised Neighbourhoods in Inner City Johannesburg. Urban Forum, 1–12. http://doi.org/10.1007/s12132-017-9314-3
Iso-Ahola, S. E. (1982). Toward a social psychological theory of tourism motivation: A rejoinder. Annals of Tourism Research, 9(2), 256–262. http://doi.org/10.1016/0160-7383(82)90049-4
Loureiro, S. M. C., & de Araujo, A. B. (2015). Negative Film Plot and Tourists´ Image and Intentions: The Case of City of God. Journal of Travel & Tourism Marketing, 32(4), 352–365. http://doi.org/10.1080/10548408.2014.896769
Mendes, A. C. (2010). Showcasing India Unshining: Film Tourism in Danny Boyle's Slumdog Millionaire. Third Text, 24(4), 471–479. http://doi.org/10.1080/09528822.2010.491379
Meng, Y., & Tung, V. W. S. (2016). Travel Motivations of Domestic Film Tourists to the Hengdian World Studios: Serendipity, Traverse, and Mimicry. Journal of China Tourism Research, 12(3-4), 434–450. http://doi.org/10.1080/19388160.2016.1266068
Miles, M., & Huberman, A. (1994). Qualitative data analysis: An expanded sourcebook (2nd ed.). London: Sage Publications.
Oviedo-García, M. Á., Castellanos-Verdugo, M., Trujillo-García, M. A., & Mallya, T. (2016). Film-induced tourist motivations. The case of Seville (Spain). Current Issues in Tourism, 19(7), 713–733. http://doi.org/10.1080/13683500.2013.872606
Rajaguru, R. (2013). Motion Picture-Induced Visual, Vocal and Celebrity Effects on Tourism Motivation: Stimulus Organism Response Model. Asia Pacific Journal of Tourism Research, 1–14. http://doi.org/10.1080/10941665.2013.764337
Rittichainuwat, B., & Rattanaphinanchai, S. (2015). Applying a mixed method of quantitative and qualitative design in explaining the travel motivation of film tourists in visiting a film-shooting destination. Tourism Management, 46(0), 136–147. http://doi.org/http://dx.doi.org/10.1016/j.tourman.2014.06.005
Shani, A., Wang, Y., Hudson, S., & Gil, S. M. (2009). Impacts of a historical film on the destination image of South America. Journal of Vacation Marketing, 15(3), 229–242.
Steinbrink, M. (2013). Festifavelisation: Mega-events, slums and strategic city-staging - The example of Rio de Janeiro. Die Erde: Journal of the Geographical Society of Berlin, 144(2), 129–145. http://doi.org/10.12854/erde-144-10
Sue Yuan, & McDonald, C. (1990). Motivational determinants of international pleasure time. Journal of Travel Research, 29(1), 42–44.
Suni, J., & Komppula, R. (2012). SF-Filmvillage as a Movie Tourism Destination—A Case Study of Movie Tourist Push Motivations. Journal of Travel & Tourism Marketing, 29(5), 460–471. http://doi.org/10.1080/10548408.2012.691397
Whyte, K. P., Selinger, E., & Outterson, K. (2011). Poverty tourism and the problem of consent. Journal of Global Ethics, 7(3), 337–348. http://doi.org/10.1080/17449626.2011.635689
Williams, C. (2008). Ghettourism and Voyeurism, or Challenging Stereotypes and Raising Consciousness? Literary and Non-literary Forays into the Favelas of Rio de Janeiro. Bulletin of Latin American Research, 27(4), 483–500. http://doi.org/10.1111/j.1470-9856.2008.00280.x

Appendix – Interview guide

Name:
Nationality:
Profession/main occupation:

1. What motivated you to visit/stay in a favela?
2. What did you know about favelas before visiting one? From which sources do you believe this knowledge comes?
3. Was visiting a favela the main goal of your trip to Rio? If not, what was it?
4. What do you believe has contributed to your interest or curiosity regarding the favela?
5. What comes to your mind when you think about favela?
6. Please, talk about your experience in the favela. The positive negative points or anything else you want to share.
7. Do you remember having seen any film(s)/tv-series(s)/soap-opera(s)/video-clip(s) that takes place in a favela? If so, which one(s)?

If the interviewee does not remember having seen any audio-visual product that takes place in a favela, the interview must continue from question 10.

1. Would you say that having watched this(these) film(s)/tv-series(s)/soap-opera(s)/video-clip(s) has somehow influenced your motivations to visit a favela? (what about to visit Rio? And Brazil in general?)

In case the interviewee does not associate the audio-visual product to his/her motivations to visit the favela, the interview must end here.

1. Which elements of this(these) film(s)/tv-series(s)/soap-opera(s)/video-clip(s) motivated you to visit a favela or Rio de Janeiro?

For those who don't remember having watched any film(s)/tv-series(s)/soap opera(s)/video-clip(s) that takes place in a favela:

1. Do you know (have you ever heard) of any film(s)/tv-series(s)/soap-opera(s)/video-clip(s) that takes place in a favela? If so, which one(s)?
2. What do you know about this(these) film(s)?

Innovative Activity of Enterprises under the Condition of Financial Deficit

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Abstract: The successful development of innovation-active enterprises lies at the root of an effective market economy. However, according to the results of surveys on the entrepreneurship specifics in Russia, the innovative activity of enterprises is currently insufficient. The reasons for this are: lack of financial resources, caused by, among other things, economic sanctions; the high cost of innovation; insufficient capacity of organizations for innovation. Nowadays, enterprises have to withstand tough competition in attracting capital to finance business, which is especially hard for small enterprises. In this paper, the main factors influencing the innovation activity of an enterprise are investigated. The influence of financial and other types of constraints on a company's innovative and entrepreneurial activities is examined. As a result, the connection between the stable financial position of the company and its innovative activity is proven. The indicators of the financial and economic efficiency of the enterprise that influence the entrepreneurial and innovative activities of the company are revealed. It is demonstrated that the ability to correctly assess the economic benefit of using novelties is one of the key factors to the successful innovative activity of an enterprise. To analyze the financial constraints of enterprises that operate under the conditions of a capital deficit, the sources of financing the company's investment activities were considered. It is shown, in particular, that in order to attract loan capital, it is necessary to maintain a sufficient level of such limiting indicators such as solvency and financial stability. The paper considers modern methods of assessing and maintaining a sufficient level of these indicators at the enterprise. In addition to the financial component, the other internal and external factors of the innovative activity of an enterprise were considered in the paper. Based on the results of the study, a system of key performance indicators for the enterprise has been developed, which determines the relevance and scientific novelty of this work. Timely controlling and maintaining the required level of selected indicators will lead to an increase in the efficiency of the company's innovation and investment activities.

Keywords: Innovation, finance, constraints, entrepreneurship, solvency, financial stability, profitability, business activity, key performance indicators.

1. Introduction

The innovation activity of enterprises is one of the main factors of economic growth in contemporary societies (Ahlstrom, 2010, Steil, Victor and Nelson, 2002, Romer, 1990). Successfully functioning innovation-active enterprises are the basis of a developed market economy. The role of innovation is constantly increasing, occupying one of the priority directions in the development of world countries economics (Maradana et al, 2017). Today, investment in technological development is not only the main source of economic growth, but also the main anti-crisis measure (Zabolotskaya, 2015). Corporate finance greatly contributes to the development of entrepreneurial and innovative activities of companies, as they are characterized by flexibility and the ability to innovate (Neff, 2002). To enhance the innovative activity of enterprises, the basic institutions in the field of innovation have been created in Russia, including venture funds such as: Russian Venture Company, Russian Fund for Technological Development, Russian Development Bank, Bank for Development and Foreign Economic Affairs (Vnesheconombank) and others. However, despite the efforts made by the Government of the Russian Federation, the Russian economy has not succeeded in forming a stable trend of innovative development. According to the results of research on the specifics of entrepreneurial activity in the Russian market, it has been revealed that the innovative activity of enterprises is currently insufficient (Asaturova, 2015, Bek et al, 2013). According to the Federal State Statistics Service, in 2015, the share of organizations that implemented innovations in the total number of organizations surveyed was 9.3%, while technological innovation was introduced in 8.3% of enterprises (HSE Publishing, 2017). In the US this figure reaches 33% whereas in countries of the European Union it is 53%. For example, in countries such as Belgium, Switzerland, Germany and Iceland, more than half of the companies surveyed implemented technological innovations (52.9, 52.7, 52.6, 50.1%, respectively). The share of new or improved technologies, products and equipment in developed countries accounts for 70 to 85% of GDP growth, while in Russia, GDP growth is not caused by this factor. The share of research and development in the costs of technological innovation in Russia is 14-16%. The percentage of GDP expenditure on R&D is 0.53% in Russia, up to 2.5-3.0% in industrially developed countries (Zabuga and Vaisman, 2017).

Let us consider the reasons for the low innovative activity of Russian enterprises. Based on statistical data, according to the Statistical Handbooks "Indicators of innovation activity" for the years 2013-2017, three groups of factors negatively affecting the innovative activity of an enterprise can be identified: economic factors (the highest negative impact), internal factors and external factors (HSE Publishing, 2017).

The insufficient innovative activity of Russian companies is related, first of all, to such economic factors as the lack of own funds, the high costs of innovation and the lack of financial support from the State. The amount of funds for innovation in Russia remains low, while the economic sanctions increase difficulties in attracting external financing (Vertakova and Kulikov, 2014, Abramov, 2016). Modern enterprises have to withstand tough competition when attracting capital to finance business and innovation. This is especially true for small business enterprises. To solve this problem, in our opinion, it is important to provide a high level of financial standing of the enterprise, which will increase its attractiveness for investors and profitability.

The next two factors, included in the top five of the ranking - high economic risk and uncertainty of economic benefits of innovation results - are interrelated. The high economic risk of implementing innovative projects is typical for any economic system. Moreover, in addition to the traditional risk of any project associated with uncertainty about future scenarios for the development of certain events, innovative projects carry additional risks associated with uncertainty about the implementation of new ideas. The greater the positive effect expected from innovation is, the higher is risk. Therefore, an enterprise faces the task of determining an acceptable ratio of risk and return on investment (Litnitsky, 2014).

The last factor - low innovative potential of an enterprise - is associated with the lack of qualified personnel, as well as with the low experience of work with innovative projects. To eliminate these shortcomings, it is necessary to train staff, arrange project competitions and provide monetary incentives for implementing projects. These factors are more difficult to describe analytically, but the most important, from our point of view, in eliminating this shortcoming is the company's stable financial position, which has a huge impact on supporting the internal innovation climate in the company and providing the motivation to be the best.

Factors that negatively affect the innovation activity of an enterprise cause the constraints that impede innovative project implementation. This paper considers three types of such constraints: resource, productive and market constraints. Since the main problem limiting an enterprise’s innovative activity is the lack of financial resources, the main task is to increase the enterprise’s ability to attract funds for innovation.

Determining the connection between the financial position of an enterprise and its ability to innovate is the main feature of this work. The paper shows that financial stability and solvency indicators characterize the enterprise’s innovative attractiveness, which determines its ability to attract loan capital to finance innovation. Based on the revealed interrelations, a system of key performance indicators for the financial analysis of an enterprise is developed. It is justified that the timely controlling and maintenance of the required level of selected indicators will lead to an increase in the efficiency of the company's innovation and investment activities. This determines the relevance and scientific novelty of this work.

Thus, **the main objective of this work** is to find ways to enhance the innovation activity of companies operating under the conditions of financial deficit and to develop a system of key performance indicators that affect the innovation activity of the enterprise.

Achieving this goal implies resolving the following tasks: 1) analyse the factors hindering the enterprise’s innovative activity; 2) investigate the impact of constraints on innovative activity; 3) analyse possible sources of financing of innovative activity; 4) reveal the relationship between the stable financial position of the company and its ability to implement financing for innovation; 5) develop a system of key financial and economic indicators assessing the innovative activity of an enterprise.

The methodological basis of this research is the theory of innovation systems, theory of constraints and the theory of financial analysis. The paper uses analytical research methods based on normative models of financial analysis, such as the method of calculating analytical coefficients, comparative analysis and factor analysis.

2. Analysis of factors and constraints that affect an enterprise's innovative activity

Analysis of ways to increase the innovation activity of enterprises is based on a comprehensive research of factors and constraints that affect innovation. The term "innovation" was first introduced by the Austrian scientist J. Schumpeter, who interpreted innovation as a change in order to introduce and use new types of consumer goods, new production and transportation vehicles, markets and forms of organization in industry (Schumpeter and Opie, 1983). Even before introducing the concept of "innovation", he singled out five typical changes leading to a new quality of the production process emergence, namely: the use of new technology, new technological processes or new market support for production (purchase and sale); introduction of products with new properties; use of new raw materials; changes in the organization of production and its logistics; the emergence of new markets. However, innovation should not be limited only to the sphere of entrepreneurial activity. Innovations are possible in all spheres of human activity: innovation is an idea aiming to gain economic content and ~~to~~ be in demand in the society.

The innovation process (IP) is the process of transforming scientific knowledge into innovation, which can be presented as a succession of events, during which innovation ripens from an idea to a concrete product, technology or service and is distributed while being used in practice (Khvatova, 2009). This process is not interrupted even after an innovation is introduced, because as the distribution spreads, the innovation improves. The IP is aimed at creating the products, technologies and services required by the market.

The possibility of implementing the IP is associated with a certain concentration of an enterprise's resources, the innovative climate in the country and the enterprise's internal innovative potential. In the introduction of this paper, the factors impeding the IP were analysed. In scientific literature, factors are defined as conditions, causes and parameters that affect both the economic process and the outcome of this process (Asaturova, 2016, Litnitsky, 2014). However, in practice, the result itself can also be a factor hampering innovation. Factors and conditions that have a negative impact on innovation and entrepreneurial activity are called constraints (Krasnova, 2013). Therefore, together with an analysis of the factors that affect an enterprise's innovative activity, the effect of constraints on the feasibility of innovative projects is investigated. According to the theory of constraints (Goldratt and Cox, 1992), a constraint is understood as a factor that would contribute to a more successful achievement of the goal, if the company possessed a larger amount of it or used it more efficiently. Goldratt and Cox argued that in any economic system there are boundaries that do not allow it to develop further. There is also a system of constraints in the IP. The system of constraints in innovation means that the optimal combination of the minimum possible number of organisational resources should be found to create and promote an innovative product, in a limited market environment, in order to achieve the maximum possible financial result or other benefit. Let us analyze the main limitations within an innovation system. Based on the literature review, the following types of constraints can be identified: resource, result and market constraints (Krasnova, 2013).

1. *Resource constraints.* Under these constraints, the production or further development of an innovative product is only possible by creating a proper combination between the minimization of resources and the achievement of the desired result. These constraints include, first of all, financial resources, as well as production, technological and labor resources. At the moment, these are the most significant limitations. To overcome resource constraints (including financial ones), it is necessary to raise the company's productivity level, which is estimated by various indicators of the efficiency of the use of enterprise resources, as well as solvency and financial stability indicators, which affect the innovation attractiveness of an enterprise.
2. *Result constraints.* These constraints characterize the future profit of the implementation of the project. Under these constraints, the production and development of an innovative product is possible only in case the product's usefulness for the enterprise needs is proven. In order to take into account these constraints, it is necessary to evaluate the effectiveness of an innovative project implementation. The methods of the economic justification of an enterprise's investment and the innovation activity effectiveness are considered in the works by Asaturova (2015), Litnitsky (2014), Nikolenko and Tarasova (2016). In our opinion, the most important indicators are: net present value of investments (NPV); internal rate of return (IRR); payback period of investments (PP).
3. *Market constraints.* This type of constraint is based on the competitiveness of the innovative product and its brand awareness. Under these constraints, the production or development of an innovative product is only possible in the case of finding a correct concept of conquering a market. The economic

risk of introducing innovation is caused by the uncertainty in the innovative product's competitiveness. This fact is confirmed by the ranking of factors hampering the innovative development of Russian enterprises. According to this ranking, the fifth place among the reasons for low innovation development is the uncertainty of the economic benefit of the innovation result (see Table 1). In order to reduce uncertainty, it is necessary to predict the level of competitiveness of the innovative product. The problems of forecasting the competitiveness of innovative products are discussed in the paper by Zabuga and Vaisman (2017). One of the most important factors affecting the increase in the competitiveness of the company's products is the maintenance of a high level of productivity. Its level, characterized by the ratio of the obtained result divided by the volume of resources consumed, is measured by various profitability and business activity ratios.

When considering the external factors influencing the innovation activity of enterprises, it is also necessary to take into account the innovative and investment climate in the country, the presence of crisis phenomena, the current legislation in the investment sphere, the availability of the benefits for small and medium-sized businesses enterprises and other conditions for innovation. These parameters have a great influence on the entrepreneurial and investment activity of an enterprise, but as the enterprise itself cannot influence their optimization we will therefore not consider them when developing a system of indicators for assessing the effectiveness of the enterprise's activities that affect its innovative activity.

Thus, based on the previous analysis of factors and constraints, it can be concluded that the main problem for entrepreneurship at this current stage of the Russian economy is the resource deficit, including financial constraints. Modern enterprises have to withstand strong competition when attracting capital to finance business and develop innovation. In order to increase the effectiveness of innovation in a financial-deficit environment, it is necessary to increase the ability of an enterprise to attract the capital for innovation. In addition, in our view, the main way to do it is to maintain a company's strong financial and economic position.

As in the conditions of a financial deficit, it is the stable financial position of an enterprise that makes it possible to increase its investment attractiveness and to ensure the possibility of using the company's own capital to finance innovation (Asaturova, 2018).

However, based on the analysis of modern literature, it can be concluded that the financial component of increasing the innovation activity of an enterprise has not been sufficiently developed (Asaturova, 2016). For the moment, there is no developed system of key financial and economic indicators assessing the innovative activity of an enterprise. In this paper, we will trace the dependence of the company's innovative activity on its financial position and will develop a system of key indicators of the company's financial and economic performance, affecting the innovative activity of the enterprise. The theoretical basis for the development of the system of indicators are the works of Russian and foreign authors in the field of financial analysis, such as Brealey, Myers, and Marcus (2017), Garrison, Noreen and Brewer (2017), Sheremet (2011), Savitskaya (2012).

3. Analysis of the financial constraints' impact on financing innovation

As already noted earlier, the problem of financing innovative activity is the main factor restraining the innovative development of Russian enterprises. For an enterprise, financial constraints are primarily related to limiting the possibility of attracting own and borrowed capital to finance innovative activity. In order to identify indicators that increase innovation activity in the conditions of financial deficit, it is necessary to investigate the reasons for the financial constraints of the different types of financing. This will help to understand how an enterprise can influence and overcome them. To explore this question, we will analyze the sources of funding for innovation activities and the financial constraints connected with their use.

Based on the analysis of modern literature and the practice of Russian enterprises, it can be concluded that all sources of financing the company's innovation activity can be divided into 2 groups: external – loan sources of financing and internal sources - own sources of financing (Glukhov and Ostanin, 2013, Lee and Saen, 2012).

According to the present conditions in Russia, due to the reduction in state financing, the main type of *external financing* for the development of innovation in small and medium business enterprises has been bank credits and other types of loan financing in the financial and credit market. It is necessary to mention that the loan sources of funds have its advantages. The cash flows from the realization of the project are concentrated on

the accounts of the enterprise, providing the potentially profitable assets, which gives an opportunity to increase profitability. At the same time, control over the management of the company is not distributed to an unlimited number of individuals, as in the case of the use of share capital. In addition, financing through loans may be preferable for the development of new projects of enterprises that already exist because such enterprises are not required to pay higher fees for bank credit due to insignificant risk in the presence of material security for a loan covered by available assets.

However, at the moment, the use of bank loans is strongly limited in a view of high interest rates and its availability is severely limited by parameters such as the financial position of the enterprise. The objective reason for the insignificant use of foreign capital by Russian organizations is the low level of economic profitability of assets compared to the interest rate on loan capital in the Russian financial market. Therefore, bank loans are, as a rule, used to implement projects that have a high rate of return. Note that the rate of interest and the possibility of obtaining a loan at an enterprise primarily depend on the magnitude of the risk on the project and the characteristics of the company. Therefore, to ensure the possibility of attracting loan financing, it is necessary to increase the investment attractiveness of the company and the level of profitability of the company's assets.

Let us consider the other external forms of financing, such as state budget financing, foreign investment, venture capital and financial leasing. Note that the use of these forms of financing is strongly limited or has a specific nature. For example, financing using the state budget, as the main source of financing for large-scale scientific projects, is typical for large industrial enterprises. In addition, its availability is very limited. The state budget funds are given primarily to industries focused on the production of import-substituting products, competitive goods and services, on industries whose products will continue to be in high demand for a long time, as well as to industries developing new products or products of a higher class. Foreign investors in Russia mainly finance innovative projects related to the development of progressive foreign technologies. However, in view of the economic sanctions that are applied to Russia now, this type of financing is limited (Boboshko, 2014). The use of venture financing in the Russian market also has its limitations. One of the main factors hampering the development of venture capital investment is the lack of a legislative framework for the creation of private venture funds. Practice shows that a large part of venture companies working in the Russian market are organized by international organizations, or on the basis of intergovernmental agreements, which is again substantially limited in the face of economic sanctions. Financial leasing, as a form of a long-term loan to finance fixed assets, also has its limitations. Leasing schemes cannot be applied to all types of innovative projects. What is more, the cost of purchased equipment, together with the interest owed to the bank and insurance payments, can be extremely high, while the equipment market price during leasing can significantly decrease. Statistics show the limited use of this type of financing at Russian enterprises. In the Russian economy, leasing accounts for only 2-3% of investment into equipment.

The internal sources to finance innovation involve the use of own funds of organizations. These include the company's paid-in capital, retained earnings and the company's depreciation fund.

Self-financing by a company's internal funds is one of the main sources of financing the company's activities in conditions of limited capacity for obtaining loans. Internal financing sources include the accumulated capital profits, including the reserve fund, the depreciation fund of the enterprise and the expansion of the share capital of the enterprise. However, the use of these types of financing also has its limitations. The main limitation for most Russian enterprises is the low profitability and, as a consequence, the limit of net profit as the main internal source of financing. The share of depreciation charges in Russia as a source of financing of capital investments is also not high. At the moment, it is about 20% of the financing of capital investments, while in other countries their share reaches 70%. Therefore, in order to ensure the use of profit and depreciation fund to finance innovation, it is necessary to maintain profitability and business activity at a high level, and to improve the efficiency of the use of fixed assets of the enterprise.

Equity financing allows accumulating large financial resources by placing shares among an unlimited number of investors. The primary issue of shares is connected with the creation of new enterprises. For the development of an existing business, including the implementation of innovative projects, an additional issue of shares is made. The use of this form has some advantages over the loan sources of financing, since it allows enterprises to postpone the payment of liability for a later period, when the investing object starts to make a profit and the costs and results are more certain. However, collecting such funds for small and medium-sized companies

is more difficult than obtaining a bank loan. That is why in order to attract the capital through the issue of shares, it is necessary to ensure the stable financial position of the company, monitor the quotation of company shares and other indicators of the company's economic performance.

Thus, under modern conditions, which are characterized by limited budget financing, economic sanctions, high interest rates for lending and low profitability of the company's assets, the financing of the company's innovative activity is objectively limited. Overcoming these financial constraints is primarily related to raising the level of the financial position of the company. The stable financial position of the enterprise and monitoring such indicators as solvency and financial stability will allow the enterprise to provide a high level of investment attractiveness for increasing the possibility of attracting loan capital. Maintaining a high level of indicators such as profitability and business activity will make it possible to increase the efficiency of financing innovation with the company's own resources.

4. Developing a system of key performance indicators affecting the innovative activity of an enterprise

In the previous part of the study while analyzing the sources of financing innovation in modern conditions, we found that financing innovation is mainly carried out at the expense of the own funds of the organization and bank loans. Timely accounting of indicators of solvency and financial stability allows the company to respond to a possible shortage of cash in time, avoid bankruptcy and ensure the possibility of further borrowing for business expansion and development of innovations (Moiseeva and Scheulnikova, 2008).

In order to use its own sources of financing, an enterprise needs to monitor the status of indicators such as profitability and business activity. Ensuring a high level of productivity and asset turnover will overcome the company's resource limitations. Key financial and economic indicators from the sections of solvency, financial stability, business activity and profitability, contributing to the increase of the innovative activity of an enterprise, are summarized in Table 1. Let us justify the choice of specific indicators.

4.1.1 The solvency indicators.

The level of solvency indicators shows which part of the short-term debt can be repaid by the working capital available to the enterprise. These indicators differ by the level of liquidity (Asaturova, 2017). The most important indicator in assessing the company's investment attractiveness, in our opinion, is the *current asset ratio* indicator (CR), as it assesses the overall payment abilities of the enterprise, including the debts payment together with the opportunity of the further running of the business. In these conditions, the current assets should exceed the company's short-term debts by at least two times, as the most liquid assets can be used to pay debts. In order to analyze all the groups of debt of the company, the method of analyzing the liquidity of the balance is used (Asaturova, 2018). According to this method, the solvency assessment is carried out for all types of enterprise debts, grouped by maturity. If the own capital to ensure a sufficient level of solvency is not enough, the enterprise faces the task of increasing solvency. The solution of this task is connected with the replenishment of net working capital by the company profit (Biger, Gill and Mathur, 2010).

4.1.2 The financial stability indicators.

Analysis of financial stability implies an assessment of the possibility and appropriateness of borrowing funds to finance projects. The most important indicator characterizing the financial stability of the enterprise is the Equity to Total Assets indicator (EtTA). The level of the coefficient should exceed 50%. In this case, creditors realize that all loan capital can be compensated by the property of the enterprise. The financial solidity indicator characterizes the financial stability of an enterprise. The value of this coefficient shows the weight of those sources of financing that the enterprise can use in the business for a long time. The assets investment indicator characterizes the correctness of investing equity capital in the company's assets. The equity mobility indicator is very important for ensuring the flexibility of an enterprise in a constantly changing market environment. It shows the level of the net working capital in equity capital, characterizing the share of the equity capital, which is used in the working capital of an enterprise.

4.1.3 Profitability indicators.

Profitability indicators assess the level of capital return. The main purpose of profitability indicators is the overall assessment of the effectiveness of investing funds in the company. These figures are calculated as the ratio of the received for the investment base, with the help of which this profit was obtained (Garcia-Teruel

and Martínez-Solono, 2007). Under the base we can understand the invested capital, the resources expended and the sales of the production. The level of profitability characterizes the enterprise's ability to attract the company's own capital to finance innovation. The most preferred indicator for the possibility of influencing the innovative activity of the company is the Return on Equity indicator (ROE) which characterizes the profitability of the joint-stock or equity capital. The Return on Sales indicator (ROS) characterizes the profitability of sales.

The Return on Costs indicator (ROC) characterizes the profitability of production (recoupment of costs and expenses), characterizing the efficiency of the company resource use, which is important for overcoming resource constraints. The return on fixed assets indicator characterizes the return on property plant and equipment and values the efficiency of the use of the company's fixed capital.

4.1.4 Business activity indicators.

Indicators of business activity assess the effectiveness of the use of company resources by type, which is important in the presence of resource constraints. The high level of the business activity indicators characterizes the high level of company productivity, which measures the cost-benefit ratio of the company.

Business activity is calculated using indicators of turnover (turnover ratio and turnover period in days), which can be applied consistently to any type of analyzed resources in the enterprise (Asaturova, 2018). The concrete indicators are selected based on an analysis of the specifics of the enterprise. The most preferable indicators for the purpose of the overcoming of resource restrictions are turnover of fixed and working capital, inventory turnover and accounts receivable turnover. The growing level of these indicators allows companies to attract fewer resources to achieve the necessary results, which is important in the context of resource and financial constraints.

Thus, the selected key performance indicators that affect the increase of the innovative and investment activity of a company operating under financial constraints are presented in the Table 1.

Table 1: The system of key performance indicators assessing the innovative activity of an enterprise in the conditions of a capital deficit

Indicators	Principle of calculation	Comment
1. Solvency and financial stability indicators		
1. Current asset ratio indicator (CR)	Working capital / Current Liabilities > 2	It characterizes the ability of pre-acceptance to pay off short-term debts with simultaneous continuation of uninterrupted activity
2. Equity to Total Assets indicator (EtTA)	Equity capital / Total Assets > 0,5	Characterizes the independence of the enterprise from borrowed funds. It is the main criterion for the possibility of borrowing loan capital
3. Financial solidity indicator	(Equity capital + Long-term loan capital) / Total Assets > 0,5	Characterizes the share of capital of long-term use
4. Assets investment indicator	Equity capital / fixed assets capital > 1	Characterizes a share of equity in fixed assets of the enterprise
5. The equity mobility indicator	Net working capital / equity capital * 100 %	Characterizes flexibility in the use of a company's equity capital.
2.Profitability indicators		
1. Return on Equity indicator (ROE)	Net Profit / Equity capital * 100 %	Characterizes the efficiency of the equity capital. Promotes the valuation of stock quotes on the exchange.
2. Return on Sales indicator (ROS)	Net Profit / Sales of production * 100 %	Characterizes the profitability of the implementation, estimates the possibility of financing business by profit.
3. Return on Costs indicator (ROC)	Net Profit / Costs * 100 %	Characterizes the level of productivity and cost recovery level.
4. Return on fixed assets indicator	Net Profit / Fixed assets * 100 %	Characterizes the return on property plant and equipment, the efficiency of the use of fixed assets.

3. Business activity indicators		
1. Asset turnover indicators (by types)	Revenues from sales / cost of assets	Characterizes enterprise productivity, resource efficiency, by type
2. The period of assets turnover in days	Number of days per year / asset turnover	Characterizes the duration of one turnover of the assets in days

Timely accounting and maintaining the required level of these indicators allows companies to increase the opportunity of raising funds for the enterprise and thereby leads to an increase in the innovative activity of the enterprise. The proposed system of indicators can also serve as one of the methods for assessing the financial risk of working with the company (Nefediev and Suloyeva, 2014).

5. In Conclusion

In this paper, we have investigated the possible ways to activate innovative activity at Russian enterprises in the conditions of financial deficit. To solve this problem, the following tasks were performed:

1. The analysis of the factors interfering with the innovative activity of enterprises in the current conditions is made. It is shown that the main factors that negatively influence the innovation activity of enterprises are economic factors, such as the lack of financial resources, the high cost of innovation, the economic risk in the implementation of the project and the inability to determine the economic benefits of the project.
2. The impact of various types of constraints on the company's innovative and entrepreneurial activities were analyzed. Resource, performance and market constraints were considered. It was revealed that the most important constraints in the innovative activity of enterprises are the resource constraint and in particular, the financial constraints.
3. The influence of financial constraints on the possible ways of financing innovation is considered. It was revealed that the main sources of financing in modern conditions are loan capital on the financial and credit market, as well as the self-financing of the enterprise thanks to the profit of the enterprise and additional issue of shares. The ways of overcoming financial constraints by the use of various types of financing are considered.
4. The connection between the financial condition of an enterprise and its ability to attract funds for activating innovation activity under financial constraints is traced. It is shown that the provision of a stable financial position of a company is one of the most important conditions for increasing the investment attractiveness and innovative activity of the enterprise. Solvency and financial stability indicators will allow the company to provide a high level of investment attractiveness to increase the possibility of the loan capital rent. Maintaining a high level of profitability and the business activity indicators will increase the possibility of financing innovations by the company's equity.
5. Based on the results of the study, a system of performance indicators of the enterprise that have an impact on the innovation activity of companies was developed (Table 2). Timely accounting and maintenance of the required level of these indicators will lead to an increase in the effectiveness of the innovative and investment activities of an enterprise, which determines the relevance of this work.

Using the developed system of indicators in the business practice of the enterprise gives the entrepreneur an opportunity to identify the main shortcomings in the financial and economic activities of the company that negatively affect the innovation process. Correcting these shortcomings can significantly increase the possibility of attracting financial resources to finance innovative projects.

References

Ahlstrom, D. (2010) “Innovation and Growth: How Business Contributes to Society", Academy of Management Perspectives, Vol 24, No. 3, pp 11–24, doi:10.5465/AMP.2010.52842948

Asaturova, Yu. M. (2015) “Methods of assessing the effectiveness of innovative activity of the enterprise”, Innovative economy and industrial policy of the region (ECOPROM-2015), Proceedings of the International Scientific and Practical Conference, Alexander Babkin (ed.), pp 382-385.

Asaturova, Yu.M. (2016) “Directions of activization of innovative activity of industrial enterprises”, New economic reality, cluster initiatives and development of industry (INPROM-2016), Proceedings of the international scientific-practical conference, Alexander Babkin (ed.), pp 307-313.

Asaturova, Yu. M. (2017) “Methods for analyzing the solvency of the enterprise”, Industrial Policy in the Digital Economy: Problems and Perspectives (ECOPROM-2017). Proceedings of the scientific-practical conference with international participation, Alexander babkin (ed.), pp 576-579.

Asaturova, Yu. M. (2018) “Development of an integrated approach for analyzing the financial and economic activities of an enterprise”, Nauchno-technicheskie vedomosti SPbSPU. Economic sciences, Vol 11, No. 1, pp 222-234.

Bek, M.A., Nadezda N. Bek, N.N., Sheresheva, M.Y. and Johnston, W.J. (2013) "Perspectives of SME innovation clusters development in Russia", Journal of Business & Industrial Marketing, Vol 28 (3), pp 240-259, https://doi.org/10.1108/08858621311302895.

Steil, B., Victor, D. G. and Nelson, R. R. (2002) Technological Innovation and Economics Performance. A Council of Foreign Relations Book. Princeton University Press.

Romer, P. M. (1990) “Endogenous technological change”, Journal of Political Economy, Vol 98(5), pp 71–102

Neff, C. (2002) Corporate Finance, Innovation, and Strategic Competition, Springer Science & Business Media.

Maradana, R.P., Pradha, R.P., Dash, S., Gaurav, K., Jayakumar, M. and Chatterjee, D. (2017) “Does innovation promote economic growth? Evidence from European countries”, Journal of Innovation and Entrepreneurship, Vol 13, No.1, pp 1-23, https://doi.org/10.1186/s13731-016-0061-9.

Zabolotskaya, V.V. (2015) “State financial support of innovative activities of SME abroad”, Financy i credit, Vol 28, pp 31-43.

HSE Publishing (2017) Innovation activity indicators. Statistical Handbook, [online] HSE Publishing, Moscow, https://nangs.org/analytics/vshe-ctatisticheskij-sbornik-indikatory-innovatsionnoj-deyatelnosti-pdf.

Zabuga, A.S. and Vaisman, E.D. (2017) “Methodical aspects of the problem of forecasting the competitiveness of innovative products of an industrial enterprise”, Nauchno-technicheskie vedomosti SPbPU. Economics, Vol 10, No. 4, pp 155-165.

Litnitsky, I.A. (2014) The method of effective management of innovative projects in conditions of uncertainty: dis. Ph.D. St. Petersburg: SPbSPU.

Vertakova, Yu.V. and Kulikov, M.V. (2014) “Interstate economic cooperation of Russia in conditions of economic sanctions and restrictions”, Izvestiya South-Western State University. Series: The Economy. Sociology. Management, Vol. 3, pp 11-19.

Abramov, D.V. (2016) “Possible probable choice of the company's optimal strategy in the context of the global economic crisis and restrictions of economic sanctions”, Economics, sociology and law, Vol 4(1), pp 6-13.

Schumpeter, J.A. and Opie, R. (1983) [1934]. The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle. New Brunswick, New Jersey: Transaction Books. ISBN 9780878556984. Translated from the 1911 original German, Theorie der wirtschaftlichen Entwicklung.

Khvatova, T. (2009) National systems of foreign countries: goals and development strategies, St. Petersburg: Polytechnical Institute.

Brealey, R.A., Myers, S.C. and Marcus, A.J. (2017) Fundamentals of Corporate Finance (Mcgraw-hill/Irwin Series in Finance, Insurance, and Real Estate) 9th Edition, McGraw-Hill Education; 9 edition.

Garrison, R.H., Noreen, E. and Brewer, P.C. (2017) Loose Leaf for Managerial Accounting, 16th Edition, McGraw-Hill Education; 16 edition.

Goldratt, E.M. and Cox, J. (1992) The Goal: A Process of Ongoing Improvement, North River Pr; Revised edition.

Krasnova, N.A. (2013) “The concept of limitations in the innovation process”, Economics and management of innovative technologies, Vol 11 [online] http://ekonomika.snauka.ru/2013/11/3262.

Nikolenko, T.Yu. and Tarasova, E.V. (2016) “The system of balanced indicators evaluation and the tools for evaluating the effectiveness of innovative projects”, Nauchno-technicheskie vedomosti SPbPU. Economics, Vol 6 (256), pp 228-235.

Nefediev, D.S. and Suloyeva S.B. (2014) “Methods for detecting risks at an industrial enterprise”, Organization of production, Vol 4, pp 69-77.

Sheremet, A.D. (2011) Complex analysis of economic activity, Moscow: INFRA-M.

Savitskaya, G.V. (2012) Analysis of economic activity, Minsk: RIPO.

Glukhov, V.V. and Ostanin, V.A. (2013) “Formation of theoretical aspects of financial science at internationalization of economic relations”, Middle-East journal of scientific research, Vol 13, pp 95-100.

Lee, K.H. and Saen, R.F. (2012) “Measuring corporate sustainability management: A data envelopment analysis approach”, International Journal of Production Economics, Vol 140, No. 1, pp 219—226.

Boboshko, N.M. (2014) “Use of economic analysis in the management of financial and economic activities of the organization in the anti-crisis measures”, Transport business of Russia, Vol 1, pp. 142-147.

Moiseeva, A.S. and Scheulnikova, L.Yu. (2008) “Methodology for assessing the solvency and financial stability of enterprises”, Successes in chemistry and chemical technology, Vol 22, No. 12, pp 9-12.

Biger N., Gill A. and Mathur N. (2010) “The Relationship between Working Capital Management and Profitability: Evidence from the United States”, Business and Economics Journal, Vol 10, pp 1—9.

Garcia-Teruel P.J. and Martínez-Solono P. (2007) “Effects of Working Capital Management on SME Profitability”, International Journal of Managerial Finance, Vol 3, No. 2, pp 164—177.

Reshaping Society with Open Innovation – The Seeding of a New Open and Innovative Mindset

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Abstract: This article is a description of a growing community and movement taking place in Portugal related to open innovation. The testimonies of two principal promoters as well as the views of two career academics were gathered. Herein, the process is described whereby real corporate problems felt in industry and requiring a solution are brought for discussion and resolution by a community of motivated problem-solvers, who were carefully chosen for their skills and capabilities. Can this initiative become a mass phenomenon and can it be built up to attract [paying and sponsoring] corporations across Europe and from different continents? How can the events evolve to become mainstream? What capabilities and promotion are necessary for that to occur? The promoters involved are entrepreneurs located in central Portugal and are seen to be forward-thinkers disrupting how innovation is seen and approached. In a society geared towards services and tourism the team is seeking to bring open innovation to the fore in a country also considered to be very creative and not lacking in creative talent – but which on the other hand is very traditional, collectivist, hierarchical, consensus-seeking, and where innovation may be resisted and change viewed with suspicion. In a 72-hour time frame where problem-solving participants are invited and gathered at a physical venue individuals surpass themselves and experience team work in a setting where all logistics issues are previously carefully thought out and taken care of – so as to provide for the best problem-solving environment possible. The open innovation initiatives (called Hackathons) involve the following: defining the challenges (we want challenges that define goals and purposes but that are open enough to let the team build something creative), defining the fit (each candidate can apply as a team or individually; candidates select their preferred area); building teams (the candidates are free to change teams and can even propose their own challenges; we encourage communication between the team elements and also the mentors). A three-day Hackathon involves: creating a team spirit; constant feedback; building an MVP (Minimum Viable Product); learning new things; sharing is caring.

Keywords: open innovation, traditional society, disruptive practices, disruptive thinking, problem-solving.

1. Introduction

This article is a manifest for action, given the situation in Portugal, and seeks to shed some light on which critical requirements should open innovation satisfy in order to be productive. "There is wide acknowledgement that inter-firm co-operative ties now play an important role in promoting innovation within firms […] The key idea is that through the exchange and co-ordination of resources and information in the value chain, firms can benefit from synergies in production, organisation and crucial knowledge transfer, which can lead to greater levels of both product and process innovations." (Tomlinson, 2010, p.762). Open innovation occurs along a closed-open continuum and is a new paradigm (Chesbrough, 2003). However, in traditional societies, such as Portugal, progress in this direction has been happening slower and change is imperative. Trust between open innovation partners is an important issue, and more study on the functioning of networks is necessary, in addition to the work done concerning transaction versus relationship societies.

Firms need also to release and dedicate funds to the pursuing of new innovative avenues in order to make, for example, open innovation Hackathon events financially rewarding for both parties – the organisers as well as the firms seeking solutions to their problems and challenges (Oliveira et al., 2012, 2013). This study is mainly an account by change agents who are implementing novel, cost-effective and carefully planned open innovation initiatives in Portugal. The ultimate objective is for the open innovation consortium to become an internationally sought out innovation partner, and to achieve this certain principles will have to be followed (Van Geenhuizen et al., 2015). As an exploratory initial effort this work is soon to be expanded upon with a more in-depth and specialized account, aimed at specific target groups. Open innovation is addressed as being a society-wide movement, going beyond companies and other organizations.

1.1 A definition of some key concepts related to innovation

Innovation may be defined as "new and useful products or procedures" (Rossberger and Krause, 2012, p.84).

This usefulness will depend on the region we are in and will also be dependent on the prevalent culture (Muslims and the Jewish will not eat pork, and people in India will not eat beef, for example). One hears tales of how in Africa older iPhone models are shipped there for sale, as in this region they lack the funds to buy the latest iPhone models. Thus, innovation adoption will also be dependent on economic factors. Additionally, certain countries do not have commercial relations with the USA, for example, and this limits the sort of products people have access to – again, an economic factor, as well, or even a political one, if political hostilities exist (Ghemawat, 2001).

Some authors have classified innovation as possibly concerning products / services – "product innovations involve significant changes in the capabilities of goods or services" (Oslo Manual, 2005, p.17); organisational practices – "the implementation of new organisational methods" (Oslo Manual, 2005, p.17); marketing practices – "the implementation of new marketing methods. These can include changes in product design and packaging, in product promotion and placement, and in methods for pricing goods and services" (Oslo Manual, 2005, p.17); as well as processes – "process innovations represent significant changes in production and delivery methods" (Oslo Manual, 2005, p.17). Nespresso was innovative in the way it worked with George Clooney to sell and promote Nespresso coffee as a capsule (marketing innovation). Having people work in an open space made people socialize more but also led to greater peer control (organizational innovation). Apple products have exceptional and innovative design and packaging (marketing innovation). Amazon and Farfetch innovated in the form concerning how products are delivered (in these cases, over the Internet, and via e-commerce) and have reaped tremendous rewards for that innovative effort (process innovation). Farfetch and Apple have also placed their products at the top end of the product spectrum, and this eliteness has also benefitted sales and the brand (marketing innovation). A lot of innovation today occurs linked to marketing practices.

Everdingen and Waarts (2003) did a study entitled "The effect of national culture on the adoption of innovations". Their results indicate "that variables describing national culture have a significant influence on the country adoption rates" (Everdingen and Waarts, 2003, p.217). They found that, still further, "while new products, systems or services are frequently launched in multiple countries, it is not uncommon for products to have high rates of adoption in particular countries but low rates in others. Even within Europe." (Everdingen and Waarts, 2003, p.217). So, the UK is different to Sweden, which is different to Portugal. Though not discussing Portugal in their article, they did mention our neighboring "cousin" Spain, and found that "the Nordic countries (Denmark, Sweden, Norway) have relatively high adoption rates, while the UK and southern countries like Spain score significantly lower" (Everdingen and Waarts, 2003, p.217).

Rossberger and Krause (2012, p.84) showed that "at the country level three cultural dimensions (uncertainty avoidance, in-group collectivism, and human orientation) are crucial for innovative outcomes in 55 countries".

Additionally, "diversity is expected to be positively related to innovation, which would make the inhomogeneity in cultural practices a cause of national innovation" (Rossberger and Krause, 2012, p.88).

According to Everdingen and Waarts (2003, p.228), "the higher the scores on UAI [uncertainty avoidance index], MAS [masculinity index] and PDI [power distance index], the lower the ERP adoption rate [ERP stands for Enterprise Resource Planning systems – which are an innovative and advanced type of software for controlling operations, promoting collaboration and the sharing of production knowledge for example in a manufacturing firm environment]. And, the higher the score on LTO [long term orientation], the higher the ERP adoption rate". Therefore, as Portugal scores very high on UAI (i.e. it is adverse to change, with only Greece scoring higher than Portugal, on this dimension, out of 62 countries) and high on PDI (i.e. organisations are very hierarchical and autocratic) (Hofstede, 2001), it is expected to have a lower adoption rate. Portugal also scores low on LTO (being short-term oriented) (Hofstede, 2001), leading, again, to a low adoption rate of innovations.

Chesbrough (2003) first coined the term "open innovation" as a paradigm assuming that innovation performs quicker and better if firms use external ideas as well as internal ideas, and internal and external paths to market. An example of successful open innovation is Hollywood, which for decades has innovated through a

network of partnerships and alliances between production studios, directors, talent agencies, actors, scriptwriters, independent producers and specialised subcontractors (such as the suppliers of special effects).

The mobility of this workforce is legendary: Every waitress is a budding actress; every parking attendant has a screenplay he is working on" (Chesbrough, 2003, p.37). While countries such as Portugal score high on uncertainty avoidance, and low on masculinity, meaning that they are not innovation-welcoming, but rather prefer harmony and good [even if superficial] relationships (innovation disrupts rather than unites, especially in its initial phases), the notion of open innovation may present itself as problematic. Furthermore, people strive for long-term employment with rock-solid contracts in Portugal and the idea of mobility does not generally have appeal in Portuguese society.

Baldwin and Hippel (2009, p.1), in relation to the open innovation topic, "conclude that innovation by individual users and also open collaborative innovation increasingly compete with – and may displace – producer innovation in many parts of the economy. We argue that a transition from producer innovation to open single user and open collaborative innovation is desirable in terms of social welfare, and so worthy of support by policymakers". Thus, we see the theme of this article as being important to the innovation community as, herein, we describe how we are witnessing the seeding of a new open and innovative mindset, in Portugal. Open innovation in such terms, and in a society with creative individuals such as Portugal, may spell new business opportunities for newly formed entrepreneurs who may appear as user-inventors; if the open innovation culture catches on.

However, open innovation also needs to be 'managed' such that benefits can be gained by all partners. We mention management of decision rights, bargaining power and – if new technology is involved - intellectual property rights (Gambardella and Panico, 2014). Management of the degree of openness and open knowledge relations is also important as the benefits on innovation or growth tend to stop increasing after a certain level and may even decrease (inverted U-shape relation) (Laursen and Salter, 2006; Taheri, Ye and Van Geenhuizen, 2018).

1.2 A discussion on open innovation

Open innovation is getting quite the attention from entities aiming to deliver creative and successful products to the market. Corporations need to move faster than ever and hard-working motivated employees are the fuel.

The ability to go through the whole process chain from Ideation to Production in a fast and controlled way shapes the market. Delivering quality products and reaching the market first are two key elements towards success. We've seen many big companies adopting Product Development methodologies such as Agile, which are built for fast adjustment and open communication. A prioritised backlog is shared with the whole team and is agreed with the customer, promoting openness, transparency through knowledge sharing and co-creation.

Instead of delivering a final product with a huge amount of features, it encourages delivery iterations of smaller feature sets so that feedback can be obtained earlier in order to allow early stage adjustments. That is today's reality: build fast, get feedback early, and adapt. Startups have also been employing these concepts.

Eric Ries in his Lean Startup Book - a manual for today's entrepreneurs defines the 3 key concepts that every startup should look into: Build > Measure > Learn. Building fast, getting feedback faster and taking lessons to adjust to that feedback. Startups worldwide have taken this approach starting with an MVP (Minimum Viable Product) and following this 3-step-cycle faster than ever. Alongside these methodologies new sets of tools started being accessible to everyone, such as electronics, 3D Printers, cheap computing machines for prototyping (such as Arduino and Raspberry Pi to name a few). This also allows to obtain faster prototypes of components at a much lower cost.

It is the consortium's mission to bring all of these concepts to everyone so that we can help shape the mindset towards a more open and innovative approach in work, specifically in product development. To do so we started idealising an open Hackathon and in the process we ourselves use all of the methodologies we want to put in practice at the said events.

2. Building a truly open event and shaping society's mindset

Some of the companies that participated were a little bit too shy about the challenges…

We have defined a process to allow people to fuel their brains by solving real problems in an open way. Each event creates its own culture, and we constantly promote communication between all parties through open platforms. We defined a model in which several companies and research organisations could share their real problems. We would open these challenges to the community for people to apply to solve them as teams within 72h.

Let us go through the process faced by our organisation:

1. Preparation
2. Three Day Hackathon
3. Post Hackathon

As an organisation we need to put some mechanisms in place. We follow the same methodologies we advocate within the organisation. We organise ourselves as if we were a set of Scrum Teams working on an Agile Project. We have a Product Owner who is responsible for defining the requirements and mapping them into the User Stories, which are then tracked in a backlog – we use Asana (Asana, 2018) for that. We defined a set of teams and a Scrum Master per team. We defined the following teams:

- Program
- Logistics
- Sponsors and Partnerships
- Marketing
- Multimedia Platforms
- Participants Support

The program is in charge of defining the rules of the game. This team defines what will happen and when. It defines the schedule and helps the Product Owner define the requirements for logistics. The program team sometimes acts as the customer for the Product, and because of that, it is in constant contact with the Product Owner during the construction of the backlog.

The logistics team is in charge of everything that concerns the venue. It needs to take into account the available space in order to feed the available slots for sponsors; it needs to think about video and audio, where to place the stage and its dimensions. All the details of how the event is going to play out and even support activities: social events, where to sleep, food, water, constant refreshing drinks, lights, etc.

The Sponsors and Partnerships team is in charge of ensuring that the event happens, they take care of conveying the vision towards companies that want to reshape the industry by taking advantage of these events. They are the word spreaders and go on Roadshows to present and promote the event in Universities, Research Institutes, Corporates, Schools. Not only do they talk about the event they also promote the values which the organisation represents as being basic to the next generation society.

The Marketing team designs the concept and all the content for media promotion. We use a theme that is matched with both the region and the type of challenges. This helps promote the local entities, and makes them act as partners as well. Marketing is all about delivering a message, and this team is key towards that goal. In the end everything we are working for sums up to delivering a message for the future. The brand is very important and it is born not only from beautiful graphics, but mainly from concepts, ideas worked from a group of creative people that take the local characteristics and the concept of the event and create a beautiful graphical representation of those same ideas. The creative team also decided to attribute a Creative Common Open Source license and shared all the sources of this brand. These simple parallel decisions also contribute to the Open Innovation mindset, inviting others to reuse and collaborate with these open minded creative teams.

The multimedia platform team acts as the support team, taking care of the digital platforms, streaming, website, registrations, communication platforms, etc. Basically everything that is digital. This team works in close collaboration with the Participants support team, which is responsible for selecting the participants,

onboarding them, and promoting conversation with the challengers. Throughout the event the participants will always have someone from this team to count on.

Each team is self-organised. It has its own features which each team member commits to and each team member is in constant communication with the Scrum Master. Once a week all the Scrum Masters gather with the Product Owner (and anyone else who wants to meet, provided they are primarily listeners) for a Sprint Grooming Session, in which for each iteration, all the Scrum Masters explain what was done, the problems faced, and what needs to be done next. Each problem is duly noted and the Product Owner identifies who can help solve it. Any delay impacting on other tasks is evaluated, and the project is updated accordingly. Each Scrum Master is given limited time to keep the meeting agile, but Action Items are taken to be followed up afterwards with only the required elements. The main focus is to highlight the Progress, the Problems encountered and the Planning to be done until the next meeting.

Each meeting is scheduled by sending an agenda beforehand stating the objectives of the meeting, the prerequisites for that meeting (e.g.: study a document, complete a form) and the expected outcomes.

3. The community

We thrive to create a community. None of this would be possible without the combination of several entities. Our goal is to bridge the gap between the Industry, the Startups and Academia, bringing Makers into the play.

The Maker movement is defined as a DIY (Do It Yourself) culture, and is composed of tech enthusiasts that thrive to solve problems on their own. It has gained quite a momentum with the ease to acquire electronic components that China offers nowadays. They are essential to the success of the event and the community we promote.

Regarding startups, in Thiel and Masters (2014) one may read that “positively defined, a startup is the largest group of people you can convince of a plan to build a different future. A new company’s most important strength is new thinking: even more important than nimbleness, small size affords space to think”. They are a key engine towards innovation these days, as they promote change at a faster pace in a riskier way.

The industry is the basis for everything. Usually coined to bigger corps, which needs to manage profits and shareholders, they are thought of as a big ship that is harder to maneuver. More resilient to faster changes and more difficult to adapt. We believe this has changed. More and more, big corporations are looking to do things the “Startup-up” way, creating innovation and intrapreneurs.

Academia contains all the engineering fuel. It is thinking ahead of time, usually less concerned with profit and more with the vision of the future, breaking the line between what is and what it could very well be in the future.

We want to combine all of these profiles to create a rich and positive community in which everyone can seek others to complement their knowledge and needs.

4. Event Preparation

There is a lot of work before the event.

It all starts with the definition of the challenges. We want challenges that define goals and purposes but that are open enough to let the team build something creative. For instance, one of the challenges proposed for a biomedical device (BITalino, 2018) was to create a musical instrument (virtual or physical) controlled by physiologic signals acquired through a wearable device. This kind of challenge allows the teams to have a common and shared goal but leaves a lot open for creativity and as regards the approach, since nothing is specified as to how it should be accomplished. Our organisation works closely with the entities providing the challenges to make them open, creative and executable within the span of the event. We focus on increasing the engagement of the mentors since an early stage to improve the quality of the preparation.

After having a set of challenges, we open the call to the candidates. Each candidate can apply as a team or individually. Candidates select their preferred area. When selecting the candidates we use their profile and

match them with other candidates to create multi-disciplinary teams in their preferred challenges. They are given some challenges to choose from which they can decide as a team.

The organisation selects teams taking into account the type of challenge and the candidates' profiles in order to create multi-disciplinary teams. When candidates apply as teams, other elements can be added to the team to complement their technological skills. As soon as a team is formed, they sign-in to our community – we use Slack(2018) – which is organised by channels, and where each team has its own channel, but can also communicate with all the other teams. Each challenge owner is also added to the team. This is usually someone within the challenge-proposing organisation that has been accompanying the challenge definition and will help out the team as mentor. The candidates are free to change teams and can even propose their own challenges. We encourage communication between the team elements and also the mentors.

5. Three Day Hackathon

Let the games begin.

We start the event with a short keynote to lay down some rules. We then show the place around to all the participants in groups and invite them to interact so that a true team spirit is built. We promote cooperation between teams and have social events for people to relax.

We believe that environment is key and to boost productivity and creativity we focus on having a venue with lots of natural light during the day, and good lighting during the night. We design social areas and a fun room with arcades and a lounge. We pick food that is light and nutritional to keep creativity standards high. All communications are short and concise to keep people working. We promote a casual and safe environment where everyone can be relaxed.

When the event starts we encourage teams to start talking about how they are going to solve the problem: their approach, what they need, planning and execution. It is expected that when the Hackathon starts teams already have an idea of what, how and when to build. We emphasize this by establishing two well defined times of the day in which each team is invited to share the following, with all the Mentors:

- Progress: what was done, what changed;
- Needs: roadblocks, necessities for the next stage;
- Goals: objectives for the upcoming hours.

We call this the PiNG (Progress, Needs, Goals), a concept we have reused from TOM Hackathon (TOM, 2018), and which reflects a short moment in which people basically do a Stand Up meeting such as a Scrum Meeting . We print out large boards (figure 1) for each stage, so that everyone can see their progress throughout the event and so that anyone can go and see what the needs of each team are.

We encourage the teams to think of each of these stages as an iteration, and all the mentors are invited to give feedback on the progress at the PiNG.

We advise the teams to think of the final result of their work as an MVP (Minimum Viable Product). Something that could actually represent what they are trying to achieve within the time constraints of 72 hours. The MVP should be iterable, meaning that, a working basis should be created with features / functionalities added as time goes by. We encourage people to build, and to that end we have over 12 mentors always available that cover several areas. We go the extra mile to have several 3D printers, electronic materials, large printers, as well as experts to explain and teach as to how to use them. Mentoring is key to help teams define what is really important, and what is not, for the goal of the project.

As mentioned above we bring top-class mentors to the event who are always ready to help everyone in their tasks. However, sometimes that isn't enough. For that end we also promote several workshops which people can attend, and which try to target the several challenges. Amongst the basic ones, we typically include a 3D Printing workshop, a fast prototyping workshop with small computing devices and sensors, a product design workshop and a data science 101 workshop. Hands-on is a "must", and we exclude all presentation-only formats.

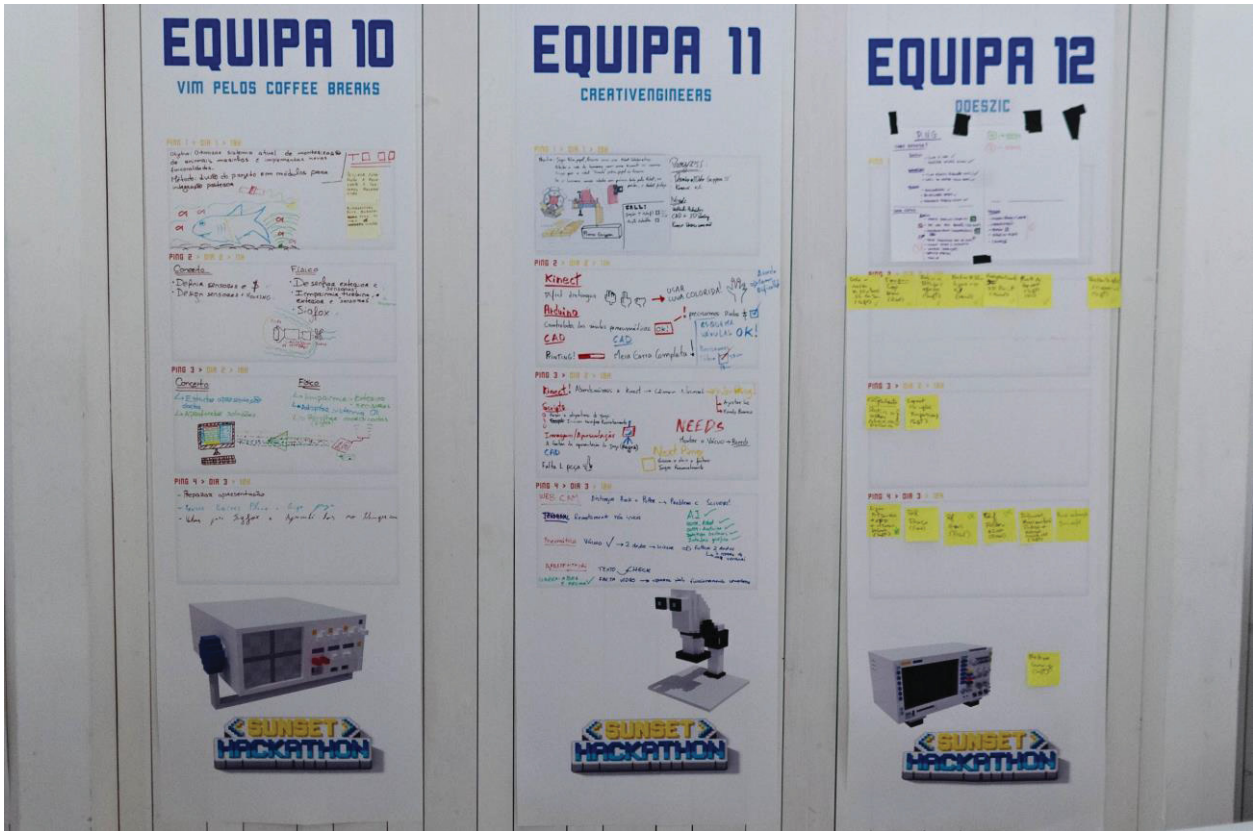

Figure 1: PiNG Wall

We want people to go back to their jobs with more tools than what they came in with. The first tool we focus on is the mindset of building something from scratch while rethinking an existing problem. Then comes the knowledge of using modern product development techniques. After that we focus on teamwork and organisational skills such as planning and work structuring. And, last but not least: openness by sharing.

Throughout the event we invite people to share their work on open platforms such as GitHub or Thingiverse.

As a team we also document everything in those platforms (information such as rules, guidelines, frequently asked questions, media formats, etc.). We always have someone available on the communication platforms to help and we promote teams to talk to each other through those channels as well as by stating what they need. Moreover we Live stream the workshops and talks to our community so that the knowledge is spread and people ask for more from us.

All the developed works are shared at the end with a broader audience, through a three minute pitch and showcase, in which the product is shown functioning. We invite mentors and challenge owners to join as a jury and ask the teams questions after each presentation. After that they will meet and choose the "best" three teams. We don't think that competition is the most important thing but it spices things up a little and everybody sees it as a friendly competition.

We don’t want the event to be inconsequent so beforehand we engage with the sponsors (challenge givers) to have internal presentations within their organisation. This has proven to be extremely successful. Interested teams go to the sponsors’ headquarters and present their work facing the employees who are interested. This always generates conversation and some works resulted in an interest to further develop the concepts, which for us represents a true twist on how innovation works. This is in fact one of the surprising outcomes of the event which we classify as a return on investment for challengers, as detailed below.

6. Return on Investment for challengers

Our hackathons produce instant results vertically. We help prepare innovative and interesting challenges while creating an ideal working environment that will stimulate trust, creativity and engagement. Some of the

expected results are of a qualitative nature and therefore difficult to quantify, but the simple fact of starting to talk about Open Innovation and the methodologies associated to the Hackathon inside a company already triggers a changing process that will shape mindsets to accept Open Innovation practices and make old processes more flexible. We firmly believe that our methodology helps the seeding of a new open and innovative mindset by just experiencing but also by revealing the need for the management of open innovation.

Our key outcomes are the following:

1. Developing new ideas
2. Training and building up on expertise
3. Promoting a culture of Open Innovation
4. Open Mindset

6.1.1 How much does it cost to kick-start a new concept? How much is lost by not testing a new idea?
Let us face it. Big corporations have complex processes. Because of quality control, management overheads, market fitting, requirements analysis, etc., asking a team to develop a new concept will probably lead to high budgets.

Sometimes the best way to deal with a new idea is to just start doing it. Hackathons are a great way to create a very early concept and to try it out. Sometimes we can instantly discover that it does not work, or that it is too complex. We like to think of hackathons as described in Knapp, Zeratsky and Kowitz (2016): "Sprint, how to solve big problems and test new ideas in just 5 days", except that we extend the final day (implementation and test day) into three days.

Moreover, teams are already so tangled up in their daily work that it is sometimes hard to fit in new products / ideas. Some concepts are just never implemented.

6.1.2 *How much is spent on training activities per person? Does it focus on multiple aspects?*
Different companies spend different budgets on training. Hackathons are also training activities. As mentioned above we feature hands-on workshops, but we will also guide the teams through the whole process: participants will actually be learning while on the job, but in a more open and creative way. They will be exposed to new tools, techniques and ways of working and thinking.

At the end of the day, the goal is for participants to develop new skills, knowledge and techniques that are relevant to their day-to-day jobs.

6.1.3 *How much is a brand worth?*
Building a brand is hard. In today's world we also need to make them shine and be attractive to buyers and employees. Hackathons are a way to connect with the community, thus helping to increase global awareness of brands as innovative and dynamic employers. They allow for exposure and, specifically, appeal to a market segment in which what drives people is the power to create with an open mind.

People will also have the opportunity to get to know other employees and further build upon the creation of a work culture / environment.

Open communication not only helps promote a new mindset within the company but it also helps in the transmitting of a powerful message to the external world. It reaches out to other corporations, universities, research institutes and tribes such as Makers.

A lot of companies already put out Open Source software which anyone can use and build upon. The idea is that if the community also contributes, products gain traction and can become better in a faster way. Some have started sharing their own internal tools with the community to take advantage of this, such as the Android OS (2018) launched by Google or React launched by Facebook.

Platforms that allow for the sharing of knowledge are proliferating. Open source already plays a major role in the industry and platforms such as GitHub (allows for the sharing of software) and Thingiverse (allows for the sharing of 3D models ready to be printed by anyone).

We promote the use of open source technologies and advise that projects are always shared with the community. We use open communication tools so that everyone can contribute to projects.

Universities fuel tech companies and, more and more, companies are starting to develop closer connections with the students to build awareness and pass the message of a great working environment. They also contain research institutes which hold some of the best experts and tech leaders in their departments.

Open events are crucial for any country to lead in fast society evolution. Open Innovation is about planting the seeds for companies to make the necessary quantum leap to get better at what they do (improve their efficiency) while contributing to a better society as a whole. It is a win-win situation for everybody in the ecosystem and the only losers are those not taking part in the revolution.

7. Conclusion

Innovation is never going to be easy as human beings in general are resistant to change. Innovation means the disruption of the present order of things, as Schumpeter acknowledged, and goes against the harmony so desired in Portuguese society where even our revolution, in 1974, occurred without any significant events; very unlike our neighbouring Spain, where hundreds of thousands, perhaps millions of people, were killed, during their civil war and revolution in the 20th century.

To have the ambition to change society in Portugal, which is very adverse to change, more so than the average European country, will indeed require Guerrilla Marketing (low-cost marketing albeit with a significant reach) (Almeida and Au-Yong-Oliveira, 2015) and a lot of positive word-of-mouth to spread the message and results of our initiatives. Funds are lacking and change normally requires a lot of capital; though start-ups do tend to lack financial backing, in general (Oliveira et al., 2012, 2013), and the best still manage to survive and grow.

Portugal needs to develop its internal and external marketing, investing in the creation of content about the best national case studies. We have to show, both nationally and internationally, the best case study results on new product development and on new business development. A new attitude needs to be publicized and new open innovation tools used.

We have described the process which we follow at our Hackathons. This article may also provide some additional visibility to our initiatives, which are all about innovation and entrepreneurship and so the intended audience for our work will gather and receive our work, at the ECIE 2018. We hope to attract the attention of enterprises which are perhaps at a loss as to what path they need to follow in order to increase their competitiveness. Our team is very adept at putting together events where all will benefit – those developing the innovations, and those on the receiving end of these innovations – the enterprises.

We thus hope with our study to have shown that change is indeed happening in Portugal, and in this case also linked to entrepreneurs and startups, as is normally often the case; and aided, somewhat by the academic community present in the region. To make the type of event described herein mainstream, and to be able to bring in corporations from different geographies, to solve their real problems in specialised environments, is perhaps an objective which may take some time, but which we dare to dream of.

If such events are possible in Portugal, which is not necessarily the most welcoming of environments for large scale innovation, then surely a lot may be accomplished also in other regions, with the right mindset and the right attitude and, above all, the right motivation for change. It would be interesting to research other environments (within Europe but also on other Continents) and their acceptability to open innovation efforts, such as those described in this article.

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References

Almeida, J., Au-Yong-Oliveira, M. (2015) O empresário português e o uso do marketing de guerrilha. [The Portuguese business person and the use of guerrilla marketing]. In: Au-Yong-Oliveira, M., Moreira, A.C., Ferreira, J.J.P., Gonçalves, R. (Editors), IMC 2015: Proceedings of the International Management Conference, 26th June, DEGEIT-UA, published by UA Editora, pp.270-280.

Android OS (2018) Android unites the world. Launched by Google. Available from: https://source.android.com/, accessed on 02-04-2018.

Asana (2018) Asana: organize tarefas e mais. Faça seu trabalho fluir. [Asana: organize tasks and more. Make your work flow]. Available from: http://asana.com/pt, accessed on 02-04-2018.

Baldwin, C.Y. and Hippel, E. von (2009) Modeling a Paradigm Shift: From Producer Innovation to User and Open Collaborative Innovation. Harvard Business School Working Paper 10-038, November, pp.1-34.

BITalino (2018) Redefining biomedical education, research and prototyping. Beautifully designed hardware and apps. Available from: http://bitalino.com/en/, accessed on 02-04-2018.

Chesbrough, H.W. (2003) The era of open innovation. MIT Sloan Management Review, Spring, pp.35-41.

Everdingen, Y.M. van and Waarts, E. (2003) The effect of national culture on the adoption of innovations. Marketing Letters, 14(3), pp.217-232.

Gambardella, A. and Panico, C. (2014) On the Management of Open Innovation. Research Policy 43 (5), pp.903-913.

Ghemawat, P. (2001) Distance still matters. The hard reality of global expansion. Harvard Business Review, September, pp.1-12.

Hofstede, G. (2001) Culture's consequences. Comparing values, behaviors, institutions, and organizations across nations. 2nd edition. Sage, California.

https://doi.org/10.1080/09537325.2018.1459539

Knapp, J., Zeratsky, J. and Kowitz, B. (2016) Sprint: how to solve big problems and test new ideas in just five days. Simon Schuster.

Laursen, K. and Salter, A.J. (2006) Open for Innovation: the Role of Openness in Explaining Innovation Performance among UK Manufacturing Firms. Strategic Management Journal, Vol 27, pp.131-150.

Oliveira, M.A., Ferreira, J.J.P., Xavier, A., de Sousa, J.C.C.P., Meireles, G., Sousa, M., Tomperi, S., Torkkeli, M., Salmi, P., Tolsma, A., Ye, Q., Tzmrielak, D., van Geenhuizen, M. (2012) Spin-Up – Creating an entrepreneurship coaching and training program for university spin-offs. Proceedings of the ECIE 2012 – Santarém, 20-21 September, vol. 2, pp.530-538, Viva, C., e Lucas, F. (Eds.) WOS: 000321565500061.

Oliveira, M.A., Ferreira, J.J.P., Ye, Q., Van Geenhuizen, M. (2013) Spin-Up: A Comprehensive Program Aimed to Accelerate University Spin-Off Growth. Proceedings of the ECIE 2013, Brussels, Belgium, 19-20 September, vol. 1, pp.34-44. WOS: 000343654100005.

Oslo Manual (2005) Guidelines for collecting & interpreting innovation data. OECD. European Commission. 3rd edition.

React (2018) React is a JavaScript library for building user interfaces. Launched by Facebook. Available from: https://code.facebook.com/projects/176988925806765/react/, accessed on 02-04-2018.

Rossberger, R.J. and Krause, D.E. (2012) National Culture, Heterogeneity and Innovation. New Insights into the Relationship between the GLOBE Dimensions and National Level Innovation. GSTF International Journal of Law and Social Sciences (JLSS), 2(1), December, pp.84-89.

Slack (2018) Where work happens. It's the foundation for team work. Available from: https://slack.com, accessed on 02-04-2018.

Taheri, M., Ye, Q., Van Geenhuizen, M. (2018) University spin-offs' struggle with openness in early knowledge relationships: in search of antecedents and outcomes. Technology Analysis & Strategic Management,

Thiel, P. and Masters, B. (2014) Zero to One - Notes on startups, or how to build the future. Currency.

TOM (2018) TOM: Tikkun Olam Makers. Available from: https://www.youtube.com/channel/UCSvUYvIx6HZuvcD3SvI2s8Q, accessed on 02-04-2018.

Tomlinson, P.R. (2010) Co-operative ties and innovation: Some new evidence for UK manufacturing. Research Policy, Vol 39, pp 762-775.

Van Geenhuizen, M., Ye, Q., Au-Yong Oliveira, M. (2015) A skills approach to growth of university spin-off firms: Export as an example. In: David Gibson and Jan Slovak (Eds.), Building sustainable R&D centers in emerging technology regions. Masaryk University, Brno: Muni Press, pp 145-164.

The Successful Implementation of Servant Leadership at a Factory in the USA

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Abstract: This is a case study on leadership, a topic which has been much debated in the literature, as solutions for many diverse situations are still lacking and seem to escape us. The case describes how an entrepreneurial wood veneer factory operates, in the USA, with images included of a number of operations. The manager-owner took us on a guided tour from raw material (logs) to finished product (veneer wood). Waste is minimized at the factory in a very stream-lined operation which has a minimal amount of managers in place. Each worker is responsible for his or her job, done to perfection, as one task rolls on to the next, without stopping. The attitude of the innovative servant-type leadership in place is that "win-win" situations are better for all, and there is enough profit to go around. Servant-leadership-type leaders exist to serve employees and exercise minimal management control. At this firm there are no self-serving managers. Rather, mature and great working relationships are developed. Being greedy would mean that unions would have to be brought in. At this firm that was not necessary, by request of the employees themselves. Hispanic workers are very good and are cherished at this firm, in the heart of the USA. As leadership is dependent on culture, the discussion also includes references to cultural aspects relevant to management. The story is thus of a positive firm with positive leadership and subordinates. We conclude that employees who have emigrated from poorer countries in search of a better lifestyle may indeed make excellent workers, despite what some political leaders have announced in the media. We have found evidence that Spanish-speaking individuals do not only work well under autocratic leadership, as portrayed by the literature. Our study is thus revealing of a new cultural-type involving workers working outside their home countries. Under different leaders, in different countries and environments, certain workers are prepared to go the "extra mile" and behave in a completely different way as to what is expected from them in their home countries. This is surprising and may have important implications for multinational firms worldwide.

Keywords: cooperation, collaboration, leadership, win-win, wood veneer, production

1. Introduction

The finished product at the wood veneer factory analysed herein is used to make floors, furniture and doors, among others. One might think that furniture, for example, is made of solid wood. However, this is not the case. Slim slices of wood veneer will go on the outside and be filled up to make finished products, such as chairs and tables. We feel that this information is important as wood is very much cherished (for many purposes), however many people are not aware of the process followed in order to get wood-based products to market.

The case is about leadership, the discussion of which is far from resolved, though there are certain practices which are recognized as being more appropriate in certain situations and geographies. For example, in an emergency, or in a crisis, if there is no time to waste, if time is of essence, then a more autocratic leadership style is seen to be best. On the other hand, if there is more time and if the participants in the decision making process, and those affected by the decision, are highly qualified, and there is time for discussion, then a more democratic approach will lead to the best results. Furthermore, certain countries are seen to have a particular culture which will favour more autocratic versus more democratic leadership styles, depending on the case in hand. For example, the USA and other Anglo-Saxon countries are naturally more democratic environments than, for example, Hispanic countries, in general (Hofstede, 2001; Hofstede et al., 2010).

This study shows how the firm analysed uses a servant leadership style, with minimal management control being exercised. Employees are fully responsible for their tasks and do not require what has been termed

"micro-management", whereby production line supervisors are very close to each operation, interfering constantly to optimize production output. This form of micro-management might be acceptable in a paternalistic country such as Portugal where there is a large power distance index (PDI = 63 – see Hofstede, 2001, for a discussion of this) registered between leaders and managers and their subordinate employees.

Employees who are micro-managed are seen to lack the capacity to perform work tasks by themselves, which may actually become a self-fulfilling prophecy over time as employees become more and more dependent on their managers for decision-making. In contrast, servant leadership seeks to make employees independent and able to decide and navigate corporations by themselves. It is argued that, for example, in Portuguese speaking countries, that such a leadership style is not effective and is not desirable.

The article, in the following section, provides some background notes on leadership; which is then followed by a description of the methodology used in the study; after which the case itself is presented and discussed; finally, the contribution of the article is set forth, as are suggestions for future research.

2. Background - Some notes on leadership

Perhaps due to a greater democratization in society which is also, in turn, due to the advent and evolution of information and communication technologies (ICT), and online social networks in particular, "the subject of authoritarianism and how it influences leadership and leadership processes has been neglected in recent decades." (Harms et al., 2018, p.105). Portugal, a high power distance country, has seen many changes including in higher education, whereby lecturers now share their personal cell phone numbers with their students, who they have perhaps befriended on Facebook and / or on Instagram and WhatsApp – in what is no longer a distant and estranged working relationship. "However, recent global events make it clear that a better understanding of authoritarianism is needed and that leadership researchers would benefit from a renewed interest in studying why followers embrace autocratic leaders." (Harms et al., 2018, p.105). Though a number of Portuguese university professors are now closer to their students, this does not mean that they are respected more than they were in the past. Harms et al. (2018, p.105) actually state that: "Specifically, we will begin by addressing a fundamental question that has driven research for over 70 years: "Why do free people willingly choose leaders who will restrict their liberty?"".

Our study, in fact, is a little different, if not the opposite. We have chosen to do research on a firm where the leader is not autocratic and who rather defends, as indeed works alongside, his employees – making their jobs easier, instead of more difficult. In addition, these same people who have chosen to follow their leader's judgement, and management philosophy, when at home, in their Hispanic countries, have inevitably done the opposite – that is, they have chosen autocratic leaders in government and choose also to follow autocratic leaders in firms – one may just imagine the kind of chaos that might occur if leaders were not authoritarian in Mexico or in Guatemala – where participative and democratic leaders are seen to be weak (Irving, 2010).

"The emergence of the democratic-leadership is one of the most humane styles of leadership. Democratic leadership positioned people as the most important factor in the leadership exercised by the orientation and emphasis on relationships with members of the organization." (Lestari et al., 2018, abstract). Why is this form of leadership not more popular, and indeed not more successful, given its emphasis on the treating of human beings as being central to the success of organizations? Financial needs, of emigrants, and being outside one's own environment and comfort zone,, without a "safety net" to fall back on, may make people more cooperative and indeed more hardworking. However, the evidence gathered on the case study herein is quite clear – the employees at the firm acted responsibly and productively, even in the absence of constant supervision by an autocratic leader – which would have been the case had they been at home, in their home countries.

3. Methodology

In order to get to know the firm better, the authors were taken on a factory tour, by the owner-manager. The whole interaction lasted for one whole working day. During the company visit the authors were accompanied by a main (international) customer of the firm. The owner-manager of the firm took great care in explaining the whole manufacturing and transformation process to his visitors. A lot of organizational pride could be noted as we took the tour and as we realised that the firm had come a long way in its history (it was founded

in the 19th century). Observation – "seeing, hearing or sensing data relevant to the research" (Remenyi, 2014, p.123) played a major role in the writing of this case study.

During the visit a number of photos were taken (some of which are shown herein). Despite no restrictions having been imposed, as concerned the photography, and as concerned, for that matter, the material learned and observed – the firm studied herein remains anonymous and no mentioning of anything which might otherwise help single them out is present in the text.

A description of how the work flows fluidly at the factory is essential to the essence of the story, as in so doing the simplicity of the operation, free of major bottlenecks, becomes evident.

4. Discussion and presentation of the case

After a tour of a factory in the USA (in late March, 2018, for a couple of hours), we must say that the whole complexity of the operation of preparing wood veneer (for floors, furniture, doors, among others) was astounding. The rules are clearly laid down, at the firm, and the value chain must not be broken. This is how this German-owned firm is managed (it has had German ownership since the 1960s).

We started off by seeing logs of wood outside, in storage, in the car park. Nice big, long and wide logs. Of different varieties (image 1). The next step involved taking the bark off the logs (images 2 and 3).

Image 1: Logs of wood outside - in storage

Images 2 and 3: Taking the bark off the logs

Then the logs were soaked in water, of increasing temperature (the water increases in temperature 5ºC, per hour, automatically). If soaked straight into hot water the logs would split, making them useless; thus the care of soaking logs initially in cold water and then making the water gradually heat up – so that they would become soft enough to cut. The smell of heated wood was very peculiar (images 4, 5 and 6).

Images 4 and 5: Logs soaked in water

Image 6: Logs soaked in water

Then the logs went to one of two places, to be cut. If they were big enough they would be cut vertically. Sliced into wafer thin pieces of wood. If the log was smaller, it would be cut in a circular fashion, around its perimeter. To make the slices longer and larger (images 7 and 8).

Images 7 and 8: Logs ready for cutting

After being sliced into thin pieces of wood veneer [*folheado de madeira*] (image 9), the wood would then go into a drying machine (image 10).

Images 9 and 10: Wood veneer and a drying machine

After being dried, the wood would be cut (finished). Unattractive edges would be cut off. Places in the wood from which branches had grown out would also be singled out (with white chalk) for elimination (images 11-13). Customers will often aid in deciding which parts of the finished wood veneer they want to buy.

Images 11 and 12: Wood veneer ready for finishing (ready for cutting unattractive pieces off)

Image 13: Wood veneer ready for finishing (ready for cutting unattractive pieces off)

After tying the finished wood together, the wood would go to be classified (image 14). Depending on the type of wood (white oak, red oak, walnut, etc.) the classification could involve from 30 to 100 different levels (of quality). The length of the wood is also classified. White oak sorting is a nightmare and goes up to 100 different classifications. An important employee (very senior in the operation and trusted by management) would do the wood classification – a task that machines were definitely not able to perform. The objective is that the wood classification be always the same, so as to avoid customer complaints.

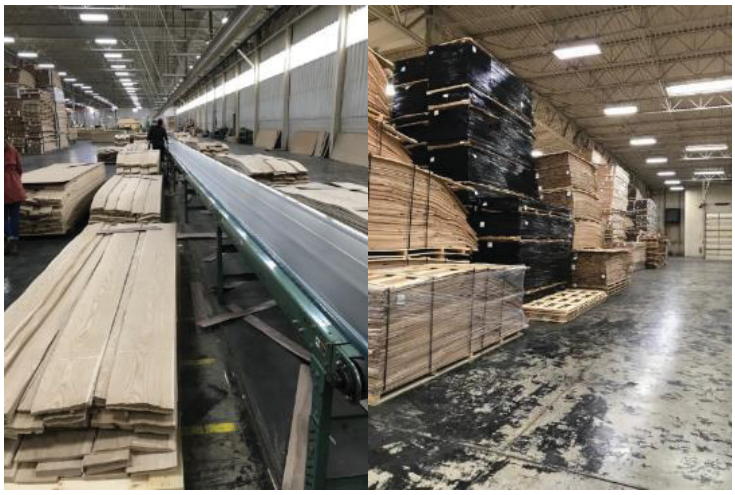

Image 14 (on the left): Wood classified for customers

Image 15 (on the right): Wood veneer in storage – to later be shipped off to customers

The wood veneer would then go into storage, to later be shipped off to customers (images 15 and 16).

Image 16: Wood veneer in storage – to later be shipped off to customers

Of note is that a highly paid employee (image 17) will sharpen the knives that cut the wood. Each knife costs around 3 thousand dollars and lasts up to 3 months. The knives are then replaced. A sharpened knife will cut into paper just be laying the paper on top of it and by gently bringing the paper down. This job is thus quite dangerous and requires extra care. The sharpening of the knives may be done using a Japanese (high quality grade) stone, for example (image 18).

Image 17 (on the left): The division which sharpens the knives

Image 18 (on the right): The sharpening of the knives may be done using a Japanese (high quality grade) stone

The factory, very well laid out, with the material going from one step to another, further and further into the heart of the factory, employed mainly South American (Hispanic) workers. Workers from Guatemala, the Honduras, El Salvador, Mexico, among others. These people are very good workers as they work out of necessity and in order to upkeep their families. Most of the workers are women. This may be a problem when heavier-duty tasks need to be done. Instead of one man doing the task, two women would be required. Other than in these cases, women are tremendous workers. They work fast and keep costs down as being mothers and raising families they are well aware of the cost of living. They also do not miss work. Men, on the other hand, mainly work to not default on their child support payments. If, in the USA, they default such family support payments they will go to jail.

The only manager in the factory is the owner (or son of the owner, who is close to retirement). He will spend his time in production, solving problems as they appear. He will not stay "hidden" in his office but will "manage by walking around", as the literature likes to call it. "Management-by-walking-around (MBWA) is a widely adopted technique in hospitals that involves senior managers directly observing frontline work" (Tucker and Singer, 2015, p.253). At the factory an objective was to actively solve easy problems as they arose, which leads to improved performance (Tucker and Singer, 2015). With managers at a minimum in the factory, certain setbacks of MBWA were also not to be felt – such as making situations more complicated, rather than

simplifying them (Tucker and Singer, 2015). The owner-manager is also responsible for buying the wood. There is no place in the factory for numerous "pure" managers who just oversee operations and add no value; except for the owner-manager himself, who will manage the 140 people in the factory.

Absenteeism is a problem and being at around 8% this means that additional workers need to be employed (around 10% extra staff) (please see Oliveira, 2005, for a discussion of how absenteeism should be at, or below, 2%). North Americans do not make the best factory workers and tend to be unreliable. North Americans, at this level, work to make some money; then perhaps they will stop for a day or two; only to return to work when they are again lacking money for their daily necessities.

The reason for having a supplier in the USA (with high salaries in comparison to most countries) to make wood veneer is that certain geographies have certain types of wood, which may then be shipped all around the world (to Europe, Brazil, Africa, among many others), to customers who want, for example, white oak.

Of note is that this firm does not deal with unions. Unions did come round at one stage, and there would be a lot of shouting – mainly at management – as the unions treated the firm very badly. However, the employees did not like that, they did not feel comfortable with this situation. Therefore, it was jointly and collectively decided (employees and management) and agreed to not have unions at the firm.

The owner-manager wanted to go from eight hour days to nine hour work days. However, this was turned down by the employees, mainly the women, as they had to go and tend to their families after eight hours of work. An agreement was arrived at though – and that was to work for five hours on a Saturday. Therefore, management was pleased to get the equivalent of 5 x 9 hours per week. Every week.

This is a case of servant leadership in action. Leaders exist to serve the employees and to make them better at what they do, aiding their operations. There are no self-serving managers who expect things to be done while they are being served. Rather, mature and great working relationships are developed. Hispanic workers are very good and are cherished at this wood veneer firm, in the heart of the USA.

At this servant leadership firm employees "look to their organizational leaders for vision and direction" (Blanchard, 2018, p.9), much as with traditional leadership. Furthermore, the purpose of servant leaders is "to help your people become eagles rather than ducks and soar above the crowd – accomplishing goals, solving problems, and living according to the vision" (Blanchard, 2018, p.11). Therefore, servant leaders are, in a first instance, responsible (for creating an image of the path to be followed, onwards towards the future; for showing the firm where they want to go, and the results that are intended to be achieved) and then, in a second instance, responsive (gearing the team towards superior implementation – and, in the meantime, turning the traditional hierarchical pyramid upside down). As a consequence of the above, firm collaborators are first responsive (to the visionary senior leadership) and then responsible for what they do (capable of implementation, aided by a responsive senior leadership team).

5. Contribution

We discuss an entrepreneurial company which has implemented the controversial and [still] novel "servant leadership" style. The stage is unique, in the USA, involving a German firm with mainly Hispanic employees. Intuitively, one may be led to think that an autocratic leadership style would be best – as Hispanic countries register a high power distance culture – Colombia scored 67, Ecuador 78, Guatemala 96, Mexico 81, Panama 95, and Salvador 66, for example, for Power Distance (Hofstede, 2001; Hofstede et al., 2010) – and thus would seemingly respond badly to a leadership style where the leader exists to serve his or her employees (servant leadership). The case study reveals, however, that the opposite is true. The firm's Hispanic employees come to work and do not waste time or energy with "internal political games" and with unions and do not constantly need to be told what to do – which might have favoured them in the short-term but certainly would have damaged the prospects of the company in the long-term. We thus tell the story of a positive firm with positive leadership and collaborators.

We also suggest that certain employees who emigrate from certain poorer countries and seeking an improved life style abroad may make excellent employees, contrary to what some political leaders have announced on the media and as regards immigrant workers. This is a case of senior leadership accomplishing the perfect

match with its workforce – despite what the literature says about Spanish-speaking individuals and them preferring and working well only under autocratic leadership. "We highlight Anderson's (2006) exploration of barriers that impede the effective implementation of servant leadership in Latin America […] Anderson identified ten primary barriers and three central strategies for overcoming these servant leadership barriers" (Irving, 2010, p.123).

Our study is thus revealing of a new cultural-type by workers working outside their home countries – which goes contrary to what the literature says about them. Under different leaders, in different countries and environments, certain workers are prepared to go the "extra mile" and behave in a completely different way as to what is expected from them in their home countries. This is surprising and may have important implications for multinational firms worldwide.

6. Future research

It would be interesting to research how Portuguese emigrants perceive their environments when they emigrate to work in other countries. Portuguese emigrants have been noted to work very hard, in extreme conditions and often under considerable personal hardship, when abroad and when working for foreign bosses. Portuguese workers are renowned for their dedication to work, for avoiding conflict, and for being innovative and for blending in with the locals – when working in another country. It would be interesting to study their mindsets in these situations and why, at home, in Portugal, with such a capable workforce, Portugal has gone bankrupt three times, in its modern democratic history (since 1974), and is incapable of supplying jobs to its qualified youth population who are even encouraged to emigrate by successive governments in power – in order to find more worthy tasks in the workforce when abroad.

Just like the Hispanic workers focused on in this case study – who often also come from impoverished backgrounds and countries, and who emigrate to the USA to become highly cherished and highly valued employees – the Portuguese seem to "go into a higher gear" when abroad.

This is a phenomenon which needs to be researched further so that lessons may be learned and applied in their home countries and when aiming for greater economic development.

References

Blanchard, K. (2018) What is servant leadership? In: Blanchard, K., Broadwell, R. (Editors) (2018). Servant leadership in action – How you can achieve great relationships and results. Berrett-Koehler Publishers, Oakland, USA, pp.7-13.

Harms, P.D., Wood, D., Landay, K., Lester, P.B., Vogelgesang Lester, G. (2018) Autocratic leaders and authoritarian followers revisited: A review and agenda for the future. Leadership Quarterly, Vol. 29(1), February, pp.105-122.

Hofstede, G. (2001) Culture's consequences: Comparing values, behaviours, institutions and organizations across nations. 2nd Edition. Sage Publications, Thousand Oaks CA.

Hofstede, G., Hofstede, G.J., Minkov, M. (2010) Cultures and organizations: Software of the mind. Revised and Expanded 3rd Edition. McGraw-Hill.

Irving, J.A. (2010) Cross-cultural perspectives on servant leadership. In: van Dierendonck, D., & Patterson, K. (Editors), Servant leadership – Developments in theory and research. Palgrave MacMillan, Basingstoke, pp.118-129.

Lestari, Y., Rosdiana, W., Noviyanti (2018) Democracy leadership (study approach of bureaucrats leadership at sub bagian tata usaha badan perencanaan pembangunan daerah, East Java province). Journal of Physics: Conference Series, 953.

Oliveira, M.A. (2005) Building leadership: how pride in your work leads to better attendance and quality. Performance Improvement Journal (PIJ), vol. 44, No 7, August, pp.5-7, International Society for Performance Improvement (ISPI) and John Wiley and Sons, Inc., Online ISSN 1930-8272, DOI: 10.1002/pfi.4140440703

Remenyi, D. (2014) Dictionary of research concepts and issues. ACPIL, Reading.

Tucker, A.L., Singer, S.J. (2015) The Effectiveness of Management-By-Walking-Around: A Randomized Field Study. Production and Operations Management, vol.24(2), February, pp.253-271.

Management of innovation – Constraints on commercialization of University Innovation: Evidence from SA

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Abstract: Globally, commercialization of university innovation has increased and gained in interest by universities, industry and politicians. The idea of marketing innovation produced by universities is the practice embraced in most advanced economies. However, government's investment in R&D have not generated the anticipated return. A gap has been identified between innovation developed from publicly financed research and the failure to convert these findings into tangible outcomes. Research undertaken without the ambition to commercialize or to be profitable, lacks market focus. The study reports on an investigation that explored reasons for the current low commercialization rate of university innovation in South Africa, with a view to increasing this rate. The qualitative data enquiry discovered that the key challenges in commercialization were perceived to be: lack of entrepreneurial skills, lack of adequate infrastructure and funding opportunity to commercialize research, commercialization not regarded as a high priority to senior university management, institutional bureaucratic regulations and an inefficient system of decision making with regards to intellectual property, research lacks market focus, research is not undertaken with commercialization in mind and lack of local industry receptors to induce engagement. **Design:** This paper adopted the mixed survey method, which utilized a questionnaire survey to collect data from the 23 university IP managers, and a semi-structured interview schedule was used to collect data from innovators affiliated to one of 23 universities. **Value:** This study outlines key factors that could, if implemented improve level of commercialization of university innovation. Innovation and entrepreneurship changes our lives, work and contributes to our future. Has contributed to improved standard of living, creates job opportunities and generation of income, which forms conditions for prosperous societies. Creates social change. Breaks away from tradition, produces unique offerings that generates new wealth. All resulting in greater morale and economic freedom with profound, long-lasting impact on human race.

Keywords: innovation; entrepreneurship; innovation management; entrepreneurial innovator; intellectual property rights; publicly-funded research; technology transfer; commercialization.

1. Introduction

Innovation is frequently described as the lifeblood of organizations, and within a corporate setting, the true value of innovation is manifested in outcomes such as the success of commercialization (Schendel and Hill 2007: 1). Universities need to equip their researches with entrepreneurial skills in order to implement their innovations (Lakovleva 2011). Entrepreneurialism at universities is epitomized by the rise in patenting, licensing and the creation of spin-off companies by academic researchers (Wright et al 2007).

Innovators with entrepreneurial ability is of vital importance since most innovation are sold at an embryonic stage and further development requires inventor participation (Thursby and Thursby 2003). This view is supported by Spilling (2010), who argued that commercial activity relates to the key driving force, which is "the entrepreneur and their ability to identify and develop business opportunities". Clark (2004) also highlighted the entrepreneurial transformation of universities requiring collective entrepreneurial action. This view is further reinforced by D'Estea et al (2013) who advocates the importance of prior experience in innovation-related activities would greatly impact on continued success in academic entrepreneurship.

A key driver for economic growth is knowledge and investment in research and development (R&D). To realize benefits as return on investment, an innovation's inherent value is only acknowledged within its environment when the public utilizes the manifested outcome (such as a commercial product) (Bansi 2016). Tahvanainen and Nikulainen, (2010) maintains that commercialization is certainly a significant provider to economic growth, which is further supported by Bansi (2016) affirming that accessibility and utilization by the public contributes to ultimate economic growth. In principle, commercialization is an exchange of know-how for financial return (Speser 2008), which can be apparent in diverse ways that include:

- impact of entrepreneurship on innovation success
- activity that converts innovation into tangible products or service
- route of transferring R&D outcomes from a university research laboratory to industry

- identification of a commercial prospect for scientific or engineering invention and consequent steps to design, develop, and to further enhance the innovation for usefulness
- adoption of a innovation or service by customers
- arrangement that allows innovators to receive economic gain from their efforts, which includes patent licensing, R&D funding, and joint ventures

Further, as identified by Natsheh et al (2015), commercialization is not always a straightforward process; many challenges requires to be overcome for its success. Especially so, innovation in its embryonic stage may face challenges simply because it lacks familiarity and public validation.

This paper presents findings of results of study on commercialization of university innovation. The results attempts to add value to both universities and innovators, by firstly providing awareness to potential challenges, and secondly offers possible solutions to overcome challenges. The review of literature on challenges experienced by international universities is discussed, followed by the survey description and interview methodology of the study. Results are presented on key findings followed by a conclusion.

2. Literature Review

Variation of commercialization systems are found amongst the different countries. Prior to 1980, the lack of a uniform IP policy governing ownership and the lack of incentives to commercialize innovation presented challenges for US universities. The situation was corrected by the introduction of the Bayh-Dole Act, as opposed to Australia where the university commercialization environment imposed limitations and controls in activity that satisfied national standards.

Ultimately, the Bayh-Dole Act gave US universities the opportunity of ownership on innovations, removed Government from the process, and provided incentives for commercialization to occur. Through revenue sharing between university and researcher, the Bayh-Dole Act strengthened incentives for researchers to actively participate in commercialization activity. This was also the experience in countries such as, the United Kingdom, Japan, Germany, Austria, France, Denmark, China, and the Republic of Korea. However, this practice is not imperative for successful technology transfer, since in some leading innovative countries of Europe (such as Finland and Sweden) researchers own their IP. Some believed that the Bayh-Dole Act could adversely affect the quality of university research, nonetheless there is limited empirical evidence to prove this effect.

Innovation activity based on university-generated IP has been on the increase in the US, Western Europe and Canada, however literature suggests that the European Union has been lagging behind. It was also found that older knowledge transfer offices produced fewer innovation disclosures, patent applications and grants as compared with younger offices. As knowledge transfer offices gain in experience, it becomes easier to weed out research results with weak commercial potential thereby contributing greater focus of attention on commercially promising technology.

Each country's IP policy, procedure and regulations has its own strengths and weaknesses that result in challenges and successes. For example, the higher education sector of Australia has a well-developed system that is subsidized by Government and focuses on adding value to key primary products in the mining and agricultural sector.

A case study of Japan, Finland, Canada, and the Flanders region of Belgium found that these nations changed their national innovation strategies to increase R&D spending, collaboration between industry and academia, and new technology start-ups (Wessner 2013).

Germany's ability to remain globally competitive in advanced manufacturing exports, despite wage and other costs being higher in comparison with the US is possible through being a mature industrialized nation. Although the German patent system was known to be similar to the US system, it was considered more stringent, thereby resulting in a lower number of patent grants although likely higher in average value. Their patent examination process requires the patent to be new, non-obvious, and capable of producing greater efficiency. As with the US system, the courts adopt a liberal attitude in interpreting and enforcing existing patent rights once granted. Penalties for wilful infringement include not only fines but also the possibility of imprisonment. Unlike the US policy, German patents were also subjected to working requirements. Meaning

the grant of a patent could be revoked after the first three years if not commercialized, if the owner refused to grant licence use of innovation deemed for public interest, or if the innovation was primarily being exploited outside Germany.

Canada and the United Kingdom have similar IP systems to that of the Bayh-Dole Act style approach. Failure of research institutions to take responsibility for IP management stems from the Canadian system, which arises out of the laissez-faire approach to IP ownership. Both the Canadian and the UK experience may therefore find the solution of research bodies being the most conducive owners of IP.

Although the Finnish system was not investigated in detail, it was found to be comparatively different from countries that emphasize funding instruments to promote research collaboration between higher education and the business sector. Strong emphasis focused on human capital and areas for industrial innovation. Canada proposes research bodies give priority to local industry and small business when licensing IP, while the UK on the other hand considers such an obligation unrealistic and inconsistent with the global nature of industry. Although the Chinese IP system was not evaluated in detail for this study, it is known to have similar ideas to India. Both nations have innovation agendas for improving living standards and moving into high-tech knowledge-intensive industries. Their systems attract foreign investment from industries that are found to develop global competitive corporations. According to Breitwieser and Foster (2012) empirical literature suggests that the effectiveness of patent protection in India varies from industry to industry, and inventive activity is sensitive to protection only in selected spheres such as the chemical and pharmaceutical sectors.

Countries have fine-tuned their intellectual property right regimes as per their developmental requirements. Against this backdrop, there is an ongoing attempt to harmonize and strengthen intellectual property protection regimes worldwide.

It is difficult to assess which country's strategy and policy will continue with success. Policy options found appropriate in one country may be completely challenging for another country, yet all responsibility is aimed at encouraging strategies and systems to identify, protect, manage and exploit valuable IP in the best interest of each country. Literature suggested that strong IP regimes may inhibit the diffusion of knowledge and technology development in countries that are technology followers. Valuable insights for decision-makers and policy-makers have been discussed, which presents a holistic picture of the continually changing global context.

To validate these challenges experienced by IP&TTO managers, a series of interviews were undertaken with innovators whom agreed that the above-mentioned factors could affect commercialization success. Likewise, the survey revealed that technical development, entrepreneurship and a lack of adequate infrastructure hindered success in commercialization of university innovation. The IP Act, which is based on the US Bayh-Dole Act, recognizes the importance of publicly funded institutions such as universities. The objective of the IP Act is to ensure that IP from publicly financed research and development is identified, protected, utilized and commercialized for the benefit the people of South Africa.

3. Experience of South African Universities

In compliance with the IP Act, a number of universities in South Africa have sought to establish intellectual property and commercialization departments that are responsible for generating revenue from research. However, despite the potential, there is minimal in the way of innovation, patenting and commercialization at present at South African universities. Cloete, Nel and Theron (2006) are of the view that a contributing factor to low patenting activity by South African scientists may result from "research not conducted with commercialization in mind, and therefore lacks market focus."

University inadequacies range from the absence of emphasis on commercialization, to a low to non-existent entrepreneurial culture. Deficiencies in commercialization knowledge among researchers was emphasized as another barrier. Results revealed not all barriers are common between universities and some barriers may be more excessive than others. It is likely that the impediments vary between universities based on an individual's overall knowledge of the commercialization process.

The study contributes to understanding the impediment to societal progress and provides a starting point for further research. It shows that a lack of market focus and related issues are key challenges to commercialization which are similar to previous studies. It has also been confirmed that industry partners ought to encourage the building of a supply chain which will require enhanced university-industry collaboration.

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Presently, South African universities are found to be lagging behind in creating an IP culture, thereby reflecting low disclosure rates. University IP&TTO's should encourage disclosure internally instead of directly to industry. Increased disclosure results in greater patent applications with commercial possibilities. This hypothesis is consistent with the findings of Mellon (2011) who argued that a large patent portfolio impacts on the greater probability of positive commercialization activity. It can therefore be assumed that the extent of a patent portfolio in relation to commercialization activity is an influential element in defining the commercialization performance gap.

The university environment and culture have a profound impact on the probability of commercialization success. Factors within the control of universities include conducive IP policies and practices; incentives for participation in IP activity, e.g. promotion prospects; unbiased decision making on innovation; and, entrepreneurial skill with focus on issues of risk management in the context of commercialization. While the IPR Act was envisioned to accelerate commercialization, Government did not adequately plan for research output in the form of innovation to be transferred from academia to the commercial market. It was anticipated that the IP&TTO's at universities would facilitate the transfer of innovation to the marketplace; instead, they have become gatekeepers constraining the flow of innovation, which frustrates researchers and industry.

Governments ought to enhance university-industry collaboration via their part in funding universities. A decent reward system for researchers would provide incentives to participate in commercialization activity. Concomitantly, collaboration with industry must be encouraged. IP transformation and commercialization energy cannot make up for a country's weak national innovation system. Appropriate technological capabilities and linkages are required prior to relevant returns appear in the form of commercially successful spin-off companies or licensing. Thus, low technological capacities in terms of both human capital and infrastructure, limited awareness on the benefits of IP among researchers, university management and industry, still require reform for success in innovation commercialization to become apparent.

4. Results

The idea of granting universities the title of ownership of IP from publicly funded research was brought about with the expectation of increased commercialization. Further, it was felt that IP would contribute to increased economic development by affording the country the opportunity to participate in global trade and industry activity. However, not all stakeholders have seen the provisions of the IP Act 51 of 2008 as favourable. For the period 2008-2013, eight universities reported to have registered more than ten patents, five universities registered between six and ten, four registered one or two and two registered none. Two universities reported having commercialized nine or more innovations, ten had commercialized between one and five and nine had commercialized none. Seven universities experienced unsuccessful attempts at commercialization. This is a very modest level of performance; even those universities, which have commercialized a patent during the six-year period averaged only around one per annum.

This study established strong evidence that possibly contributes to the low commercialization rate, which is made up by: the lack of support from university management, insufficient incentives for innovators, absence of access to funding opportunity, research undertaken without commercialization in mind which indicates lack

of entrepreneurial thought/skill; and, institutional bureaucratic regulations with and unfair system of decision making with regards to IP.

University, government and industry executives need to demonstrate genuine support for research and innovation development activity over the long term, allocate the necessary resources required for its success, and implement long-term plans and strategy for innovation. Researchers, innovators, entrepreneurs and government officials ought to aware of potential challenges in commercialization prior to investment in R&D for return income generation.

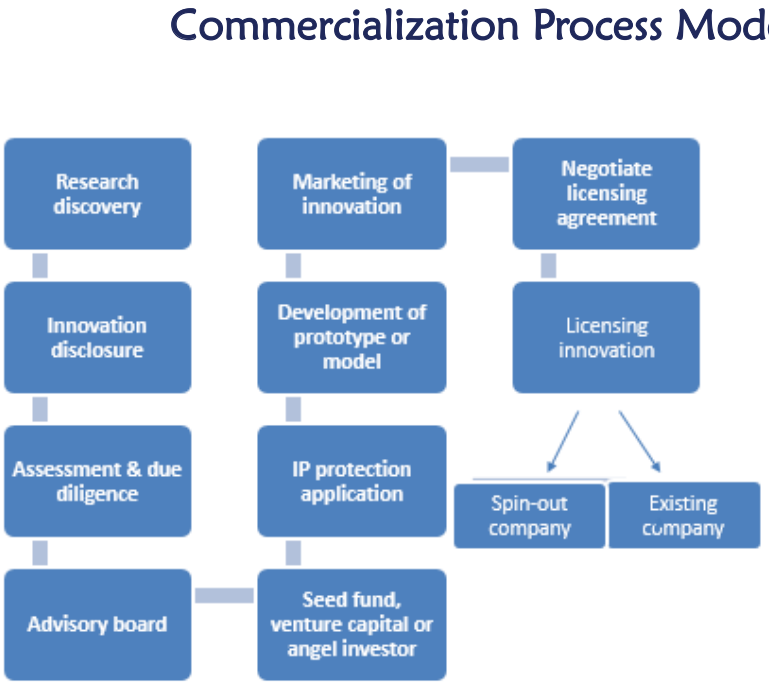
Results identified that universities with clearly defined IP policy, sound structured IP&TTO and the support of senior management are likely to enjoy success in commercialization performance. The absence of an attractive incentive system, both financially and in terms of career advancement, may have driven innovators to identify private industry collaborations outside their universities, which at times includes international engagement. Stronger university/industry collaboration ought to be cultivated for South Africans to reap the benefit of investment in R&D thereby consequently strengthen economic competitiveness.

5. Recommendations

Studies on commercialization have produced lengthy dos and don'ts, identifying qualities and characteristics of university IP&TTOs, and lists of resources that Governments ought to provide for success to be achieved. At best, these merely serve as guides that provide insight to varying extent that may contribute towards success.

The complexities involved in commercialization makes it difficult for a proposed model to effectively work in different environments, therefore a 'one size fits all' approach will not be feasible. Some of the models include activities to be undertaken simultaneously in order to increase the chance of commercialization. With the combination of data that emerged from the questionnaire, interview sessions and reviewed literature, a linear model of commercialization does not seem sufficient. Bradley *et al.* (2013: 2) identified shortcomings of the traditional linear model which include inaccuracies such as strict linearity and oversimplified processes; a one-size- fits-all approach; emphasis on patents; inadequate account of informal commercialization; failing to recognize the influence of institutional culture; and the absence of a university reward system within the model.

With the identified shortcomings in mind, the following commercialization model is proposed:



Diagrammatic representation of commercialization model

The proposed model would operate as follows:

- Research discovery

Research activity frequently lead to discoveries and innovation with the potential of commercial applicability.

- Innovation disclosure

Innovator to disclose innovation to university IP&TTO within specified timeframe.

- Assessment and due diligence

To ascertain competing products and whether the product satisfies a market need or creates a new market product. Decision on whether to proceed with innovation or not. On assessment of potential commercial value, a preliminary commercialization strategy drawn by IP&TTO.

- Advisory board

Based on submitted strategy, an advisory committee comprising of the university faculty, university IP&TTO, Government, legal adviser, innovator and industry experts in the field of the identified innovation review disclosure and advise on a potential commercialization route.

- Seed fund/venture capital/ angel investor

Application for seed funding to a potential investor or venture capital required to fund commercialization.

- IP protection

The IP&TTO engage legal counsel for appropriate IP protection that acts as a deterrent from infringement and affords potential investors with security from an investment standpoint.

- Prototype or model

A model or prototype developed to demonstrate proposed working product.

- Marketing of innovation

Once IP protection filed, market innovation to potential industry partners

- Negotiate and licensing agreement

When a commercialization partner is identified, the decision to licence the innovation to an existing company or establish a spinout company is decided upon. Royalty distribution or equity stake is negotiated. In-depth examination of innovation may involve signing of a non-disclosure agreement.

The above process may not necessarily flow in an entirely linear direction, although components illustrate overview of commercialization route.

6. Conclusion

Presently, South African universities are lagging behind in creating an IP culture, thereby reflecting low disclosure rates. University IP&TTO's ought to encourage internal disclosures instead of directly to industry. Increased disclosure results in greater number of patent applications with possibility of commercialization. This hypothesis is consistent with the findings of Mellon (2011: 23) who argued that a large patent portfolio impacts on the greater probability of positive commercialization activity. It can therefore be assumed that the extent of a patent portfolio in relation to commercialization activity is an influential element in defining the commercialization performance gap.

Reference

Bansi, R. (2012) Commercialization of University Innovation in South Africa https://ir.dut.ac.za/bitstream/10321/1485/1/BANSI_2016.pdf

Bansi, R. (2016) Commercialization of University Innovation in South Africa https://ir.dut.ac.za/bitstream/10321/1485/1/BANSI_2016.pdf

Breitwieser, A. and Foster, N. (2012) Intellectual property rights, innovation and technology transfer (online). Available: http://www.augurproject.eu/IMG/pdf/WP3_WP_ Foster_IPR_Innovation_Tech_Diffusion_FINAL-2.pdf

Clark, B. (2004) Creating Entrepreneurial Universities. Elsevier Science, Oxford.

Cloete TE, Nel, LH, Theron J. (2006) Biotechnology in South Africa. Trends Biotechnology, Vol 24, No. 12, pp 557-562.

D'Este, P., Mahdi, S., Neely, A. and Rentocchinia, F. (2013) Inventors and entrepreneurs in academia: what types of skills and experience matter? (online). Available: http://eprints.soton.ac.uk/357284/1/D'EsteMahdiEtAl2011.pdf

Lakovleva, T. (2011) Entrepreneurial intentions in developing and developed countries. Education and Training, Vol53, No. 5, pp 11-19.

Mellon, A. (2011) Evidence of commercialization activity from university research and innovation output. Macmillan, New York.

Speser, P. (2008) What Every Researcher Needs to Know About Commercialization. Providence, RI: Foresight Science & Technology Inc.

Natsheh, A., Gbadegeshin, I., Rimpiläinen, S. A., Tokalic, I. and Zambrano, A. (2015) Identifying the Challenges in Commercializing High Technology. Technology Innovation Management Review, Vol 1, No. 1, pp 26-36.

Tahvanainen, A., & Nikulainen, T. (2010) Commercialisation at Finnish Universities: Researchers' Perspectives on the Motives and Challenges of Turning Science into Business. Discussion Paper 1234. Helsinki: The Research Institute of the Finnish Economy.

Thursby, J. and Thursby, M. (2003) Industry and university licensing. Journal of Technology Transfer, Vol28 No. 3-4, pp 207-213.

Wessner, C. W. (2013) Stanford and Silicon Valley best practice (online). Available: www.ncbi.nlm.nih.gov

Wright, M., Clarysse, B., Mustar, P. and Lockett, A. (2007) Academic entrepreneurship in Europe. Cheltenham, UK: Edward Elgar.

The Impact of Important Economic Factors on the Quality of Business Environment in the SME Sector

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Abstract: A high-quality business environment shapes a country's economic system in a significant way, motivates people to start a business, and creates favorable conditions for remaining on the market and for the growth of small and medium-sized enterprises (SMEs). The aim of this paper is to define important economic factors influencing the quality of the business environment and their impact on the economic system. In regards to this aim, an empirical research was conducted in 2018, using a survey in the SME sector in the Czech and the Slovak Republic. These countries, given their common history, share a very similar economic structure and development. The research was done on a sample of 641 respondents. They were business owners and managers active in small and medium-sized enterprises. As a part of the research, important factors were defined in the following areas: macroeconomics, currency policy and interest rates, SME financing and population consumption. The respondents had the option to express their agreement using the Likert scale: strongly agree, agree, neutral, disagree and strongly disagree. The results of the research were processed via the method of regression analysis. It was discovered that the defined economic factors significantly influence the perception of the quality of the SMEs' business environment. A positive perception of the state of the macroeconomic environment motivates people to start a business. Entrepreneurs in both countries rated the current state of the macroeconomic environment as favorable and supportive of their entrepreneurial activities. They also confirmed that the current situation supports the enterprises' innovation activities. Based on the respondents' statements, the current level of basic macroeconomic parameters, such as the gross domestic product, employment, and inflation, supports entrepreneurship and creates interesting business opportunities in the SME sector. Similarly, the Central bank currency policy stabilizes the business environment in both countries. The research yielded a finding that in the current economic situation, small and medium-sized enterprises have a good access to bank loans. On the contrary, economic factors such as population consumption, changes in income and the structure of consumer spending are not statistically important factors that could influence the quality of the SMEs' business environment in the Czech and the Slovak Republic.

Keywords: access to finance, economic factors, macroeconomic environment, monetary policy, quality of business environment, small and medium-sized enterprises

1. Introduction

A high-quality business environment shapes a country's economic system in a significant way, motivates people to start a business, and creates favorable conditions for the growth of small and medium-sized enterprises (SMEs).

The quality of business environment in the SME sector is shaped by an array of economic and non-economic factors. Macroeconomic environment, monetary policy of Central bank, access to finance and consumer behavior significantly influence the quality of business environment in the small and medium-sized enteprises (SMEs) segment.

This paper examines the influence of significant economic factors on shaping the quality of business environment in the SME sector. The originality of this paper lies in the presentation of entrepreneurs' and top management's notions about the way economic factors influence the overall quality of the business environment in the Czech and the Slovak Republic.

The structure of the paper is as follows: The introduction presents views of several authors on the influence of selected economic factors on the quality of business environment. The second part defines the aim of the research, methodology and the description of the data used. The Results and Discussion part presents the results of own empirical research in the Czech and the Slovak Republic. The conclusion offers a final summary of the research.

2. Theoretical background

The influence of economic factors on the quality of business environment is examined by many authors. According to Bekeris (2012), macro-economic factors are important determinants of business conditions in the country (similarly Kadocsa & Francsovics, 2011), and hence, the factors can have a significant impact on profitability. Macroeconomic factors such as imports, exports, competition in the market, population, wage rate, FDI, GDP, unemployment, infatuation rate, business tax rates and inter-bank interest rates were examined. The authors discovered that most of the macro economic factors do not affect the profitability of SMEs except for unemployment and interbank interest rates. The result shows that increasing unemployment has a negative effect on profitability. The authors argue that higher unemployment may induce less demand for products and services and thus it has a negative effect on SMEs' profitability. With respect to interest rates, it is also found that lower interbank interest rates have a positive effect on profitability. This means that when the interest rate is lower, SMEs can borrow more from banks and hence they can invest in profitability projects that may lead to a higher profitability for SMEs. In this context, Kadocsa and Francsovics (2011) state that the monetary policy should be considered as a macroeconomic factor that influences SMEs' competitiveness.

Thai and Turkina (2014) found that economic opportunities and resources influence entrepreneurship. More recently, Ipinnaiye, Dineen and Lenihan (2017) examined the drivers of SMEs' performance and they provided evidence that firm growth is influenced by the macroeconomic environment both directly and indirectly.

One of frequently discussed topics is the access of small and medium-sized enterprises to external financing via bank loans.

Ahmedova (2015) states that access to finance is the most important factor for SMEs to be competitive in the market. She found that 86% of the SMEs in the survey (in Bulgaria) do not have a bank finance facility and thus need to give up profitable projects. It was also discovered that 62% of the firms' investments came from their owner, 24% from friends and family members, and bank loans were only about 15%. Another finding was that innovative firms can be more competitive than the non-innovative ones, as by innovating new products and services, they can reach out to new groups of customers. It was also found that technological advancements can help the firms to be competitive in the market because by using technology, a firm can be more efficient and that can create competitive advantage. Also, high competition in the market is driving SMEs' profit level to fall which is creating a survival problem.

Dajcman (2016) states that macro-economic shocks restrict banks to providing less bank loans to businesses. Banks tighten bank loans when they face a period of economic downturn. Specifically, during the World financial crisis, bank loans to firms were reduced by nearly 30% in the examined European countries. However, credit tightening is more pronounced for the SMEs than for larger firms. Another finding is that increased inflation rates negatively affected bank loans to SMEs, as due to inflation, banks need to charge higher bank loan price which reduces the tendency for firms to borrow from banks. Thus, macroeconomic factors are important determinants for SME bank loans.

Steinerowska-Sterb and Steiner (2014) analyzed the differences in the decision making process of Polish firms who have received bank finance and those who did not during the period of 2010. First, it was discovered that the lack of access to finance negatively affected the firms' growth which led to a reduction of the number of employees to cut the costs. Second, due to the lack of external bank finance, SMEs needed to cut their ongoing business projects which had a severe impact on their profitability and sustainability. Third, SMEs without bank finance had to cut their product prices in order to be able to sell them quickly and to get their money back. By doing so, credit constrained firms maintained their working capital. Finally, they found that credit constrained firms reduced the investment in R&D activities. Hence, the innovation ability of the firms was also hampered by the lack of bank finance.

O'Toole, Gerlach-Kristen, and O'Connell (2013) examined credit constraint problems for SMEs in Ireland by using the SAFE survey during the period of 2009-2011. The paper finds that the lack of access to finance is the third most important barrier for the SMEs to grow and develop. Finding customers and high competition in the market was the first and second key issues faced by the SMEs. Lack of customers was making it difficult for the SMEs to sell their products, which was creating liquidity problems. Similarly, high competition was reducing

their sales, putting pressure on SMEs to maintain their profitability. In the survey, about 61% of firms did not apply for bank loans and 39% of the firms did. Among the 39% that did apply for bank loans, 20% got rejected by banks because they could not meet the bank loan criteria. Authors argue that since the survey was done during the financial crisis and after the financial crisis period, it was still difficult for banks to lend SMEs. As a result, banks were applying strict rules and credit criteria on SMEs to access bank loans.

High lack of demand for products had a negative effect on the growth of SMEs. The paper shows that SMEs faced high competition from unregistered SMEs which was creating a problem for SMEs to sell products to their target customers (Dragnic, 2014).

3. Aim, methodology and data

The aim of this paper is to define significant economic factors influencing the quality of the business environment and quantify their power in the economic system. In regards to this aim, an empirical research was conducted in 2018, using a survey in the SME sector in the Czech and the Slovak Republic. These countries, given their common history, share a very similar economic structure and development. The research was done on a sample of 641 respondents. They were business owners and managers active in small and medium-sized enterprises.

The statistical unit of research was one enterprise. The survey was carried out on a sample of 9400 enterprises from Slovak Republic (SR) and 7800 enterprises from Czech Republic (CR). Entrepreneurs were selected from the database "Albertina" (CR) and "Cribis" (SR) randomized numbers using mathematical functions "RANDBETWEEN". The extent required for the function was always determined by the number of businesses in the region. Individual companies were directly addressed by email or phone, but also via personal meeting.

641 responses from enterprises were collected (312 enterprises in CR and 329 enterprises in SR). The percentage of completed questionnaires in form of positive feedback reactions was 4%. Examined socio-demographic data were gender, education and age of the entrepreneur (two qualitative and one quantitative statistical code), the size of the enterprise, and the length of operating on the market (two qualitative statistical codes).

The structure of the sample according to the size of firms was as follows (CR/SR): micro (258/234), small (43/71), and medium (11/24). The questionnaires was answered by (CR/SR): 236/251 men and 76/78 women.

One of the factors was also the age of the company. Most respondents had been operating their businesses for more than 10 years (CR/SR: 208/147), 48/78 of entrepreneurs 5-10 years, and the rest (56/104) of the entrepreneurs 1-5 years. The survey involved all regions of the Czech Republic and Slovak Republic. Education (CR/SR): university education (127/224), higher education (135/95), and higher education without graduation (50/10). Questionnaires were addressed to entrepreneurs from different areas of the economy (CR/SR): 109/122 were from service companies, 73/69 were from commercial companies, 53/51 from manufacturing companies, 29/39 from construction, 19/11 from transportation, 9/20 from agriculture, and the rest were labeled "Other" (industry not mentioned in the questionnaire).

Significant factors of the macroeconomic environment (EF1), monetary policy and interest rates (EF2), financing SMEs (EF3), and population consumption (EF4) were defined within the research, using the following statements:

3.1 EF1: Macroeconomic environment

EF11: I consider the macroeconomic environment of my country to be favorable for doing business.
EF12: The state of macroeconomic environment of my country supports starting a business.
EF13: The present macroeconomic environment supports enterprises' innovation activities.
EF14: The present level of basic macroeconomic factors (GDP, employment, inflation) supports business and creates interesting business opportunities.

3.2 EF2: Monetary policy and interest rates

EF21: The Central Bank's monetary policy has a positive impact on the business environment.
EF22: Banks' interest rates have a positive impact on the business environment.
EF23: Banks' interest rates have a positive impact on enterprises' innovation activities.

EF24: The Central Bank's monetary policy stabilizes the business environment.

3.3 EF3 Financing enterprises:
EF31: Enterprises have easy access to bank loans.
EF32: Banks' credit conditions for entrepreneurs are acceptable.
EF33: The cost of loans for enterprises is acceptable.
EF34: Banks have a positive impact on the quality of the business environment.

3.4 EF4 Population consumption, changes in income and the structure of consumer expenditure
EF41: The growing consumer consumption positively influences the quality of the business environment.
EF42: People can afford to buy more products and services.
EF43: The growing consumer consumption positively impacts my business.
EF44: People purchase more, compared to the past.

3.5 QBI41: The business environment in my country is of high quality and suitable for starting a business.
The respondents had the option to express their agreement using the Likert scale: strongly agree, agree, neutral, disagree, and strongly disagree.

The research results were processed using the method of regression analysis.

The following statistic hypotheses were evaluated to fulfil the main objective of the paper:

H1: Economic factors EF1 (macroeconomic environment), EF2 (monetary policy), EF3 (financing of companies) and EF4 (Population consumption, changes in income and the structure of consumer expenditure) are statistically significant and determine the quality of business environment in the Czech and the Slovak Republic.
The following statistical tools of descriptive statistics (tables, descriptive characteristics - sum) were used in addressing the above hypotheses of partial research. Methods such as absolute frequency and sorting the responses in evaluating statements were applied. The number of variations of each statement was 5 (strongly agree, agree, neutral, disagree, strongly disagree). The method of simple sorting was used to express the relative frequency of positive responses of a statement. Another used method was the relationship between qualitative variable statistical characteristics (statement, type of country) utilizing contingency table and contingency intensity. Contingency intensity was measured using the Pearson coefficient of contingency, which is based on the square contingency. Z-score was used to determine significant statistical differences in the evaluation of statements of students' answers by country of study.

To verify hypothesis H1, the regression analysis is used to quantify the relationship between variables, not with an aim of its forecasting. The dependent variable (QBE) and independent variables (EF_1, EF_2, EF_3, EF_4) with indicators are metrics, so the regression analysis is one of the appropriate statistical methods. Independent variables must satisfy the assumptions of linearity, homoscedasticity, and normal distribution of data to be statistically sound regression model parameters. The assumption of linearity was verified by a graphical analysis of data using the scatter plot. The homoscedasticity assumption has been verified using the Bartlett's test in which the p-value must be greater than the level of significance to meet the requirements. The assumption of a normal distribution of the number of students' evaluations of statements was verified by:

graphical analysis (comparing the histogram with normal distribution curve) testing, and descriptive characteristics (skewness and kurtosis), using a z-score. If the value of the skewness or kurtosis of the z-test was greater than the significance level, then the premise was rejected. A correlation matrix was used to verify the relationship between dependent and independent variables. T-test was used to verify the significance of the parameters in the regression model. The basic linear multiple regression model which defines the relationship between the dependent and independent variables, has the following general form for the Czech Republic and Slovakia:

$$QBE = \beta 0 + \beta 1 * EF1 + \beta 2 * EF2 + \beta 3\ EF3 + \beta 4\ EF4 + \varepsilon t\ , \qquad (1)$$

where *QBE* – dependent variable (Quality of business environment); β_0 – constant, $\beta_1; \beta_2, \beta_3; \beta_4$ – parameters of independent variables EF_i; EF_i – independent variables (EF_1 – macroeconomic environment, EF_2 – monetary policy and interest rates, EF_3 – financing companies, EF_4 – Population consumption, changes in income and the structure of consumer expenditure); ε_t – error term.

The coefficient of determination indicates the percentage of variability of propensity for entrepreneurship of students that is explained by the chosen regression model. Then the coefficient of determination was compared with the adjusted coefficient of determination. The F – test was used to verify the significance of the entire regression model. The presumption of multicollinearity was verified by using variance inflation factor (VIF – test). If the value of the VIF test for the independent variable is less than 5, then the parameter is not affected by multicollinearity (Hair et al., 2010). The desired p-value of the F – test must be lower than the level of significance. The level of significance is 0.05. The calculations were done using sophisticated statistic software SPSS Statistics.

4. Results and Discussion

To test hypothesis H1, regression analysis of data was used. Linear trends between the dependent variable (QBE) and independent variables (**EF_1, EF_2, EF_3, EF_4**) can be seen in the results of a graphical analysis (scatter plot). The graphic analysis of normal distribution of data shows divergences from normal distribution in the EF_4 independent variable. The results of the assumption of normal data distribution are given in Table 1.

Table 1: Skewness, kurtosis and z- value of independent variables

Independent variable	Skewness	z- value	Kurtosis	z-value	Bartlett's test
EF_1	0.1693	0.6154	-0.7504	0.1445	0.5541
EF_2	0.2318	0.2565	-0.8667	0.8751	0.8421
EF_3	0.0171	1.9217	-0.5085	0.2111	1.4777
EF_4	-0.0429	0.1799	-0.0429	0.3598	2.0209

Source: Authors' results.

The results confirmed that the EF_1 and EF_2 independent variables fulfil the conditions of normal data distribution as well as homogeneity of variances (Bartlett's test EF_1, $EF_2 > 0.05$). The independent EF_3 and EF_4 variables do not fulfil the condition of normal data distribution (z - values of skewness EF_3 and z – value of kurtosis $EF_4 > 2.000$). These independent variables can be inserted into the regression model with the aid of the t-test. The results are shown in Table 2.

Table 2: Characteristics of the variables not included in the model in the first phase

Independent variable	Partial correlation	t- value
EF_3	0.3398	2.8254
EF_4	0.3315	2.2121

Source: Authors' results.

In Table 2 the calculated test characteristic of student distribution in the independent variables (EF_3 and EF_4) are higher than the critical test value. EF_3 and EF_4 are accepted as an independent variable in the linear regression model. The intensity of dependence between the dependent and independent variables is illustrated in Table 3.

Table 3: Correlation matrix of variables in the model of quality business environment

	QBE	EF_1	EF_2	EF_3	EF_4
QBE	1				
2	0.4021	1			
EF_2	0.4127	0.3609	1		
EF_3	0.3270	0.2768	0.3642	1	
EF_4	0.3055	0.3130	0.3559	0.3057	1

Source: Authors' results.

From the results of the z-test (see Table 1), the t-test (see Table 2) and the correlation matrix (see Table 3), independent variables EF_1, EF_2, EF_3 and EF_4 are accepted as statistically significant parameters of the linear

regression model. The results of testing the significance of the thus designed regression model with three independent variables are shown in Table 4.

Table 4: Characteristics of quality business environment of regression model

Least squares multiple regression					
R^2					0.2737
Adjusted R^2					0.2691
Multiple correlation coefficient					0.5231
Residual standard deviation					0.7759
Regression equation					
Independent variables	Coefficient	Std. Error	t- Stat	p-value	VIF
(Constant)	0.5185	-	-	-	-
EF_1	0.2357	0.0358	6.5743	<0,001	3.6515
EF_2	0.2442	0.0402	6.0786	<0,001	2.8765
EF_3	0.0159	0.0419	3.7991	<0,001	4.3211
EF_4	0.1010	0.0375	2.6918	0,002	3.1897
Analysis of variance					
F-ratio					59.9078
Significant level					<0.0001

Source: Authors' results

Graphic analysis of the entire model confirmed the conditions of linearity, homoscedascity and independence of deviations. The conditions of normality were also fulfilled by the results of the normal distribution graph.

The Variance Inflation Factor results demonstrated the absence of the effect of multicollinearity (VIF independent variables are less than the critical value 5 (Hair, 2010): EF_1 = 3.6515; EF_2 = 2.8765; EF_3 = 4.3211; EF_4 = 3.1897). The differences between the determination coefficient and the adjusted determination coefficient are minimal (R^2 - 0.2737 and Adjusted R^2 - 0.2691). The p-value of the F-ratio of the entire regression model is less than 0.005.

The above calculations of the characteristics of regression analysis (see Table 4) lead to the formulation of the shape of the linear regression function of regression model of propensity for entrepreneurship of university students as follows:

$$QBE = 0.5185 + 0.2357*EF1 + 0.2357* EF2 + 0.0159 EF3+ 0.1010 EF4 + \varepsilon t , \quad (2)$$

where *QBE* – dependent variable (Quality of business environment); β_0 – constant, $\beta_1; \beta_2, \beta_3; \beta_4$ – parameters of independent variables EF_i; EF_i – independent variables (EF_1 – macroeconomic environment, EF_2 – monetary policy and interest rates, EF_3 – financing companies, EF_4 – population consumption, changes in income and the structure of consumer expenditure); ε_t – error term.

The hypothesis that the designed regression model is statistically significant at a 0.05 significance level is accepted. The variability of selected independent variables (EF_1, EF_2, EF_3 and EF_4) explains up to 27.37 % of the variability of intensity of the quality of business environment in the SME segment in the Czech and Slovak Republic. The determinant Macroeconomic environment has the greatest influence on the quality of business environment from all selected economic factors. Contrariwise, the smallest influence, if statistically significant, is the determinant population consumption, changes in income and the structure of consumer expenditure. The economic factors had an influence on QBE of SMEs.

Hypothesis was confirmed. The results showed that statistically significant indicators are: I consider the macroeconomic environment of my country to be favorable for doing business (EF_{11}), the state of macroeconomic environment of my country supports starting a business (EF_{12}), The present macroeconomic environment supports enterprises' innovation activities (EF_{13}), The Central Bank's monetary policy stabilizes

the business environment (EF_{24}), enterprises have easy access to bank loans (EF_{31}) and People purchase more, compared to the past (EF_{44}). Other indicators are not statistically significant.

Other authors also examine the quality of the business environment in the analyzed countries, and present interesting inputs in this field.

The results of the survey by Virglerova et al. (2017) "have demonstrated that four groups of key determinants can be identified in the business environment studied among SMEs in the Czech Republic. The first and most global determinant is "State and public perception" which includes both the country's legislative background and the general public's perception of entrepreneurs. The second is "Banks and their approach to business" which includes the most important external source of finance for SMEs in the Czech Republic. The third area is "Knowledge of rules and principles" which determines the activities of business owners especially on the financial market. The last determinant is "Financial risks and their increase in post-crisis times", comprising the awareness of financial risks, risk management, and the changes in risk perception during the crisis and after it.

The state plays a very important role within its business environment. Three areas of the state's influence on the business environment were selected: the state's help with entrepreneurship, administrative burden related to entrepreneurship, and corruption and clientelism. These areas were moreover examined in terms of the age of the business and company size. It was found that SMEs perceive the help of the state more than micro businesses. More than 53% of entrepreneurs encountered clientelism. Furthermore, the results confirm that the problem of corruption increases with company size. Encountering corruption and clientelism may be significantly more influenced by the length of entrepreneurship than by the company size (Virglerová et al., 2016).

Ključnikov et al. (2016) define and quantify important factors of the quality of the business environment for small and medium-sized enterprises (SMEs) in the Czech Republic. They found that only 10% of the entrepreneurs positively evaluated the applicable forms of state financial support. 64% of Czech entrepreneurs feel the support of their surroundings while doing business, 45% think that SMEs have restricted access to external sources of financing, and over half note the intensive influence of market risk. It was also determined that there are statistically significant differences in the pattern of responses between micro-enterprises and small and medium-sized enterprises.

The payment discipline represents a major problem in SMEs in Slovakia. While 83% of them noted the existence of problems with overdue receivables, 30% of the respondents acknowledged problems with their own payment discipline and identified secondary insolvency as the most important reason for it (Ključnikov et al., 2017).
Results by Ključnikov and Popesko (2017) suggest that Slovak entrepreneurs primarily supply their products and services on the domestic market, while their export potential is limited. The assessment of the state support of export activities is rather negative. An alarming finding is that Slovak entrepreneurs in the SME segment do not use even basic tools of financial risk reduction to a higher extent, and that the use of services of the state export bank Eximbank is negligible.

5. Conclusion

The aim of this paper is to define significant economic factors influencing the quality of the business environment and quantify their power in the economic system.

In was discovered in this research that macroeconomic factors play an important role in shaping the quality of the business environment. Among the most significant factors influencing the quality of SMES' business environments are: the state of the macroeconomic environment, Central Bank's monetary policy, access to external financing, and population consumption. Factors most influencing the perception of the quality of SMEs' business environment in the Czech and the Slovak Republic are: EF_{11} (I consider the macroeconomic environment of my country to be favorable for doing business), EF_{12} (the state of macroeconomic environment of my country supports starting a business), EF_{13} (The present macroeconomic environment supports enterprises' innovation activities), EF_{24} (The Central Bank's monetary policy stabilizes the business environment, EF_{31} (enterprises have easy access to bank loans and EF_{44} (People purchase more, compared to the past).

The research has its limitations, but also brought interesting findings and a potential inspiration for further research of the quality of the business environment in the SME segment. Next research will be oriented on defining not only economic, but also non-economic factors influencing the quality of the business environment in the SME segment.

References

Ahmedova, S. (2015) „Factors for increasing competitiveness of small and medium-sized enterprises (SMEs) in Bulgaria“, Procedia-Social and Behavioral Sciences, 195, pp 1104–1112.

Bekeris, R. (2012) „The impact of macro-economic indicators upon SME's profitability“, Ekonomika, 91(3): 117–128.

Dajcman, S. (2016) „The bank lending channel of monetary policy and its macro-economic effects: evidence from a sample of selected euro area countries“, Engineering Economics, 27(2): 124–133.

Dragnic, D. (2014) „Impact of internal and external factors on the performance of fast-growing small and medium businesses“, Management: Journal of Contemporary Management Issues, 19(1): 119–159.

Hair, J. F., Black, W. C., Babin, B. J., and Anderson, R. E. (2010) "Multivariate data analysis", New Jersey: Upper Saddle River: Prentice Hall.

Ipinnaiye, O., Dineen, D., and Lenihan, H. (2017) „Drivers of SME performance: a holistic and multivariate approach“, Small Business Economics, 48(4): 883–911.

Kadocsa, G. and Francsovics, A. (2011) „Macro and micro economic factors of small enterprise competitiveness“, Acta Polytechnica Hungarica, 8(1): 23–40.

Ključnikov, A., Kozubíková, L., and Sopková, G. (2017) "The Payment Discipline of Small and Medium-sized Enterprises", Journal of Competitiveness, Vol. 9, Issue 2, pp 45–61.

Ključnikov, A. and Popesko, B. (2017) "Export and its Financing in the SME Segment. Case Study From Slovakia", Journal of Competitiveness, Vol. 9, Issue 1, pp. 20–35.

Ključnikov, A. et al. (2016). "The Entrepreneurial Perception of SME Business Environment Quality in the Czech Republic," Journal of Competitiveness, Vol. 8, Issue 1, pp. 66–78.

O'Toole, C., Gerlach-Kristen, P. and O'Connell, B. (2013) „Measuring credit constraints for Irish SMEs“, Quarterly Economic Commentary, 1(3), pp 1–14.

Steinerowska-Sterb, I. and Steiner, A. (2014) „An analysis of external finance availability on SMEs decision making: a case study of the emerging market of Poland“, International Business Review, 56(4): 373–386.

Thai, M. T. T. and Turkina, E. (2014) „Macro-level determinants of formal entrepreneurship versus informal entrepreneurship“, Journal of Business Venturing, 29(4): 490–510.

Virglerova, Z., Dobes, K., and Vojtovic, S. (2016) "The Perception of the States Influence on its Business Environment in the SMEs from Czech Republic", Administratie si Management Public, 14 (26): 78–96.

Virglerova, Z., Homolka, L., Smrčka, L., Lazányi, K., and Klieštik, T. (2017) "Key determinants of the quality of business environment of SMEs in the Czech Republic", E & M Ekonomie a Management, vol. 20, No. 2, pp. 87–100.

What is the Role of Networks and Geography in Reward - Based Crowdfunding Success?

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Abstract: The crowdfunding phenomenon attracted considerable academic and professional attention in recent years. Research on the determinants of performance in rewards-based crowdfunding campaigns is developing at a fast pace and had essentially wide in its focus, allowing us to learned generically about what works and what does not work in this type of crowdfunding. In our paper we deepen this research by analysing the role of networks and geography in reward-crowdfunding success and examining potential differences according project goal. Using the most popular crowdfunding platform in Portugal (PPL crowdfunding), we followed 340 campaigns initiated and ended in 2017 and constructed a data set to capture campaign characteristics and funding outcomes. A binary logistic regression model was used to investigate networks and geography factors driving a campaign's success. Our results highlight the role of social networks and project region on funding success rewards-based crowdfunding. With our study, we contribute to the literature on crowdfunding and funding success. We provide comprehensive view on the role of networks and geography explaining in rewards-based crowdfunding success. We extend the previous knowledge by the fact that both networks specific aspects and geography specific aspects have an influence on the question of whether a project is successfully funded and can thus be realized. We also found a different role of these variables according to the size of the project. From a practical point of view, the results of our study are highly relevant for stakeholders on crowdfunding platforms. Project founders can make use of the results in order to improve the information related to their projects to increase the chance to have a project successfully funded. Our results are also relevant for crowdfunding platforms itself. These platforms might automatically assess the chance of successful funding of projects. Furthermore, platform operators could also suggest changes to founders whose project have been evaluated as potentially less successful.

Keywords: rewards-based crowdfunding; success prediction; networks; geography

1. Introduction

In the summer of 1885, the Statue of Liberty was in pieces in New York, with no funding to stand on a pedestal. So Joseph Pulitzer, The New York World editor, decided to launch a fundraising campaign in his newspaper. The newspaper kept readers up-to-date with the crowdfunding campaign, listing donors and amounts on a regular basis. The campaign raised money from more than 160 000 donors with more than three quarters of the donations, totalling less than a dollar. In just five months, The New York World grossed $101091 - enough to cover the last $ 100 000 to complete the pedestal. If launched today, this campaign would be a classic crowdfunding project, such as those run online by existing platforms around the world.

Joseph Pulitzer used the newspaper to raise money from a very large group of donors, each promising only a small money exchange. Those who donated a dollar or more received a mini 12-inch model of the statue. In a similar vein, artists, musicians, small entrepreneurs, and others have long relied upon funding from various backers to produce new works. Rewards-based crowdfunding enables funders to obtain financial resources from the general public, via internet-based platforms, in exchange for some level of non-financial reward (Davis et al. 2017).

While the crowdfunding phenomenon has attracted considerable practitioner and scholarly attention, existing research does not allow us to fully understand the determinants of crowdfunding campaigns performance (McKenny et al, 2017).This is a key question within crowdfunding research to date.

Research on the determinants of performance in rewards-based crowdfunding campaigns had essentially wide in its focus, allowing us to learned generically about what works and what does not work in this type of crowdfunding (see Kuppuswamy and Bayus, 2017 for a review). Two perspectives that deserved some attention refer to the possible influence of networks and geography on successful rewards-based crowdfunding. Networks are important channels through which can access financial resources (Ahlers et al, 2015; Brüderl & Preisendörfer, 1998). In rewards-based crowdfunding an exploratory study made by Mollick (2014) suggested that there are connections between social networking sites of a founder and their ventures with funding success. A body of literature also has examined and identified negative effect of geographic

distance in different contexts (Sorenson and Stuart, 2001; Seasholes and Zhu, 2005; Nieuwerburgh and Veldkamp, 2009). However in rewards-based crowdfunding Agrawal et al (2011; 2015) suggests that online mechanisms seem to diminish many distance-sensitive costs.

To deepen the role of networks and geography in rewards-based crowdfunding success we narrowly focused research question: what is the role of networks and geography in rewards-based crowdfunding success? Additionally, we questioned whether the influence of networks and geography changes with the project goal? To answer these questions we followed 340 campaigns initiated and ended in 2017 in the most popular crowdfunding platform in Portugal (PPL crowdfunding), and constructed a data set to capture campaign characteristics and funding outcomes. This platform uses a rewards-based model where founders receive tangible, nonmonetary rewards for their contributions, often in the form of products /services, or tokens of appreciation such as thank you notes.

The paper is structured as follows: Section 2 provides a brief overview of the study context. Section 3 presents a review of literature and the hypotheses to be tested. The data used, the statistical model and measurements of the variables are detailed in Section 4. The univariate and multivariate results of our data analysis are presented in Section 5. Section 6 provides conclusions.

2. Study context

Important steps have been taken to introduce regulation of crowdfunding into Portuguese legal system. First, with the publication of Law nº 102/2015, of August 24, that defined the legal regime for crowdfunding (LRC). In this law, crowdfunding is referred as the type of financing of entities (or their activities and projects) through which any natural or legal person, national or foreign, obtains investment from one or more individual investors, using a crowdfunding platform. In LRC four modalities of crowdfunding were established and regulated, namely: (i) Donation-based crowdfunding (ii) Reward-based crowdfunding; (iii) Equity-based crowdfunding; (iv) Lending - based crowdfunding. Law no. 102/2015 was subsequently supplemented by Administrative Rule no. 344/2015, of October 12, which established the rules applicable to the prior notification procedure for the start of activity of crowdfunding platforms through the means of Donation and Reward. The Portuguese Securities Market Commission approved CMVM Regulation No. 1/2016 where it defined the regime applicable to Equity-based crowdfunding and Lending-based crowdfunding.

This progress in building the legal framework for crowdfunding has only recently been completed with the publication of Law nº 3/2018, of 9 February 2018. This law defines the applicable sanctioning to the development of crowdfunding activities in Portugal. The law also makes the first amendment to Law 102/2015 of 24 August, which approves the crowdfunding.

3. Literature review and hypotheses derivation

3.1 Networks and reward - based crowdfunding

Networks are important channels through which can access financial resources (Ahlers et al, 2015). In crowdfunding there is the social network as a result of community crowdfunding platform where the entrepreneur is embedded in. This social network can help entrepreneur to find backers for his projet (Nahapiet and Ghoshal, 1998; Zheng et al, 2014). Belleflammea et al (2015) states that 'social buzz' or 'eWOM (electronic word-of-mouth), in the form of support, that a particular campaign would receive on social networks (e.g., shares on Facebook, or tweets on Twitter) may be critical for the campaign success. They consider que some funders put more weight on recommendations they receive from friends in a social network than on general information of campaign. According this author "social buzz" may supplement adequately the campaign description that a founder would give on crowdfunding platform. Agrawal et al (2014) suggest that the evolution of a fundraising campaign depends on founder social ties. Mollick (2014) found that a fundraisers number of Facebook connections (taken as a proxy for the size of a founder's social network) are a good predictor of successful fundraising. Thies et al (2014) analysed the effects of "social buzz" on the likelihood of success of crowdfunded campaigns. Their data set combines information about projects proposed on Indiegogo platform and number of shares and tweets that these campaigns received, respectively on Facebook and Twitter. Their results show that "social buzz" (especially Facebook shares) positively influences project backing. Others author's also agrees on the importance of social networks to collecting funds in crowdfunding models (Agrawal et al 2011; 2014; Kuppuswamy and Bayus, 2013; Lin et al, 2013).

Consequently, we hypothesize that:

H1: Crowdfunding projects with largest number of facebook shares are more likely to be successfully funded than projects with fewest facebook shares.

Throughout campaign some projects receive comments on the platform that can stimulate (new) funders to invest (Mollick, 2014). Antonenko et al (2014) found that the number of comments or founders updates on the project matter and point out that intensive communication positively impacts successful projects. Based on these previous results the following hypotheses will be tested:

H2: Crowdfunding projects that received comments on the platform are more likely to be successfully funded than those who have not commented.

Social networks can help disseminate knowledge about the organization's existence and can also be a sign of reputation (Coleman, 1988). So, the institutions those promote crowdfunding campaigns may seem more trustworthy in the eyes of the backers than the individual founders. Members of an organization can also use their individual social networks to accelerate the dissemination of rewards-based crowdfunding campaigns.

Networks with members of social organizations and associations have attracted relatively less attention in the literature. Members of social organizations helps small private firms have better access to venture capital (Ahlstrom and Bruton, 2006) and business angels (Wong and Ho, 2007). In this sense, an organization's social networks rather than individual networks can facilitate access to finance. We believe that Institutions are more likely to succeed in a crowdfunding campaign, thus we propose the following hypothesis:

H3: Crowdfunding projects in which founders are organizations are more likely to be successfully funded than projects promoted by individuals ones.

3.2 Geography and reward - based crowdfunding

The theory predicts that investors in entrepreneurial ventures in the early stage will tend to be local, to compensate costs of collecting information and monitoring progress (Florida and Smith, 1993; Lerner, 1995; Mason, 2007). Likewise crowdfunding backers tend to support campaigns that are geographically close to them (Lin and Viswanathan, 2015). Mollick (2014) concluded that early contributions from local investors (e.g. family and friends) can determine the pattern of subsequent contributions by more distant funders. However some authors devalue this geographic variable because online mechanisms can reduce economic frictions associated with financing in early-stage projects over long distances (Agrawal et al, 2011; Vulkan et al, 2016).

Consequently, we hypothesize that:

H4: Crowdfunding campaigns developed in Continental Portugal are more likely to be successfully funded than campaigns located out of Continental Portugal.

For some people supporting rural economy is essential to maintain the viability of rural populations. Rewards-based crowdfunding can be seen by some potential funders as valuable means of promoting the development of rural areas (Kim and De Moor, 2017). Crowdfunding can contribute to inclusion if is used for financing social projects (Austin et al, 2006; Gerber et al, 2012). However rural campaigns also can exacerbate the doubts of funders as they cannot easily follow the development of projects.

We distinguish between projects carried out in urban areas and projects carried out in rural areas based on the legal-administrative criterion in force in Portugal (Law No. 11/82, of 2 June). The category of city is conferred to towns that combine more than 8000 voters with a certain set of equipment and infrastructures.
Based on this distinction the following hypotheses will be tested:

H5: Crowdfunding projects developed in urban areas are more likely to be successfully funded than projects located in low population density regions.

3.3 Network and geography and project goal campaign

Literature suggests that influence of funding target on crowdfunding campaign success differs with model of crowdfunding. In reward-based crowdfunding most studies indicate that higher funding goals are negatively associated with success (Belleflamme et al, 2014; Cordova et al, 2015; Cumming et al, 2014; Kuppuswamy and Bayus, 2013; Mollick, 2014; Zheng et al, 2014). We believe that our networks variables can contribute positively to mitigating this impact in campaigns with higher projected goals. On the contrary the negative impact of our geography variables should be more pronounced with higher projected goals.

Consequently, we hypothesize that:

H6: Social networks variables have a greater positive impact on the success of rewards-crowdfunding campaigns with project goal ≥ €2000.

H7: Geography variables have a greater negative impact on the success of rewards-crowdfunding campaigns with project goal ≥ €2000.

3.4 Additional controls

We include two additional variables in our analysis to account other factors that might be driving success in rewards-based crowdfunding. We control for duration and communication quality of campaign.

The duration of crowdfunding campaigns is determined in advance. Typically long campaigns durations are associated with greater visibility of the project and consequently better performance. However also may argue that very long campaign duration may be perceived as lacking trust of founders. Results of empirical studies give reason for these two in perspectives. Zheng et al (2014) found that the duration of the campaign is positive related to success in rewards-based campaigns in China, while no significant relationship was confirmed for the United States. Other studies also found that larger project duration increases the chances of success in reward-based campaigns (Cordova et al, 2015, Burtch et al, 2014). On the other hand, the duration of the campaign is negatively related to success in studies conducted by Cumming et al (2014), Kuppuswamy and Bayus (2013) and Mollick (2014).

When starting a crowdfunding campaign on platform founders need to create project profile including a title, project description, target funding, campaign duration and rewards. Communication on the platform can be improved by inserting photos and video. Theories of communication have been employed to understand entrepreneurial fundraising (Ahlers et al, 2015; Plummer et al, 2015). In crowdfunding, producing a video demonstrates an indicator of a higher-quality project, since it signals at least minimal preparation (Mollick, 2014). Zheng et al (2014) indicated that the shared meaning of a crowdfunding project also has a positive influence on the success of the project. The shared meaning can be enhanced through a video project.

Parhankangas and Renko (2017) consider that key part of any crowdfunding proposal is a video pitch, in which the entrepreneurs present the project to be funded. By communicating effectively, founders can convince funders about their legitimacy and potential (Lounsbury and Glynn, 2001).

4. Data and model description

Data for the analysis is derived from the most popular crowdfunding platform in Portugal: PPL crowdfunding (https://ppl.com.pt/). This platform was founded in 2011 in Lisbon by four MBA students of different nationalities. PPL crowdfunding uses a rewards-based model where funders receive tangible, nonmonetary rewards for their contributions, often in the form of products / services, or tokens of appreciation such as thank you notes. The terms of funding follow an “all-or-nothing” model and its activity is accredited by crowdsourcing.org, the benchmark in the crowdsourcing and crowdfunding industry, according to CAPS (Crowdfunding Accreditation for Platform Standards). PPL is a founding member of the European Crowdfunding Network, whose main objective is to join efforts to promote this new tool at European level. In March 2018 the PPL crowdfunding website stated that since its inception €2731738 has been raised with 73805 individual contributions (€ 37 average support). In 1800 projects launched since its inception, 830 campaigns were funded in an average period of 49 days. The success rate in PPL is approximately 45%. On average, the projects financed raised € 2818. Until March 2018, the categories of initiatives that had raised a greater volume of funding were “Music” and “Social”.

The final dataset contains information on 340 PPL campaigns initiated and ended in 2017. Data were compiled from initial campaign descriptions and result appearing on the PPL platform after expiration of campaign deadline. In 340 campaigns 52.2% obtained the intended financing while 47.8% did not reach the project goal.

Using a binary logistic regression model our study investigates the factors driving a campaign's success. The dependent binary variable (1/0) is represented by the campaign crowdfunding status (success/failure). The classification of "success" was assigned in cases where the intended financing was obtained (or passed on).

They were classified as "failure" if the intended funding was not achieved. The independent variables used in this study are a mix of continuous and categorical variables. The definitions of the individual level model variables are given in Table 1.

The binary logistic regression model to test our hypotheses related to the factors driving a campaign's success given by:

$$\text{Ln}\ \frac{p}{1-p} = \beta\, 0 + \beta\, 1\, X1 + \beta\, 2\, X2 + \ldots + \beta\, k\, Xk$$

Where *p* stands for the campaign's success probability; $\beta\, 0$ is the intercept and $\beta\, i$ is the regression coefficient. In logistic regression the coefficients derived from the model (e.g., $\beta\, 1$) indicate the change in the expected log odds relative to a one unit change in X1, holding all other predictors constant. The beta coefficients are estimated through the method of maximum-likelihood method. Version 23.0 of the Statistical Package for the Social Sciences (SPSS) was used to analyze the logistic regression.

Table 1: Definitions of individual variables

Variables		Description	
Dependent variable	Campaign Status	Whether or not the campaign succeeded in getting the funding	= 1 denoting intended financing was obtained (or passed on); 0= stands not obtaining the intended financing
Independent variables (Networks)	Facebook Shares	Campaign Facebook shares	= Number of campaign shares made via Facebook (Log10)
	Project Comments	Comments about campaign	= 0 not receive comments; 1= receive comments
	Founders	Type of founder	= 0 Individual; 1= Organization
Independent variables (Geographic)	Geographic Distance	Project location	= 0 Out of Continental Portugal ; 1= Continental Portugal
	Project Region	Type of Region	= 0 Rural Area ; = 1 Urban Area
Independent variables (Control)	Duration	Campaign duration	= Number of months
	Communication Quality	Media used in communication	= 0 communication with just videos or photos; 1= communication with videos and photos

5. Results

5.1 Descriptive statistics

Table 2 shows some of the characteristics of the sample. Campaigns that received comments during the active period were on average more successful (75.8%) while those that did not receive comments only 34.2% achieved the amount funding goal (Chi2=56.774; p=.000).

Table 2: Descriptive statistics of categorical independent variables

Variable	Value	Successful	Unsuccessful	Total	
		Percentage	Percentage	Percentage	Frequency
Project Comments	Without Comments	34.2	65.8	55.0	187
	Receive comments	75.8	24.2	45.0	153
		Chi2= 56.774 p=.000			
Founders	Individual	48.4	51.6	45.6	155
	Organization	56.8	43.2	54.4	185
		Chi2= 2.047 p=.152			
Geographic	Out of Continental Portugal	47.8	52.2	20.3	69

Distance	Continental Portugal	54.2	45.8	79.7	271
		Chi2=.670 p=.413			
Project Region	Rural areas	59.3	40.7	50.6	172
	Urban areas	46.4	53.6	49.4	168
		Chi2=5.149 p=.023			
Communication Quality	Video(s) or foto(s)	46.4	53.4	39.1	133
	Video(s)+foto(s)	57.0	43.0	60.9	207
		Chi2= 3.103 p= .078			

The campaigns originated in individual founders (45.6%) and in diverse organizations (54.4%). The initiatives of individual founders had more failure than success (51.6% versus 48.4%). In the organizations the situation found is different: 56.8% of the initiatives were successful and 43.2% failed to obtain the target funding.

In the 340 crowdfunding campaigns of the sample, 79.7% were destined to projects located in continental Portugal, while a little more than 20% were intended to be carried out of continental Portugal. Half of the campaigns included in the sample were for rural areas and the other half for urban areas. However, 59.3% of projects targeting rural areas were more successful, compared to 46.4% of the counterpart (Chi2 = 5,149 p = .023). In terms of "communication quality" it is noted that about 60.9% of the campaigns on the platform were supported in images and videos. The use of only one of these means of communication is minority in the sample (39.1%). Campaigns that only used photos or video recorded a higher failure rate (53.4%) compared to campaigns that used a strategy of communication with videos and photos together (43.0%).

Table 3 shows several continuous independent variables that potentially differentiate the campaigns with the highest probability of success. We found that the most shared campaigns on Facebook achieved, on average, greater success than those that were less shared (Anova F 40.759; Anova p = 0.000). Unsuccessful campaigns also had a longer duration. The average duration of successful campaigns was 1.55 months versus 1.67 months of unsuccessful campaigns.

Table 3: Descriptive statistics of continuous independent variables

Value	Total	Successful	Unsuccessful	Successful	Unsuccessful	Anova-F	Anova-p
	Means	Means	Means	Std dev.	Std dev.		
Facebook Shares (Number Log 10)	1.8613	2.2071	1.4724	1.062213	1.05570	40.759	.000
Duration (months)	1.6123	1.5516	1.6806	.61598	.57334	3.965	.047

When the sample is split according to the project goal (cut 2000€), we get N1 subsample with 185 observations for Project Goal < €2000 and N2 subsample with 155 observations for Project Goal ≥ €2000.To be noted, the level of successful is significantly higher with project goals ≥ €2000 (Table 4).

Table 4: Descriptive statistics of dependent variable

(Crowdfunding campaign status)

	Frequency		Percentage	
	N1 Project Goal (< €2000)	N2 Project Goal (≥ €2000)	N1 Project Goal (< €2000)	N2 Project Goal (≥ €2000)
Successful	90	90	48.6	58.1
Unsuccessful	95	65	51.4	41.9
Total	185	155	100.0	100.0

5.2 Multivariate analysis

We obtained the matrix of correlations between the independent variables used in the model. Although some of the correlations are significant they are not high enough (none is higher than 0.5) to conduct to multicollinearity problems (Hair et al 1998; Sharma,1996). We also did not check values of VIF and Tolerance that indicated multicollineraty.

The logistic regression analysis proved to be a statistically significant model (difference test/chi square = 107.022, df = 7, p = 0.000). The result of the Hosmer-Lemeshow test (chi square = 12.173; df = 8; p = 0.144) confirmed that the model fits the data. The classification table indicates that the model correctly classifies 71.5% of cases. According to the Nagelkerke R Square, the dependent variable variance explained by the model is 36%.

Analysis of Table 5 enables identification of the significant Wald coefficients in four variables (p<0.05): Facebook Shares (H1), Project Comments (H2), Founders (H3) and Project Region (H5). These four variables (and control variable "Duration") are able to predict the success of reward-based crowdfunding campaigns.

Geographic Distance (H4) and Communication Quality also used in the model, are not significant determinants of the probability of the success of crowdfunding campaigns at the usual statistical significance (p<0.05).

Table 5: Determinants of campaign's success

Variable	Coefficient (B)	Wald Chi-Square	Exp(B)	p-value
Intercept	-1,324	5,318	,266	,021
Facebook Shares (Log number)	,600	23,276	1,823	,000(*)
Project Comments (yes)	1,929	49,092	6,886	,000(*)
Founders (Institution)	,611	5,027	1,842	,025(*)
Geographic Distance (Portugal)	,464	2,006	1,591	,157
Project Region (Urban areas)	-,701	6,855	,496	,009(*)
Duration (months)	-,531	4,477	,588	,034(*)
Communication Quality (vídeo+photo)	-,011	,002	,989	,967

(*) (p<0.01) (**) (p<0.05)

Prior to performing logistic regression of each of the subsamples, we carried out the previous procedures to eliminate the question of multicollinearity among the variables of the models used. Although some of the correlations are significant they are not high enough (none is higher than 0.6 in N1 and 0.5 in N2). We also did not check values of VIF and Tolerance that indicated multicollinearity. These results lead us to conclude that the question of multicollinearity does not arise among the variables of the models.

The logistic regression proved to be a significant model statistically in both subsamples (N1: difference test/chi square = 47.701, df = 7, p = 0.000; N2: difference test/chi square = 79.400, df = 7, p = 0.000). The result of the Hosmer-Lemeshow test (N1: chi square = 15.390; df = 8, p = 0.052; N2: chi square = 8.246, df = 8, p = 0.410) confirmed in both situations that the model fit the data. The classification tables indicate that the model correctly classifies in 69% of cases in N1 and in 76.8% of cases in N2. According to the Nagelkerke R Square, the dependent variable variance explained by the model is 35.6% and 46.5% respectively in N1 and N2.

We predict that networks (facebook shares, project comments and type of founders) would have the greatest positive impact in higher projects goal. Relative to geography variables (geographic distance and project region) our expectation was greater negative impact in higher projects goal. These assumptions would be supported if there was a positive relation and an increase in the explanatory power of each variable for Model 2 in relation to Model 1 (networks) and if there was a negative relation and an increase in the explanatory power of each variable for Model 2 in Model 1 (geography).

Table 6 presents the results of the logistic regression used to identify the factors that influence the probability of campaign success according Project Goal. It is clear that facebook shares have increased positive and significant effect on the probability of success when project goal ≥ €2000 (p= 0.001 to p= .000). When we looking at project comments, the results indicate that variable has same positive influence in two subsamples (p-value = .000). Unlike ours expectation, the results show that type of founders is important and significant just in projects with target < 2000 €. Our sixth hypothesis (H6) is therefore partially supported by these results.

It has not been confirmed that negative influence of geography increases in larger projects. On the contrary, project region variable loses its significance when the project goal is higher than 2000 €. These results suggest that hypothesis 7 should be rejected.

Finally, in relation to control variables, the quality of communication plays a significant role only in campaigns ≥ €2000 (p=.039). A cut in campaign target at 2000 € makes the duration of the campaign stop being significant in any of the subsamples.

Table 6: Determinants of campaign's success according Project Goal

Variable	Project Goal (< €2000)				Project Goal(≥ €2000)			
	Coefficient (B)	Wald Chi-Square	Exp(B)	p-value	Coefficient (B)	Wald Chi-Square	Exp(B)	p-value
Intercept	-1,195	2,627	,303	,105	-2,419	5,339	,089	,021
Facebook Shares (Number Log 10)	,697	11,113	2,007	,001(*)	,623	13,519	1,864	,000(*)
Project Comments (Yes)	1,542	12,488	4,676	,000(*)	2,656	40,708	14,234	,000(*)
Founders (Institution)	1,075	7,119	2,931	,008(*)	,200	,240	1,221	,625
Geographic Distance (Continental Portugal)	,546	1,289	1,727	,256	,299	,376	1,349	,540
Project Region (Urban areas)	-,900	5,192	,407	,023(**)	-,559	1,948	,572	,163
Duration (Months)	-,320	1,397	,726	,237	-,546	1,398	,579	,237
Communication Quality (Vídeo+photo)	-,505	1,548	,603	,213	,898	4,253	2,455	,039(**)

(*) ($p<0.01$) (**) ($p<0.05$)

6. Conclusions

Previous studies investigated the success determinants of rewards-based crowdfunding campaigns were conducted mostly in the US and based on the world's largest crowdfunding reward platforms such as Kickstarter or Indiegogo. This research is developing at a fast pace and had essentially wide in its focus, allowing us to learned generically about what works and what does not work in this type of crowdfunding. Our study focused on less studied context (Portugal) and deepens this research by analysing the role of networks and geography in reward-crowdfunding success and examining potential differences according project goal.

First of all is important emphasize the high level of success found in the study. More than half the campaigns (52.2%) have achieved the project goal.

Our analysis confirms that the number of facebook shares correlates with the success of the project. This allows us to conclude that projects can be driven to success through social network. According results social networks can adequately complement the description of the campaign that a founder would give on a crowdfunding platform. As predicted in hypothesis 1 we have confirmed that crowdfunding projects with largest number of facebook shares are more likely to be successfully funded than projects with lowest number of shares. The influence of this variable is significant regardless of the campaign project goal but is even more relevant in smaller campaigns.

We also looked at the 'comments' on the success of the campaign. Comments received on the platform seem to have very significance in the success of the crowdfunding campaign, regardless of the project goal.

In hypothesis 3, we have tested if crowdfunding projects that were promoted by organizations are more likely to be successfully funded than projects whose founders were individual. Our hypothesis was confirmed. However the result showed that this is only true in campaigns with project goal < €2000.

Our results also found no correlation between geographic distance and successful financing. Crowdfunding campaigns relating to projects outside continental Portugal do not seem to exacerbate funders' doubts, perhaps because the nature of the campaigns leads them to believe in project development. The fourth hypothesis, which predicts that crowdfunding projects developed in Continental Portugal are more likely to be

successfully financed than projects located outside mainland Portugal, has not been confirmed. This conclusion is valid independently of the project goal.

We find that campaigns targeting rural areas are more successful than campaigns targeting urban areas, confirming our fifth hypothesis. This finding is new because this variable had not been tested before. However the influence of this variable is significant just in smaller crowdfunding projects.

Finally, we also looked at two controls variables on the success of the campaign. Our study found that duration of crowdfunding campaign is negatively correlated with its success. This significance was not confirmed when split the sample with cut-off at € 2000.The communication quality variable used in the study (video and photos) is not always correlated with success of the funding, contrary to what is found in other studies cited in the literature section. This variable predicts success only in the largest dimension campaigns.

With our study, we contribute to the literature on crowdfunding and funding success. We provide comprehensive view on the role of networks and geography explaining in rewards-based crowdfunding success. We extend the previous knowledge by the fact that both networks specific aspects and geography specific aspects have an influence on the question of whether a project is successfully funded and can thus be realized. We also found a different role of these variables according to the size of the project.

Taking together insights from the related literature and our findings, we put forward three conjectures: 1) the importance of networks for crowdfunding success suggests that founders need to build their networks before committing to campaigns; 2) In reward-based crowdfunding smaller projects carried out in less developed regions have a greater attractiveness of funders; 3) In larger projects communication quality is instrumental for crowdfunding success.

From a practical point of view, the results of our study are highly relevant for stakeholders on crowdfunding platforms. Project founders can make use of the results in order to improve the information related to their projects to increase the chance to have a project successfully funded. Our results are also relevant for crowdfunding platforms itself. These platforms might automatically assess the chance of successful funding of projects. Furthermore, platform operators could also suggest changes to founders whose project have been evaluated as potentially less successful.

More research is surely needed to assess the determinants successful of rewards-based crowdfunding. We present two suggestions: First, how do characteristics of the individual launching the crowdfunding campaign influence crowdfunding outcomes? Second, Founders generally broadcast crowdfunding appeals to potential investors using an online narrative. These narratives use a variety of media to encourage investment. How the content presented and media used interact to influence crowdfunding outcomes?

References

Agrawal, A., Catalini, C. and Goldfarb, A. (2011) The Geography of Crowdfunding. SSRN Electronic Journal, doi: 10.2139/ssrn.1692661.

Agrawal, A., Catalini, C. and Goldfarb, A. (2015) Crowdfunding: Geography, Social Networks, and the Timing of Investment Decisions, Journal of Economics & Management Strategy, Volume 24, Number 2, Summer 2015, 253–274.

Agrawal, A.; Catalini, C. and Goldfarb, A. (2014) "Some Simple Economics of Crowdfunding", Innovation Policy and the Economy, 14, 63–97.

Ahlers, G., Cumming, D., Günther, C. and Schweizer, D. (2015) "Signaling in Equity Crowdfunding", Entrepreneurship Theory and Practice, 39(4), 955-980.

Ahlstrom, D. and Bruton, G. D. (2006) "Venture Capital in Emerging Economies: Networks and institutional Change", Entrepreneurship Theory and Practice, 30(2), 299–320.

Antonenko, P. D., Lee, B. D. and Kleinheksel, A. J. (2014) "Trends in the Crowdfunding of Educational Technology Startups, Techtrends", 58 (6), 36-41.

Austin J., Stevenson H., Wei-Skillern J. (2006) "Social and Commercial Entrepreneurship: Same, Different, or Both?" Entrepreneurship Theory and Practice 30 (1): 1–22.

Belleflammea, P., Omranib, N. and Peitzc, M. (2015) "The Economics of Crowdfunding Platforms", Information Economics and Policy, Vol. 33, Pages 11-28.

Brüderl, J. and Preisendörfer, P. (1998) "Network Support and the Success of Newly Founded Businesses", Small Business Economics, 10(3), 213-225.

Burtch, G., Ghose, A. and Wattal, S. (2014) "Cultural Differences and Geography as Determinants of Online Pro-Social Lending, MIS Quarterly, 38(3), 773–794.

Coleman, J. S. (1988) "Social Capital in the Creation of Human Capital", American Journal of Sociology, 94, S95–S120.

Cordova, A., J. Dolci and Gianfrate, G. (2015) "The Determinants of Crowdfunding Success: Evidence from Technology Projects", Procedia – Social and Behavioral Sciences, 181, 115-124.

Cumming, D. J., Leboeuf, G. and Schwienbacher, A. (2014) "Crowdfunding Models: Keep-it-all vs. All -or-nothing", SSRN Electronic Journal, doi: 10.2139/ssrn.2447567.

Davis, B. C., Hmieleski, K. M., Webb, J. W. and Coombsa, J. E. (2017) "Funders' Positive Affective Reactions to Entrepreneurs' Crowdfunding Pitches: The Influence of Perceived Product Creativity and Entrepreneurial Passion", Journal of Business Venturing 32, 90–106.

Florida, R., and Smith, D. (1993) "Venture Capital Formation, Investment and Regional Industrialization", Annals of the Association of American Geographers, 83(3), 434-451.

Gerber, E. M., Hui J .S. and Kuo, P. Y. (2012) "Crowdfunding: Why People are Motivated to Post and Fund Projects on Crowdfunding Platforms", Proceedings of the International Workshop on Design, Influence, and Social Technologies: Techniques, Impacts and Ethics. Available at: pdfs.semanticscholar.org/c1e2/a1068.

Hair, J. F., Anderson, R. E., Tatham, R. L. and Black, W.C. (1998) Multivariate Data Analysis, 5th ed., Prentice Hall, Upper Saddle River, New Jersey.

Kim H. and DeMoor, L. (2017) " The Case of Crowdfunding in Financial Inclusion: A Survey", Strategic Change, 26: 193–212.

Kuppuswamy, V. and Bayus, B. L. (2013) "Crowdfunding Creative Ideas, the Dynamics of Project Backers in Kickstarter", SSRN Research Paper, doi: 10.2139/ssrn.2234765.

Kuppuswamy, V. and Barry L. B. (2017) "A Review of Crowdfunding Research and Findings", in Handbook of New Product Development Research, ed. P. Golder, and D. Mitra, Northhampton, MA: Edward Elgar.

Lerner, J. (1995) "Venture Capitalists and the Oversight of Private Firms", Journal of Finance, 50, 310-318.

Lin, M. and Viswanathan, S. (2015) "Home Bias in Online Investments: An Empirical Study of An Online Crowdfunding Market, Management Science, 62(5), 1393–1414.

Lin, M., Prabhala, N. R. and Viswanathan, S. (2013) "Judging Borrowers by the Company They Keep: Friendship Networks and Information Asymmetry in Online Peer-to-Peer Lending", Management Science, 59, 1, 17–35.

Lounsbury, M. and Glynn., M. A. (2001) "Cultural Entrepreneurship: Stories, Legitimacy, and the Acquisition of Resources", Strategic Management Journal, 22, 545-564.

Mason, C. (2007) "Venture Capital: a Geographical Perspective " in H Landstrom (ed) Handbook of Research on Venture Capital, Edward Elgar, Cheltenham, pp. 86-112.

McKenny, A. F., Allison, T.H., Ketchen Jr., D. J.; Short, J. C. and Ireland, R.D. (2017) "How Should Crowdfunding Research Evolve? A Survey of the Entrepreneurship Theory and Practice Editorial Board". Entrepreneurship Theory and Practice, 41, 2, 291-304.

Mollick, E. (2014) "The Dynamics of Crowdfunding: Determinants of Success and Failure". Journal of Business Venturing, 29: 1-16.

Nahapiet, J. and Ghoshal, S. (1998) "Social Capital, Intellectual Capital, and the Organizational Advantage", The Academy of Management Review, 23(2), 242.

Nieuwerburgh, S.V. and Veldkamp, L. (2009) "Information Immobility and the Home Bias Puzzle", Journal of Finance, 64, 1187–1215.

Parhankangas, A. and Renko, M. (2017) "Linguistic Style and Crowdfunding Success Among Social and Commercial Entrepreneurs", Journal of Business Venturing, vol. 32, 2, 215-236.

Plummer, L. A., Allison, T. H. and Connelly, B. L. (2015) "Better Together? Signaling Interactions in New Venture Pursuit of Initial External Capital", Academy of Management Journal, Vol. 59, No. 5.

Plummer, L. A., Allison, T.H. and Connelly, B. L. (2015) "Better Together? Signaling Interactions in New Venture Pursuit of Initial External Capital", Academy of Management Journal, 59, 5, 1585-1604.

Seasholes, M. S. and Zhu, N. (2005) "Individual Investors and Local Bias," Journal of Finance, 65, 1987–2010.

Sharma, S. (1996) Applied multivariate techniques, NY: John Wiley & Sons, Inc.

Sorenson, O. and Stuart, T.E. (2001) "Syndication Networks and the Spatial Distribution of Venture Capital Investments," American Journal of Sociology, 106, 1546–1588.

Thies, F., Wessel, M. and Benlian, A. (2014) "Understanding the Dynamic Interplay of Social Buzz and Contribution Behavior within and between Online Platforms Evidence from Crowdfunding" Mimeo (Thirty Fifth International Conference on Information Systems, Auckland).

Vulkan, N. Astebro, T. and Fernandez S., M. (2016) "Equity Crowdfunding: a New Phenomenon, Journal of Business Venturing Insights 5, 37–49.

Wong, P. K. and Ho, Y. P. (2007) "Characteristics and Determinants of Informal Investment in Singapore", Venture Capital, 9 (1), 43–70.

Zheng, H., Li, D., Wu, J., and Xu, Y. (2014) "The Role of Multidimensional Social Capital in Crowdfunding: A Comparative Study in China and US", Information & Management, 51(4), 488-496.

Analyzing Entrepreneurship Cognition as the Micro-foundation of Dynamic Capabilities

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Abstract: Entrepreneurship was and is still one of the main pillars to address real economic changes in nations, especially in developing nations characterized by (1) the government inability to achieve remarkable growth in various areas(economic, social, technological, political… etc) , and (2) the high level of uncertainty and risk of investment in this still-growing economies. Firms and entrepreneurs thus face numerous challenges and are expected to be equipped with particular types of capabilities to survive and maintain competitiveness which is what Teece et al. (1997) labeled as "Dynamic Capabilities". Additionally, the entrepreneur must exhibit distinct ability to deal with these changes. This distinct ability could be attributed to numerous factors, but entrepreneurship cognition remains the dominant. Entrepreneurs implement many cognitive processes, yet, in dynamic market settings (characterized with high risk and uncertainty) specific cognitive processes remains more important than others. This current study accordingly will try to link between both firms' capabilities to deal with environmental challenges and entrepreneurs' cognitive abilities required in this process. It will shade light on the type of dynamic capabilities firms' need to deal with market dynamism and the role of the entrepreneurs' cognition in shaping these capabilities. It will provide a conceptual framework to identify the cognitive processes required by each type of the dynamic capabilities. It could be concluded that this paper will provide a link between the field of strategic management by focusing on capability development and the field of cognitive psychology and entrepreneurship by identifying the entrepreneur's relevant cognitive and mental processes contributing as a micro-foundation to the capability development.

Keywords: The Resource Based View, Dynamic Capabilities, Entrepreneurship Cognition, Entrepreneurial alertness, Cognitive Adaptability, Entrepreneurial Judgment

1. Introduction

Instability, new players, government inefficiencies, changes in consumer preferences, technological advancement and the need for innovation are just some of the numerous challenges entrepreneurial firms face in today's business world. This imposes risk and uncertainty on their operations (Teece et al., 2016; Teece and Leih, 2016).

Accordingly, firms are continuously adjusting and re-adjusting their business models, operations and practices to match, lead and benefit from these environment hostile conditions. In entrepreneurial context, this calls for further focus on continuous opportunity exploration and exploitation (Stevenson and Jarillo, 1990; Cuervo, 2005) to achieve long-term competitiveness.

In the field of strategic management, researchers have been always trying to answer the question of how firms could achieve a sustainable competitive advantage (Teece et al., 1997; Ambrosini and Bowman, 2009). The Resource Based View (RBV) is among the contributing views to this issue (Barney, 1991). Competitiveness is viewed as a factor of organizational resources and capabilities of specific characteristics (Barney 1991, 1995).

With the increased market evolution, resources are not enough to maintain competitiveness but the use of these resources is what differentiates between firms. The use, shaping and reshaping of resources is referred to as "Capabilities" (Penrose, 1959; Amit and Schoemaker, 1993; Eisenhardt and Martin, 2000; Felin et al., 2012). In hyper dynamic environment organizations tend to depend on a specific type of capabilities labeled as "Dynamic Capabilities" (Teece et al., 1997).

Due to their increased importance, scholars have been interested in understanding how these dynamic capabilities are developed in a firm and what could be the potential pillars affecting their existence. In general, capabilities are implicit and embedded firms' routines or practices (Harreld et al., 2007; Grewal & Slotegraaf, 2007), resulting from collective and teamwork (Helfat and Peteraf, 2003; Pandza et al., 2003) and they are

developed over time not over a single point of time (Amit and Schoemaker, 1993). Historical decisions and choices of the firm typically affect the path of capabilities development (Schreyogg and Kliesch-Eberl, 2007). The main decision makers in entrepreneurial firms are the entrepreneurs. Many entrepreneurial aspects affect entrepreneurial decisions but their cognition stands as one of the leading aspects. Research in entrepreneurship cognition has gained momentum over time trying to answer the question of "why" entrepreneurs pursue non-traditional cognitive paths (Mitchell et al., 2002).

Accordingly, the following paper provides an in-depth analysis of dynamic capabilities, their foundation and development, and explores the role of cognition in this process. It also contributes to the literature by providing an interdisciplinary approach that explains the phenomenon from different perspectives of neighboring disciplines which are strategic management, entrepreneurship and cognitive psychology. This paper further highlights the cognitive abilities required in the process of capability development in entrepreneurial firms. More substantially, this paper contributes to advancement in the research of dynamic capabilities and cognition by framing them into types (opportunity recognition and capitalizing capabilities for dynamic capabilities) and processes (alertness, cognitive adaptability, judgment for cognition). Additionally, the selected categorization of dynamic capabilities and the cognitive processes are relatively novel in the relevant management research agenda. For instance, cognitive adaptability is among the cognitive variables related to the study of dynamic capabilities, yet, still scholars have not yet tackled it from this perspective.

Additionally, the paper is proposing that cognitive adaptability with a specific type of dynamic capability could be a separate independent variable affecting its development and with another type, it could have a moderating effect.

2. The Theoretical Foundation

Dynamic environment usually imposes pressure on organization to alter its business practices and recently to redefine the main sources of its competitiveness. Many management practices and theories articulated firms' competitiveness among which is the Resource Based View (RBV). The RBV articulated by Barney (1991) assumes that competitiveness lies in both resources and capabilities (Penrose 1959, Wernfelt, 1984, Barney, 1991).

Cordially, firms started shifting their focus from being market and product oriented to strategizing for resources its acquisition, development and use (Wernerfelt, 1984). However, resources on its own are not enough for sustainable competitive advantage. Organizations should always consider their capabilities to better explore, use, re-use their resources (Penrose, 1959).

Organizational capabilities have had different labels across literature; some refer to it as collective skills, work routines (Winter, 2003) or firms' best practices. Working on defining capability was very generic in the early years, were some referred to as superior capacities or abilities (Wernerfelt, 1984), others described it as a "Process" that results from interaction between different resources over a period of time (Amit and Schoemaker, 1993). In 2000, Winter used "routines" a building block for capabilities (Felin et al., 2012).

Routines are "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman and Pentland, 2003: 95). For him, capabilities are accumulated "routines" resulting from firms' inputs and management decisions. These routines result in capabilities, which lead to competitive outputs by the firm.

It worth mentioning that organizations' capabilities have different types, deployed based on the context.

Environmental Dynamism is among the contextual variables that call for a specific type of capabilities labeled as Dynamic Capabilities (Helfat and Winter, 2011). In 1997, Teece, Pisano and Shuen introduced the "Dynamic Capability Framework". This framework emerged to examine how competitiveness could be maintained or improved given the changing, "hypercompetitive" or "high-velocity" environment (Barreto, 2010). They defined dynamic capabilities as "ability" with the purpose to "integrate, build and reconfigure internal and external competences to address rapidly changing environment" (Teece et al., 1997: 510).

After Teece et al. (1997), Eisenhardt and Martin (2000) described these dynamic capabilities as "processes" and "routines" with the purpose to adapt to or even initiate environmental changes. These capabilities are different than other capabilities added that dynamic capabilities enable firms to modify its stock of resources and capabilities either through configuring and integrating the current base or adding new ones (Winter, 2003; Zahra et al., 2006). In 2007 Teece developed the comprehensive approach to define dynamic capabilities through its functions. He claimed that dynamic capabilities enable firm to *sense* new opportunities, *seize* and capitalize them and also *reconfigure* and orchestrate its resources and assets. Many categorizations for dynamic capabilities followed the work of Teece (2007). Among the recent are the one adopted by Wu et al. (2016). Embarking from focus on innovation, knowledge management and to match the entrepreneurial cycle, they divided dynamic capabilities into opportunity recognition and opportunity capitalizing capabilities.

Opportunity recognizing capabilities in the recent strategic literature are labeled as the "externally oriented" capabilities since they help organizations sense, scan and search the external environment for opportunities.

These capabilities result from the ability to detect and gain knowledge from the firms' external environment.

Accurate knowledge acquisition and gain depend on the firms' great effort and optimal speed in collecting and accumulating the knowledge (Zahra and George, 2002) which on its turn will allow firms to filter opportunities to select which to pursue. Additionally, like any other capabilities, when opportunity recognizing capabilities are shared among different departments, the more information is gathered which increase the probability of new innovations within the entire firm (Wu et al., 2016). Managerial process, organizational structure and managerial abilities should facilitate the integration of new knowledge in the firm to enhance firms' ability to sense the environment for new opportunities (Liao et al., 2009).

On the other hand opportunity capitalizing are "internally oriented" capabilities, because once the opportunity had been identified, organizations should do the necessary changes in terms or configuring reconfiguring resources to match the opportunity and the environmental changes (Teece, 2007) and this will eventually result in market acceptance of the opportunity. This could be done by altering organization structure, applying new management techniques and reshaping firms' networks (Wu et al., 2016). Additionally, Opportunity capitalizing capabilities are also related to knowledge management inside the organization, more specifically to knowledge integration from the external to within the organization and transfer of knowledge within the different parts of the firm (Wu et al., 2016; Liao et al., 2009).

3. Foundation of Dynamic Capabilities from an Entrepreneurship Cognition Perspective

Understanding dynamic capabilities as a phenomenon and its dimensions call for a "progressive scientific reduction" approach by examining its layers, components and what beneath. This is what scholars call analyzing the "micro-foundations" (Felin et al., 2012). It is claimed that dynamic capabilities are the outcome of different organizational routines (e.g. R&D, new product development) (Nelson and Winter, 1982).

Analyzing routines is found to be "vague" in the field of management (Felin and Foss, 2005). Consequently, to clearly define routines different views should be combined to reach a comprehensive understanding. Zollo and Winter (1999:12) defined routines as "stable patterns" for firms' ways to deal with "stimuli" whether internal or external. The pattern is the outcome of a systematic "organization-specific" ways of reaching a decision (Abell et al., 2008). This means that routines are formed by repetition (Pentland et al., 2012) and that is why it tends to be stable (Nelson and Winter, 1982). However, routines change, evolve or improve by time as continuous adoption of routines produce knowledge and a subsequent learning (Levitt and March, 1988). The change in routines and the ability to change the routines leads to the formation of capabilities and more specifically the dynamic capabilities (Pentland et al., 2012). Organizational ability to learn (which is necessary for capability and routines development) and integrate this learning is dependent on numerous micro factors, yet managers and their abilities to learn remain among the leading factors. On its turn, to acquire new knowledge and improve learning, individuals should possess certain skills and abilities referred to as "cognitive abilities".

The need to analyze the relationship between cognition and capabilities rise from the strategic nature of both concepts. Traditionally, it was assumed that capabilities are outcome of path dependent decision. This implicitly states that how people think and their cognition is the one of the mechanisms by which capabilities

are developed (Eggers and Kaplan, 2013). To link between both capability development and cognition, learning and knowledge must be tackled.

Entrepreneurs tend to develop mental modules to interpret, perceive and understand the surrounding environment (Porac, et al., 1989). These modules accordingly, serve as a filter for the type and genre of information managers or entrepreneurs collect, noting that this information serve as the input for decision making (Grewatsch and Kleindienst, 2017). The changes in this modules and structures result in individual learning (Easterby-Smith et al., 2000). Organizational learning is produced when the resulting learning from individual or group cognition becomes rigidly embedded in the organization. This embedment will be vividly viewed and illustrated in many organizational aspects such as its routines, policies, processes and strategies (Vera et al., 2011).

It is worth mentioning that organizational capabilities and especially dynamic capabilities allow the iteration of the learning process. Dynamic capabilities are the result of changes in routines. Changes in routines result from learning which was initiated by changes in cognition. Additionally, the changes in routines and the development of new capabilities help in the production of new knowledge which on its turn result in learning by allowing for the development of new routines (Easterby-Smith et al., 2000, Easterby-Smith and Prieto, 2008).

This could be concluded by claiming that (1)The study of micro-foundation of capabilities and especially the dynamic capabilities is fundamental for organizations as it shapes their strategic direction; (2) cognition; among other factors; stand as an essential micro-foundation for capability; (3) to better explore the relationship between cognition and dynamic capabilities, both constructs must be broke down into more illustrative aspects. Cordially, the upcoming conceptual model will analyze the micro-foundation of dynamic capabilities from a cognitive perspective and to be more specific cognition will be analyzed in terms of its processes and dynamic capabilities in terms of its types.

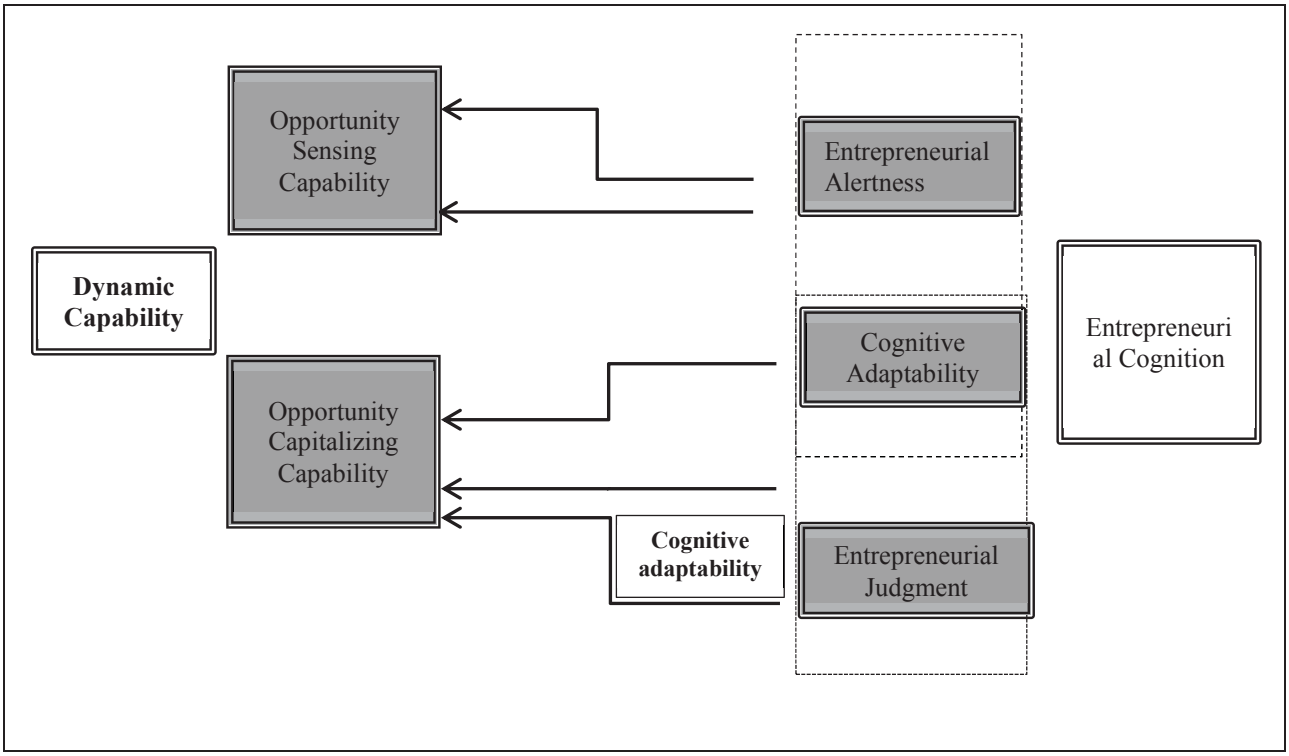

Figure 1: The Conceptual Framework

(Developed by the researchers)

The framework identifies the dynamic capabilities in terms of two types: opportunity recognizing capabilities and opportunity capitalizing capabilities. For the opportunity recognizing capabilities, the cognitive variables

claimed to have a role in its development are: entrepreneurial alertness and cognitive adaptability. First is *entrepreneurial alertness*. Opportunities are usually recognized through constant scan of the environment and industry structure (Dong et al., 2016, Teece, 2007; Helfat and Petraf, 2015). It requires entrepreneurs to actively search for information, interpret, make sense, build connection and recognize patterns within this information to shape and identify value creating opportunities (Helfat and Peteraf, 2015). Entrepreneurial alertness guides this sensing (Helfat and Peteraf, 2015), information search and recognition process (Kirzner, 1979). It was the answer to the question of how entrepreneurs interpret and schematize market event, what do they see that other do not and how do they see it (Gaglio and Katz, 2001). As cited in Gaglio and Katz (2001: 96) that alertness is "a distinctive set of perceptual and cognitive processing skills that direct the opportunity identification process". Accordingly, it could be proposed that High level of alertness as a cognitive process leads to the development of opportunity recognizing capabilities.

Alertness is the most comprehensive cognitive foundation for opportunity recognizing capabilities. in 2015 Helfat and Peteraf argued that perception and attention are the cognitive drivers for opportunity recognizing capabilities.

First for perception as a variable, it was tackled as function of perceiving something, for example, risk perception, self-perception…etc. in the field of entrepreneurship; the common function was perception of opportunity. As for attention, by examining the explanation of Helfat and Peteraf (2015) of attention, it was implied that the meant attention was to information, whether search of information, or the ability to be selective and pay attention to particular information. It is worth noting that the search also revealed that cognitive functions for opportunity recognizing capabilities revolve around: interpretation, perception, pattern recognition, sense making, schemas. These are all embedded in entrepreneurial alertness as defined by Tang et al. (2012). For them alertness is a cognitive ability, including three phases: alert scanning, alert association and alert judgment

Second is *cognitive adaptability*. Uncertainty is constant in today's business environment. It is how entrepreneurs learn, think and adapt and cope with this uncertainty that differentiate organizations. The field of entrepreneurship cognition had been pointing to this side of the entrepreneurs naming it "Cognitive Adaptability".

It is defined as "the ability to be dynamic, flexible and self-regulating in one's cognitions given dynamic and uncertain task environments". Cognitive adaptability allows entrepreneurs to adjust their learning and decisions based on feedback received from the environment (Haynie and Shepherd, 2009). Haynie and Shepherd (2009) tried to capture the main aspects of cognitive adaptability and claimed that it is the outcome of five main metacognitive mental activities which are: goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring.

Metacognition represents the mental strategies individuals employ to think. It is considered as "high order" cognitive processes through which individuals self-regulate what they know about themselves, others and the environment to employ the appropriate cognitive functions. Cognitive adaptability process begins with analyzing an individual goal orientation and whether his cognition will be directed by personal or environmental goals (Haynie and Shepherd, 2009).

Then selecting which cognitive strategies (which provide the base for entrepreneurial decision) is a factor of metacognitive awareness, knowledge and experience. In a dynamic environment context, these metacognitive processes assist in rapidly and accurately evaluate opportunities and pursue the right ones. This is because entrepreneurs with high metacognitive awareness, knowledge and experience, knows their strength and the competence of their venture, understand the environment and its dynamics will deploy the correct cognitive strategies and cordially is more likely to pursue the valuable opportunities (Nambisan and Baron, 2012).

Furthermore, within each of these metacognitive processes, monitoring occurs for the individual cognitions during all previous phases (knowledge, experience and goal orientation) to re-evaluate the decisions and re-assess personal motivation for better cognitive adaptability to the environmental changes (Haynie and Shepherd, 2009).

In general, metacognition and the subsequent cognitive adaptability enhance opportunity spotting and recognition whether inside or outside the firm ecosystem. Accordingly, as clarified in the conceptual framework, it is proposed that high cognitive adaptability leads to the development of opportunity recognizing dynamic capabilities

Additionally, it could be claimed that entrepreneurial alertness and cognitive adaptability are complementary cognitive processes enabling opportunity recognition. On one hand, ,entrepreneurial alertness guides opportunity recognition (Helfat and Peteraf, 2015) by enabling entrepreneur to actively search for information, interpret them and recognizing patterns (Gaglio and Katz, 2001). On the other hand, cognitive adaptability provides the base and guide for these cognitive activities (information search, interpretation, and pattern recognition) by guiding entrepreneurial initial thinking strategies (Haynie and Shepherd, 2009). Subsequently it could be claimed that high cognitive adaptability accompanied with high alertness leads to the development of opportunity recognizing dynamic capabilities

As for the opportunities capitalizing capabilities, the relevant cognitive processes ought to have a role in their development are: entrepreneurial judgment and cognitive adaptability. First is *entrepreneurial judgment*. Once opportunities worth pursuing had been identified, entrepreneurs should decide on some internal or external changes needed to capture these opportunities (Teece, 2007; Wu et al., 2016). Entrepreneurial judgment is what guides the selection of these decisions and their prioritizing (Teece, 2007; Uygur and Kim, 2016)

The presence of opportunity capitalizing capabilities in firms leads to actual strategic change by undertaking strategic investment decisions and/or potential changes in firms' business model (Helfat and Peteraf, 2015).

Examples for those decisions could be new product development (Teece, 2007), restructuring and orchestration in firms' resources (Helfat and Peteraf, 2015) or structure or enhancing organizational learning (Wu et al., 2016). This induces that the cognitive processes employed by the entrepreneur within the development of these capabilities are decision making oriented. Literature had been narrow in clearly identifying these processes. Teece. (2007) stressed that the cognitive requirements for the capitalizing capabilities are entrepreneurs' ability to reach non-biased decision through his judgment. Uygur and Kim (2016) defined judgment as "the cognitive process in minds of the entrepreneurs that operates on the causal model, i.e. a knowledge structure concerning what factors they believe will help the chance of profitability under uncertainty". Entrepreneurial judgment guides decisions such as resource allocation (Casson, 1982; Foss and Klein, 2012) or reaching profitable investment decisions. Making these decisions especially in uncertainty is not guided only by rationalism and knowledge but rather by entrepreneurs' opinion and beliefs; which is labeled by entrepreneurial judgment. So as illustrated in the conceptual, entrepreneurial judgment; as a cognitive process; leads to the development of opportunity capitalizing dynamic capabilities framework.

Second is *cognitive adaptability*. Cognitive adaptability allows entrepreneurs to better understand themselves, the others and the environment to take the appropriate decisions. it helps them employ the right thinking strategies, collect the accurate needed information and cordially guide their selection and decision making process (Haynie and Shepherd, 2009; Mitchell et al., 2011; Nambisan and Baron, 2012). The opportunity capitalizing phase, entrepreneurs are left with many decisions to make to seize the opportunity. He needs to be selective and accurate in his selection of which changes to undertake and in which order. Entrepreneurs who are cognitively adaptable are claimed to be more selective and more confident (convicted) in the changes they undergo. That is why it is claimed that high cognitive adaptability leads to the development of opportunity recognizing dynamic capabilities

Finally, it could be claimed that cognitive adaptability leads to better judgment which results in the development of opportunity capitalizing capabilities in the firm. For entrepreneurs' judgments to be constantly accurate, and since the environment firms' operate in nowadays is complex and dynamic, entrepreneurs must have the cognitive ability to adapt their thinking based on feedback received from the environment. This cognitive ability is cognitive adaptability. Accordingly, high cognitive adaptability along with high entrepreneurial judgment leads to the development of opportunity capitalizing dynamic capabilities.

4. Conclusion

This paper tried to broaden understanding of the dynamic capabilities often labeled in management literature a black box. it shed light on its nature as organizational routines nurtured by organizational learning. Organizational learning is an outcome of applied entrepreneurial cognition. Accordingly, it could be claimed that entrepreneurship cognition is among the main contributors in founding those dynamic capabilities. Yet, in entrepreneurial firms, these capabilities could be classified based on nature and function. Some capabilities help in opportunity recognition and other in opportunity capitalizing. Each type implies different organizational routines and work practices and cordially are nurtured with different cognitive processes. Entrepreneurial alertness and cognitive adaptability are claimed to be related to opportunity recognition capabilities. This is because alertness allows entrepreneurs to see what other over looked and cognitive adaptability provide them with the flexibility to alter their mental models based on environmental changes and thus clearly see opportunities. Furthermore, opportunity capitalizing capabilities are affected by entrepreneurial judgment as it helps entrepreneurs in deciding on many crucial aspects and changes required to seize the opportunities. Additionally, it could be claimed that judgment is enhanced with the existence of cognitive adaptability, leading to the development of opportunity capitalizing capabilities. For future research, it recommended to enlighten this research area through testing the above developed model to test its validity and the accuracy of its assumptions.

References

Abell, Peter and Felin, Teppo and Foss, Nicolai (2008) "Building micro-foundations for the routines, capabilities, and performance links.", Managerial and decision economics, Vol 29, No. 6, pp 489-502.

Ambrosini, Véronique, and Bowman, Cliff (2009) ” What are dynamic capabilities and are they a useful construct in strategic management?.”, International journal of management reviews, Vol 11, No. 1, pp 29-49.

Amit, Raphael, and Schoemaker , Paul (1993) "Strategic assets and organizational rent." , Strategic management journal , Vol 14, No.1, pp 33-46.

Barney, Jay B. (1995) "Looking inside for competitive advantage.", The Academy of Management Executive, Vol 9, No. 4, pp 49-61.

Barney, Jay(1991) "Firm resources and sustained competitive advantage." Journal of management , Vol 17, No. 1, pp 99-120.

Barreto, Ilídio (2010) "Dynamic capabilities: A review of past research and an agenda for the future.", Journal of management, Vol 36, No. 1, pp 256-280.

Casson, M., 1982. The entrepreneur: An economic theory. Rowman & Littlefield.

Cuervo, ALVARO(2005) “Individual and environmental determinants of entrepreneurship”, International Entrepreneurship and Management Journal, Vol 1, pp 293-311.

Dong, Andy, Massimo Garbuio, and Dan Lovallo (2016) "Generative sensing: A design perspective on the microfoundations of sensing capabilities.", California Management Review , vol 58, No. 4, pp 97-117.

Easterby-Smith, Mark, and Isabel. Prieto. (2008) "Dynamic capabilities and knowledge management: an integrative role for learning?.", British journal of management vol 19, No. 3, pp. 235-249.

Easterby-Smith, Mark, Mary Crossan, and Davide Nicolini. (2000) "Organizational learning: debates past, present and future.", Journal of management studies vol 37, No. 6, pp 783-796.

Eggers, J.P. and Kaplan, Sarah (2013), “Cognition and Capabilities: A Multi-Level Perspective”, Academy of Management Annals, vol 7, pp 295-340.

Eisenhardt, Kathleen, and Martin, Jeffrey (2000) "Dynamic capabilities: what are they?." Strategic Management Journal, Vol 21, No.11, pp 1105-1121.

Feldman, Martha and Pentland, Brian (2003) "Reconceptualizing organizational routines as a source of flexibility and change.", Administrative Science Quarterly,Vol 48, No. 1, pp 94-118.

Felin, T. and Foss, N.J., 2005. Strategic organization: A field in search of micro-foundations.

Felin, Teppo and Foss, Nicolai and Heimeriks, Koen and Madsen, Tammy (2012) "Microfoundations of routines and capabilities: Individuals, processes, and structure.", Journal of Management Studies, Vol 49, No. 8, pp 1351-1374.

Foss, N.J. and Klein, P.G., 2012. Organizing entrepreneurial judgment: A new approach to the firm. Cambridge University Press.

Gaglio, Connie Marie and Katz, Jerome (2001) "The psychological basis of opportunity identification: Entrepreneurial alertness.", Small business economics, Vol 16, No. 2, pp 95-111.

Grewal, Rajdeep, and Slotegraaf , Rebecca (2007) "Embeddedness of organizational capabilities.", Decision Sciences, Vol 38, No. 3, pp 451-488.

Grewatsch, Sylvia, and Ingo Kleindienst. (2017) "When does it pay to be good? Moderators and mediators in the corporate sustainability–corporate financial performance relationship: A critical review.", Journal of Business Ethics vol 145, No. 2, pp 383-416.

Harreld, Bruce and O'Reilly, Charles and Tushman , Michael (2007) "Dynamic capabilities at IBM: Driving strategy into action.", California Management Review , Vol 49, No. 4, pp 21-43

Haynie Michael, Dean Shepherd, and Jeffery (2009) “McMullen. "An opportunity for me? The role of resources in opportunity evaluation decisions." , Journal of Management studies, vol 46, No. 3, pp 337-361.

Haynie, Michael and Shepherd, Dean (2009) "A measure of adaptive cognition for entrepreneurship research.", Entrepreneurship Theory and Practice, Vol 33, No. 3, pp 695-714.

Helfat, Constance and Winter, Sidney (2011) "Untangling dynamic and operational capabilities: Strategy for the (N) ever-changing world.", Strategic management journal, Vol 32, No. 11, pp 1243-1250.

Helfat, Constance , and Margaret Peteraf (2015) "Managerial cognitive capabilities and the microfoundations of dynamic capabilities.", Strategic Management Journal, vol 36, No, 6, pp 831-850.

Helfat, Constance and Peteraf , Margaret (2003) "The dynamic resource-based view: Capability lifecycles." , Strategic management journal ,Vol 24,No.10, pp 997-1010.

Kirzner, Israel (1997) "Entrepreneurial discovery and the competitive market process: An Austrian approach.", Journal of economic Literature, vol 35, No. 1, pp 60-85.

Levitt, Barbara and March, James (1988) "Organizational learning.", Annual review of sociology, Vol 14, No. 1, pp 319-338.

Liao, Jianwen Jon and . Kickul, Jill and Ma, Hao (2009) "Organizational dynamic capability and innovation: An empirical examination of internet firms." , Journal of Small Business Management, Vol 47, No. 3, pp 263-286.

Mitchell, Ronald and Busenitz, Lowell and Lant, Theresa and McDougall, Patricia and Morse , Eric and Smith , Brock. (2002) "Toward a theory of entrepreneurial cognition: Rethinking the people side of entrepreneurship research.", Entrepreneurship theory and practice, Vol 27, No. 2, pp 93-104.

Nambisan, Satish, and Robert, Baron (2013) "Entrepreneurship in innovation ecosystems: entrepreneurs' self-regulatory processes and their implications for new venture success.", Entrepreneurship Theory and Practice, Vol 37, No. 5, pp1071-1097.

Nelson, Richard and Winter, Sidney (1982) "The Schumpeterian tradeoff revisited.", The American Economic Review. Vol 72, No. 1, pp 114-132.

Pandža, Krsto and Polajnar , Andrej and Buchmeister, Borut, and Thorpe, Richard (2003) "Evolutionary perspectives on the capability accumulation process." , International Journal of Operations & Production Management , Vol 23, No. 8, pp 822-849.

Penrose, E. (1959). The theory of the firm. NY: John Wiley & Sons.

Pentland, Brian and Feldman, Martha and Becker, Markus and Liu, Peng (2012) "Dynamics of organizational routines: A generative model.", Journal of Management Studies, Vol 49, No. 8, pp 1484-1508.

Porac, Joseph and Thomas, Howard, and Baden-Fuller, Charles (1989) "Competitive groups as cognitive communities: The case of Scottish knitwear manufacturers.", Journal of Management studies Vol 26, No. 4, pp 397-416.

Priem, Richard and Butler, John (2001) "Is the resource-based “view” a useful perspective for strategic management research?.", Academy of Management Review, Vol 26, No. 1, pp 22-40.

Schreyögg, Georg, and Kliesch Eberl, Martina (2007) "How dynamic can organizational capabilities be? Towards a dual process model of capability dynamization.”, Strategic Management Journal, Vol 28, No. 9, pp 913-933.

Shane, Scott, and Sankaran Venkataraman. (2000) "The promise of entrepreneurship as a field of research.", Academy of Management Review, vol 25, No. 1, pp 217-226.

Simon, Herbert (1955) "A behavioral model of rational choice." , The quarterly journal of economics, Vol 69, No. 1, pp 99-118.

Stevenson, Howard, and Jarillo, Carlos (1990), “A paradigm of entrepreneurship: entrepreneurship management”, Strategic Management Journal, Vol 11, pp 17-27.

Teece, David & Leih, Sohvi (2016) “Uncertainty, innovation, and dynamic capabilities: An introduction.”, California Management Review, Vol 58, No.4, pp 5-12

Teece, David (2007) "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance.", Strategic management journal , Vol 28, No.13, pp 1319-1350.

Teece, David (2012) "Dynamic capabilities: Routines versus entrepreneurial action.", Journal of management studies, Vol 49, No. 8, pp 1395-1401.

Teece, David and Pisano, Gary, and Shuen, Amy (1997) "Dynamic capabilities and strategic management.", Strategic management journal ,Vol 18, No.7, pp 509-533.

Teece, David, Peteraf, Margaret and Leih, Sohvi (2016) “Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy.” ,California Management Review, Vol 58, No.4, pp 13-35.

Uygur, Ugur,and Kim, Sung Min (2016) "Evolution of Entrepreneurial Judgment With Venture-Specific Experience." , Strategic Entrepreneurship Journal, Vol 10, No. 2, pp169-193.

Vera, D. U. S. Y. A., Mary Crossan, and M. A. R. I. N. A. Apaydin. (2011) "A framework for integrating organizational learning, knowledge, capabilities, and absorptive capacity." , Handbook of organizational learning and knowledge management vol 2, pp 153-180.

Wernerfelt, Birger. (1984) "A resource-based view of the firm.", Strategic management journal, Vol 5, No. 2, pp 171-180.

Winter, Sidney (2000) "The satisficing principle in capability learning.", Strategic management journal, pp 981-996.

Winter, Sidney (2003) "Understanding dynamic capabilities.", Strategic management journal, Vol 24, No. 10, pp 991-995.

Wu, Hang and Chen, Jin and Jiao, Hao (2016) "Dynamic capabilities as a mediator linking international diversification and innovation performance of firms in an emerging economy.", Journal of business research, Vol 69, No. 8, pp 2678-2686.

Zahra, Shaker and George, Gerard (2002) "Absorptive capacity: A review, reconceptualization, and extension.", Academy of management review, Vol 27, No. 2, pp 185-203.

Zahra, Shaker and Sapienza, Harry and Davidsson, Per (2006) "Entrepreneurship and dynamic capabilities: A review, model and research agenda.", Journal of Management studies, Vol 43, No. 4, pp 917-955.
Zollo, M. and Winter, S.G., 1999. From organizational routines to dynamic capabilities (p. 38). INSEAD.

Structural Holes and Positions in Tourism Innovation Networks: Divide to Conquer?

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Abstract: Innovation in tourism has been receiving increased attention in the last decades, especially in what concerns networked innovation processes. This has gained increased relevance in tourism, an industry made of SMEs that resort to networks to obtain competitive advantages when developing new products and services. Thus, it is fundamental to analyse the networks' structure and how it can improve innovation performance. While social capital theories mainly address how it can be used to improve the whole network, other theories focus on how individuals can use social capital to obtain better competitive positions, or how the absence of ties between nodes defines the network structure and the opportunity to build social capital. Structural holes theory analyses the absence of ties between nodes in a network and how they can be connected by a broker, who will gain control over resources and highly increase his social capital. This paper aims at identifying and comparing the different types of brokers in two tourism destinations' innovation networks (Douro and Aveiro, Portugal). In addition, it relates both the network structure and the individual position of tourism organisations, to the innovation performance of those destinations. This is accomplished by applying sociometric analysis to the innovation networks. Results demonstrate that different social structures and patterns of cooperation bring diverse impact on the innovative performance of tourism destinations. Conclusions advance recommendations for tourism organisations to increasingly contribute to tourism regions' innovative performance.

Keywords: Innovation networks; tourism; structural holes; innovation performance; Portugal

1. Introduction

Innovation in tourism has been receiving increased attention in the last decades, especially in what concerns networked innovation processes. It is widely acknowledged that, nowadays, innovation emerges mainly within collaborative arrangements, instead of being developed in an atomist way by organisations. If this is relevant for most industries, it gains increased relevance in those made entirely of SMEs that resort to networks to gain resources and competitive advantages when developing new and integrated products and services (Costa et al., 2008, Acs and Audretsch, 1988, Fernandes et al., 2017, Vonortas, 2011).

However, not all network dynamics and structures foster a positive innovation performance. Different configurations will result in distinct tourism innovations, whether in its nature, or impact (Brandão et al., 2018, Scott, 2013). Bearing this in mind, several streams of research have been analysing the most 'innovation-friendly' network structures. Social capital theory (Coleman, 1988, Putnam, 2000) focuses on how it can be used to benefit the entire network. Other lines of thought concern with how individuals can use that social capital to obtain better competitive individual positions, or how the absence of ties between nodes defines the network structure and the opportunity to build social capital. This is the case of structural holes theory (Burt, 1992, Burt et al., 2013), on which this research is based. Structural holes refer to the absence of connections between actors in a network. If these gaps are filled by an actor (broker), in theory, he will have a better and more powerful competitive position, controlling resources, knowledge, and information. Being these the basis of the development of innovation (Lundvall, 1992), it may be concluded that these actors play a significant role in the development of innovative ideas in tourism destinations. This paper aims at identifying and comparing the different types of brokers existing in two tourism networks (Douro and Aveiro, Portugal), and relating both the network structure and the individual position of tourism organisations, to the innovation performance of the destinations. This is accomplished by applying sociometric analysis, namely centrality, structural holes, and brokerage measures, to the networks of tourism organisations. Results demonstrate that different social structures and structural positions bring diverse impact on the innovative performance of tourism regions. This allows to advance recommendations for tourism organisations to increasingly contribute to destinations' innovation and competitiveness.

2. Networks in tourism innovation

The evolution of innovation models demonstrate that the practice of innovation in firms started from linear, sequential and atomistic processes developed entirely within the scope of the firm, towards the most recent models in which firms, in order to be successful, develop their innovation in a networked environment, with strong patterns of cooperation not only with other businesses, but also suppliers, customers, universities, research centres, etc. (Rothwell, 1994, Chaminade and Roberts, 2002). Nowadays, *"(…) more and more of the innovation process takes place through networking rather than through hierarchies and markets. (…) only a small minority of firms and organisations innovate alone, and that most innovations involve a multitude of organisations"* (Lundvall and Borrás, 1997:106). In tourism, both theory and practice acknowledge the same phenomenon. As Sundbo et al. (2007) argue, innovation in tourism *"requires networks and co-operative systems*" and, in this context, territories assume a paramount role, as tourists arrive to a destination to consume an integrated experience, which makes firms mutually dependant when developing common destination innovations.

Networks may be defined as *(…)*

> *organisational structures whose operating philosophy may be placed between Weber's bureaucratic model and the neoliberal or market philosophy. Networks are based on two or more (usually administrative independent) organisations which decide, by a formal or informal commitment, to engage in a medium- or long-term cooperation process involving the exchange of products and services (…). A network is, therefore, underpinned by the premises that every organisation depends on the success of others and also that competition must be viewed beyond the region where an organisation is located*" (Costa, 1996:148).

Tourism is fragmented in its nature, comprising distinct, but complementary activities, creating integrated experiences in destinations. It is geographically dispersed, because origin and destination areas are distant, and resources are used jointly as they are 'free'. In this context, networks provide important benefits, as they compensate this segmentation in bringing together tourism stakeholders and providing tourist with comprehensive experiences. Moreover, tourism business environment is turbulent and very competitive, meaning that growth or even survival of firms might depend on collective action (Scott et al., 2008). This comes in line with the thoughts of Porter (1990), who insists that it is competition associated to cooperation (and not monopoly) that fosters growth and innovation. However, he agrees on the specialisation argument: knowledge spillovers will favour innovation in specialised and geographically concentrated industries, such as tourism. The cluster approach advocated by Porter emphasises market and competition above networking and social interaction as success factors for innovation in clusters. This concept is strongly linked to Porter's "diamond model" of competitive advantage, which can be used to assess the overall quality of a business cluster. The diamond encompasses the determinants that influence competitive advantage: (i) factor conditions (production), (ii) firm strategy, structure, and rivalry; (iii) demand conditions; (iv) related and supporting industries; (v) government and chance (as additional determinants). The intensity of interaction within the diamond is increased if firms are also clustered or geographically localised (Porter, 1990). Tinsley and Lynch (2001) acknowledge that networks are the frameworks that bind the place and people together, going beyond the destination to regional, national, or even international levels.

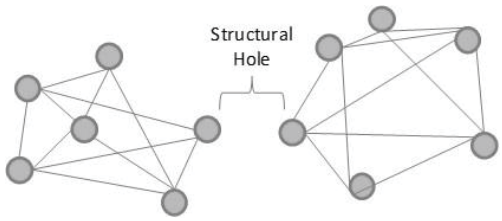
2.1 Structural Holes

The social network approach to organisations embraces several concepts and streams of study. *Social capital* is a growing research stream in organisational network studies (Borgatti and Foster, 2003). Popularised by Coleman (1988), it addresses the advantages and benefits that individuals get from the relationships established within a network, improving the entire structure. Burt (1992) concerns with how individuals can use social capital to obtain better competitive positions within the social structure. Kilduff and Tsai (2012) refer that one of the most fascinating streams of research within social networks is that of how the absence of ties between nodes defines the network structure and the opportunity to build social capital. This leads to the analysis of a fundamental concept within social networks: *structural holes*.

Structural holes are gaps in a social structure, or the absence of ties between nodes in a network (figure 1).

These nodes can be connected by a broker, who will gain control over the flow of resources across the gaps.

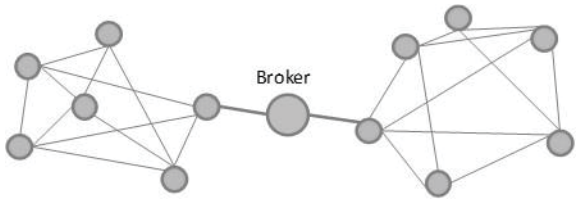
Brokers highly increase their social capital by linking two otherwise disconnected nodes, cliques, or even entire networks. In this line of thought, social capital is created within a network by structural holes, as actors can broker connections between formerly disconnected nodes (figure 2), having privileged access to information and control over the projects that bring together actors from different sides of the hole (Burt, 1992, Burt et. al, 2013).



Source: own elaboration

Figure 1: Representation of a Structural Hole

These individuals leverage their investment in social relations by connecting with different groups, achieving a powerful and competitive position (Burt, 1992, 2001). Conversely to Coleman's (1988) understanding on the most fruitful network structure for the creation of social capital (which relies on network closure), Burt considers that it is rather a function of brokerage opportunities that emerge from structural holes. Thus, structural holes are defined as *"the separation between nonredundant contacts. (…) is the relationship of nonredundancy between two contacts. (…) As a result of the hole between them, the two contacts provide network benefits that are in some degree additive rather than overlapping"* (Burt, 1992:18).

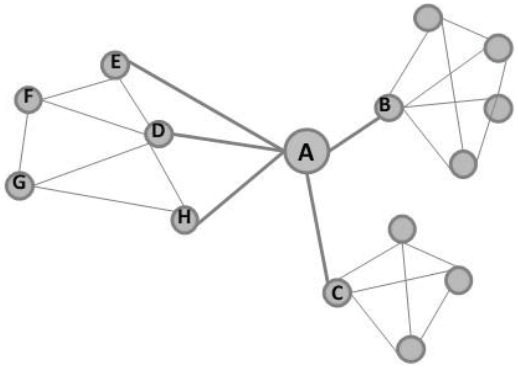


Source: own elaboration

Figure 2: Representation of a Broker

Brokers bridge structural holes, recognised by the lack of cohesion or of equivalence among actors. Brokers achieve a unique combination of information fostering innovative potential that is difficult to imitate because it emerges from social ties, rather than from training or position.

This theory embraces two categories of benefits that individuals fulfilling structural holes can achieve: information and control benefits. These individuals profit from the disunion of others. Brokers have greater access to information, improved response time to opportunities, access to novel information earlier, control and ability to negotiate the social relations because they are placed between two players who seek for the same information or between two players in two or more relations with conflicting demands (Burt, 1992:30-31).



Source: own elaboration

Figure 3: Structural advantage of a node within a network

In Burt's perspective, the more structurally constrained actors (those having small, dense, and closed networks with few or indirect ties) are less likely to attract new partners, as they offer lower returns, have reduced

access to new information and are engaged in a routine behaviour that does not favour innovation. Large, diversified, sparse and open networks stimulate creativity and innovation as they provide the access to varied information and do not constrain members, thus fostering innovative practices. As exemplified in figure 3, node A's bridging role in the social structure provides it with structural advantage over node D, despite it is in the centre of a tightly-knit clique.

Following these ideas, Burt argues that the spanning of structural holes provides the mechanism that relates weak ties to positive outcomes in Granovetter's *Strength of Weak Ties* theory (Granovetter, 1973). The strength of a tie is a function of the "*amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterise the tie*" (Granovetter, 1973:1361). The underlying argument is that someone's acquaintances (weak ties) are less likely to be socially connected with one another than his close friends (strong ties). The actor's set of acquaintances comprise a low-density network (where many of the possible ties are absent, i.e. presence of structural holes) because it is unlikely that they know each other.

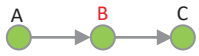
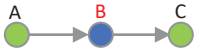
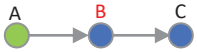
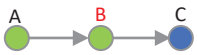
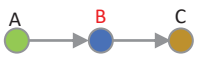
Conversely, the same actor's network of close friends is densely connected. Weak ties between a node and his acquaintances are crucial bridges between two dense cliques of close friends that would otherwise be disconnected. Granovetter's theory asserts that individuals with few weak ties will be deprived of information from distant parts of the social system and are thus confined to marginal information from their strong ties (Granovetter, 1973). This has significant impacts on innovation, as it diverts those nodes away from new knowledge underlying innovation. The geographic location is important to this discussion. Considering that different locations originate cultural differences, the ideas created and shared by a specific group will probably be entirely new for a network located elsewhere (Granovetter, 1983). Bearing this in mind, the author argues that weak ties between networks from different regions or countries perform an important mediating role by providing the necessary channels to knowledge and innovation diffusion, preventing the lock-in effect.

2.2 Brokerage

Brokers are bridges that fill in gaps or structural holes in a network, i.e. they connect nodes that would otherwise be disconnected. Thus, they have higher control and power over other nodes, as well as access to several types of resources, information, and knowledge. According to Burt (2004:349), "*people who stand near the holes in a social structure are at higher risk of having good ideas*" and therefore have a crucial role in the development of regional level innovation.

Individuals that act as brokers may play different roles types. Depending on where the actor lies on the path between two other actors and the type of relations with its neighbourhood, there are five possible combinations that resulting in different types of brokers, as presented in table 1. The existence of structural holes provides the opportunity to access to new and wider sources of knowledge and to control its flow within the network. Brokers are thus in powerful positions, despite having high or low centrality. They have rapid access to resources, fast dissemination of information regarding opportunities and threats, they benefit from cooperation, and are able to identify possible exchange partners and allies (Burt, 1992, Uzzi, 1996).

Table 1: Types of Brokers

Type of Broker	Characteristics	Graphic
Coordinator	Connects actors from the same group.	
Consultant	Connects members of the same group, but he does not belong to that group.	
Gatekeeper	Member of a group who is at its boundary and controls access of outsiders to the group.	
Representative	Controls access of his group to outside actors. He is the contact point of his group to outsiders.	
Liaison	Mediates the relation between two groups and does not belong to either of them.	

Source: Burt (1992)

3. Research Methods

This research aims to unveil the structure underlying tourism innovation networks, specifically the dynamics related to structural roles and brokerage positions occupied by tourism organisations, within tourism networked innovation processes. To achieve this, an empirical study was conducted, di8rected at regional organisations that are on the interface of tourism innovation.

The study was conducted in two destinations (Aveiro and Douro, Portugal), so that a comparative analysis can be made. The selected destinations are in different development stages, offer distinct tourism products, and attract different markets. Resorting to Malerba's (2005) definition of regional innovation systems and the legal composition of Portuguese Regional Tourism Boards, fifteen organisations were identified in each destination.

Data was collected by a questionnaire with the objective of gathering relational information, i.e., which organisations establish mutual ties within tourism innovation processes.

A set of metrics developed by Burt (1992) allows to understand how and why an actor's connections affect his constraints and opportunities, namely: i) the *effective size* of the network, or the number of non-redundant contacts.; ii) the *efficiency*, or the effective size divided by the number of alters in ego's network, informing whether the proportion of ego's ties to its neighbourhood is "non-redundant"; and iii) the *constraint*, which measures the extent to which ego has invested in people who have invested in other of ego's alters (Hanneman and Riddle, 2005). These metrics were computed using the software UCINET 6.

4. Results

In order to fulfil the research objectives, it was important to know the innovation performance of both regions.

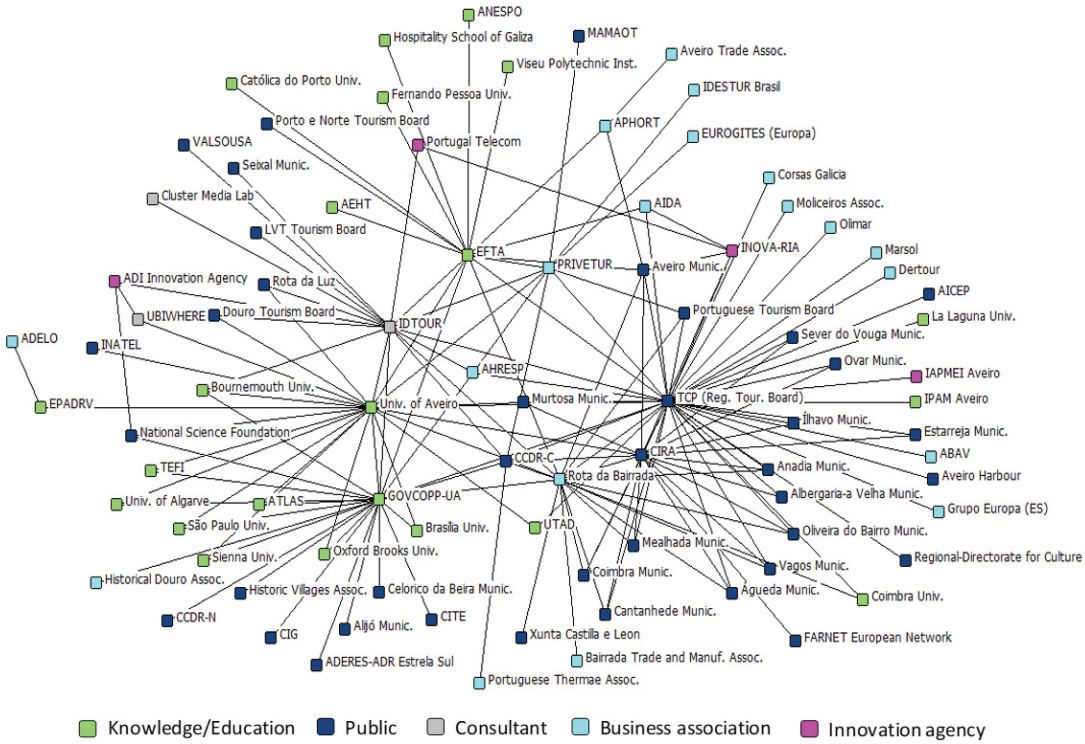
In a complementary study, the number and type of innovations introduced by tourism firms was surveyed.

Results demonstrate that Aveiro presents a higher innovation performance, as 84.4% of the firms are innovative, against 77% in Douro. Aveiro has also a higher rate of firms developing tourism products that are entirely new to the market (56% in Aveiro; 43.7% in Douro). In the light of these findings, further conclusions regarding the structural roles and positions can be drawn.

4.1 Structural holes

The analysed networks present very different structures. Aveiro's network comprises 87 actors connected by 314 ties. It has a density of 4.2% and a centralisation degree of 44.5%. It is characterised by the diversity of its actors, regarding both their geographical scope, and the type of organisations. The most central actors (those with a higher number of ties) are public organisations: the Central Portugal Regional Tourism Board (RTB), the Association of Municipalities of Aveiro (AMA), and knowledge organisations, namely the University, its Research Centre (RC), and IDTOUR (tourism spin-off), as represented in figure 4. Being the most central nodes, these actors are the most prominent in regional tourism innovation. The network of Douro includes 55 actors and 127 ties, resulting in a density of 9.2% and a centralisation of 69.2%, meaning that power is more concentrated in a few actors (those with higher centrality), which are public organisations, namely the Douro Tourism Board (DTB), the Association of Municipalities of Douro (AMD) and the North Coordination and Development Commission (decentralised body of central government for regional planning), as depicted in figure 5.

Figure 4: Sociogram of Aveiro's Tourism Innovation Network



In the innovation network of Aveiro, ten actors stand out due to their higher number of nonredundant contacts (table 2 and figure 4). The RTB, the RC and the University of Aveiro are simultaneously the most central, and the most efficient actors, which means that the impact that they are getting for each unit invested in using ties is high. Efficiency is large to the extent that an actor's alters are connected to different third parties. The efficiency of RTB is of 93%, followed by the RC with 91% and the University of Aveiro with 89%.

These ten organisations are also the less constrained actors, that is, they are endowed with a higher freedom of action within the network and lower dependence on their alters. This metric ranges from zero when the node has numerous disconnected, readily replaceable links, to one when the actor has only one effective link and hence is highly constrained. Results demonstrate that the RTB, the vocational school, RC, IDTOUR and the University of Aveiro are the less constrained actors in the network. It is also worth highlighting that there are actors that, despite not being central, have a significant role in filling structural holes and thus have important roles in the generation of regional level innovation in tourism, which are the Bairrada Wine Route, Privetur, the CCDR-C and INOVA-RIA.

In Douro, there are fewer actors presenting relevant structural holes measures when compared to Aveiro (table 3 and figure 5). Eight organisations stand out for their effectiveness. The first one is CCDR-N, with 37.2 nonredundant contacts. This actor's counterpart in Aveiro's network (CCDR-C) has a significantly lower value, with only 4.1 nonredundant contacts. These results confirm the importance of this public agency in the development of Douro as a tourism destination, especially in what relates to the support of tourism innovation based on collaboration patterns. DTB has an effective size of 34.5. However, it is more efficient than CCDR-N (0.93 against 0.91) and less constrained (0.10 for the DTB and 0.13 for CCDR-N). In the third place, with an efficiency of 0.9 and 21.7 nonredundant contacts, appears the Association of Municipalities of Douro, followed by Douro Hospitality School (effective size of 11.9 and efficiency of 0.8).

Table 2: Structural holes' measures for the tourism innovation network of Aveiro

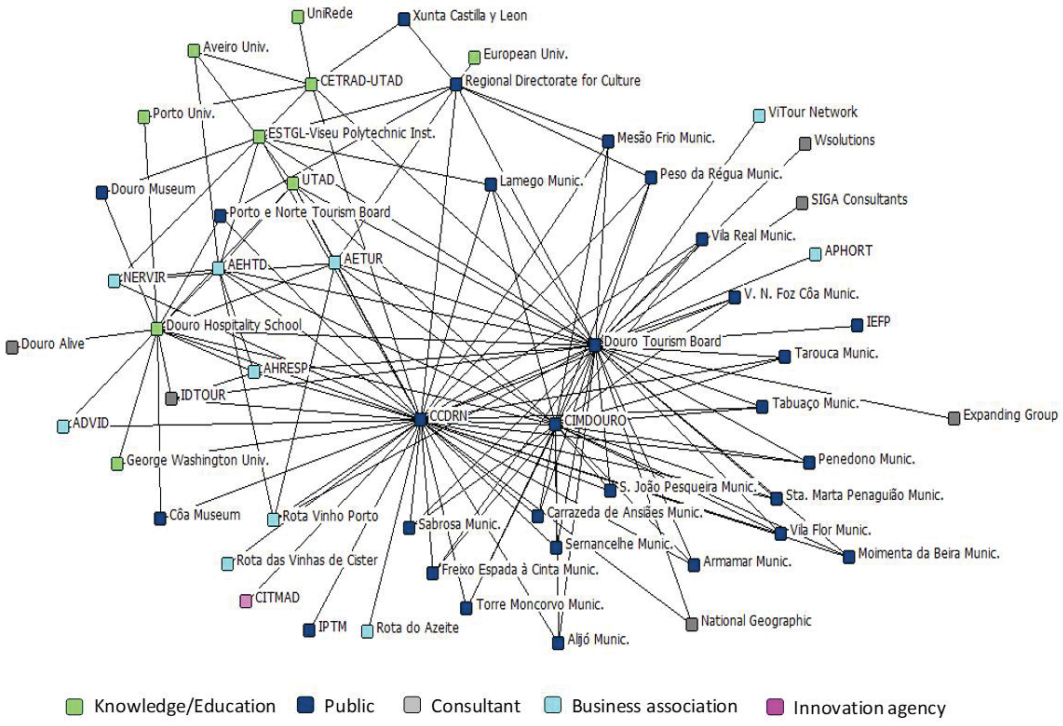
Actors	Degree	Effective size	Efficiency	Constraint
Centre Regional Tourism Board (RTB)	41	38,3	0,93	0,08
Research Centre (GOVCOPP-UA)	24	21,9	0,91	0,10
University of Aveiro	23	20,4	0,89	0,12

Association of Municipalities of Aveiro (AMA)	20	17	0,85	0,20
Actors	**Degree**	**Effective size**	**Efficiency**	**Constraint**
Bairrada Wine Route	19	15,3	0,80	0,16
IDTOUR (spin-off)	17	14,2	0,83	0,11
Vocational School	16	13,9	0,87	0,09
PRIVETUR (Rural Tourism Association)	10	7,8	0,78	0,15
Centre Coordination and Development Commission (CCDR-C)	7	4,1	0,59	0,19
INOVA-RIA (Innovation agency)	5	3,4	0,68	0,29
Whole network	*87*	*245*	*0,79*	*0,69*

The remaining organisations present inferior values, especially when compared to the actors placed at the lower places of Aveiro's ranking. The knowledge organisations do not stand out in Douro. The exception is the research unit that, despite not being very effective is, in fact, efficient, reaching 0.92 (it is important to note that an actor can be efficient without being effective, and the opposite is also true). In Aveiro, knowledge producers are within the most relevant organisations bridging structural holes.

Another interesting conclusion relates to the fact that two private business associations, namely AEHTD and AETUR seem to perform an important role at this level. Despite their lower effective size due to the reduced number of nonredundant contacts, they present an acceptable level of efficiency (respectively, 0.64 and 0.63) and of constraint (0.20 and 0.22).

Figure 5: Sociogram of Douro's Tourism Innovation Network



In addition to the organisations ranked as the most significant, one should highlight the role of the University of Aveiro also in the Douro network since it presents an efficiency of 0.78, which places it at the fifth position of the efficiency ranking, although it comprises a different network and plays a central role in the innovation network of a different region. Even though the analysis is not made to both networks together, it may be concluded that the University of Aveiro is at a privileged position as a broker, as it connects both networks.

Table 3: Structural holes measures for the Douro tourism innovation network

Actors	Degree	Effective size	Efficiency	Constraint
CCDR-N	41	37.2	0.91	0.13
Douro Tourism Board (DTB)	37	34.5	0.93	0.10
Association of Municipalities of Douro (AMD)	24	21.7	0.90	0.14
Douro Hospitality School	15	11.9	0.80	0.16
Regional Directorate for Culture	9	6.8	0.75	0.19
CETRAD-UTAD (research unit)	7	6.4	0.92	0.16
AEHTD (Association of Hotels)	10	6.4	0.64	0.20
AETUR (Tourism Firms Association)	8	4.5	0.63	0.22
Whole network	*55*	*202*	*0.70*	*0.49*

If the whole network structure is considered, the average results demonstrate that Aveiro is more efficient that Douro, with 79%, against 70%, respectively. This also occurs due to the effective size of both networks: Aveiro has a total of 245 nonredundant contacts, while Douro presents only 202. However, Douro is less constrained (0.49) than Aveiro (0.69), endowed with a higher freedom of action and less dependent on other actors (tables 2 and 3).

When highly connected actors present a significant effective size, they will have privileged access to new and diverse knowledge and information, which may improve innovation performance at destination level.

Subsequently, their efficiency will also reflect these conclusions, as they are probably the most efficient actors.

It is demonstrated that they are also the less constrained. These organisations have an important position and thus should play an important role in the network's innovation performance: they should assume the responsibility of disseminating the information, knowledge, and resources that they receive throughout the network, or at least assure that it flows through the proper channels until reaching the adequate receivers. For that to happen, there should be a strong internal cohesion and collaboration towards the development of innovative tourism products and services.

4.2 Brokerage roles

To analyse the brokerage roles, actors should first be classified into different groups. For the purpose of this work, and considering the relevance of the territory and the embeddedness of relationships in tourism innovation, brokerage among actors from different geographical levels is analysed. Therefore, actors were classified as local; regional; national/other Portuguese regions; and international.

The local actors of the Aveiro network comprise mainly municipalities, which have a minor importance as brokers, except for the municipality of Aveiro which acts 14 times as consultant (connecting members of the same group, other than the one it belongs to). However, the most important local broker is IDTOUR (spin-off), not only for the total number of times it performs this role (224), but also because it acts as a liaison (122 times), mediating the relations between two groups and not belonging to either one of them, as a consultant (66 times), as a representative, and as gatekeeper (16 times for each). This performance places the firm as the 6^{th} most important broker in the network.

Regional organisations comprise the most dynamic group and the most important brokers. The RTB is the most relevant, playing the five different types of brokerage, 1530 times, mainly as a liaison (428 times). Despite presenting a high value as coordinator (linking regional members), it is where it is less relevant (128 times).

The research unit and the University of Aveiro stand at second and third places acting, respectively, 502 times and 446 times as brokers. They are brokers at all five levels, being the liaison role the most relevant for both. It is, however, worth to observe that being both knowledge producers, the research unit assumes a higher importance as consultant, and the university both as gatekeeper and as representative, with 102 times for each role. Despite creating new knowledge, it is also a vehicle for the access of local and regional actors to

knowledge from outside the system. When analysing the brokerage roles of actors at national level or from other Portuguese regions, one may conclude that the majority is irrelevant. The only one that stands out is PRIVETUR, acting as liaison. Finally, international actors do not perform any role as brokers

Even though the innovation network of Aveiro includes less brokers than Douro. Douro has three or four actors that are the most relevant brokers, while in Aveiro there at least seven nodes with high importance in linking otherwise disconnected actors. Concerning the connection of actors from different geographical locations, the Central Portugal Regional Tourism Board is especially relevant in establishing relationships among local organisations and between local and regional, and local and international ones. It may be considered as the main gateway for providing new links for local tourism organisations. The research unit mainly brokers the relations among national actors and between national and international tourism organisations. On the other hand, the University of Aveiro mediates important links of regional to international actors and it also links international nodes among themselves, which places it as a very important element of access to new international knowledge and resources. AMA and the Bairrada wine route, due to their nature of association of local municipalities and firms, intermediate the relations among these actors. The spin off performs its brokerage role by connecting regional with national actors and national among themselves. The proportion of brokers in the tourism innovation network of Aveiro is lower than Douro's, as only 23% of its actors perform this role (20 nodes out of 87).

In Douro, local actors do not perform significant roles as brokers. The local group mainly comprises municipalities, which act exclusively as consultants. This means that they connect actors from regional, national, or international levels. They are in advantageous positions, as they can access new knowledge and resources from different locations, which may increase innovation levels. However, the number of connections is very low for all actors, as each one only acts as broker 2 times, except for a few municipalities that have a significant importance as tourism destinations in Douro, when compared to the overall region.

The most relevant dynamics in terms of brokerage occurs within the regional group. CCDR-N plays the five different types of brokerage 1484 times, especially as gatekeeper (368), representative (368) and consultant (346). This public agency can connect members from other geographical levels, controls the access of "foreigner" actors to regional actors and acts as the contact point of regional actors to local, national, and international actors. This organisation is, thus, at an extremely powerful position within the tourism innovation dynamics of Douro. The DTB presents a similar position by performing all five types of brokerage 1238 times. Although, the consultant role is the one that stands out (428 times), followed by the gatekeeper (260) and representative (260). It is also worth referring, at regional level, that the AMD acts as broker 496 times, mainly as consultant. The Regional Directorate for Culture, AEHTD, CETRAD, AETUR, the Polytechnic Institute and the University are also relevant brokers within the regional group.

Considering the actors that play the most relevant roles as brokers, it is interesting to understand at which geographical levels their action is more significant. DTB is especially important for the connection among local actors, between local and regional actors and between local and regional actors with international ones. CCRDN presents a very similar pattern, though it has a higher intervention in connecting regional actors among themselves. AMD acts mostly at local and regional levels, and Douro-Lamego Hospitality and Tourism Training School stands out for acting as a broker among regional actors, and of these with national and international ones.

Out of the total of 55 nodes that comprise the tourism innovation network of Douro, 37 (67, 3%) are brokers.

The brokerage type that is more played in Douro is the consultant (1178 times). It is also interesting to analyse this from a geographical perspective. Despite the lower importance of national and international nodes, they should not be despised, as they may introduce novelty and fresh knowledge in the network which, when considering the internal cohesion and density of this region, will rapidly and efficiently spread throughout the entire social structure and promote tourism innovation processes developed in cooperation.

5. Conclusion

The purpose of this paper was to analyse structural holes in tourism innovation networks, to identify and compare the different types of brokers, and to relate both the network structure and the individual position of tourism organisations, to the innovation performance of the destinations.

In order to do so, two distinct Portuguese destinations were studied (Aveiro and Douro). The main findings reveal that, in general, the most central actors, i.e., those assuming higher prominence in regional tourism innovation processes, are also those who perform the most significant brokerage roles. They have access to more information, knowledge, resources and exert more control and influence over other actors, as they can reach a larger number of individuals. They are also less dependent on a few specific actors. Therefore, they are in an advantageous position for knowledge acquisition and sharing and to promote collective learning, which are fundamental processes underlying innovation. It may be thus concluded that in Douro, regional tourism innovation is mainly supported by public organisations, while in Aveiro, beyond them, knowledge producers play an equally significant part.

Results also demonstrate that Aveiro is a more efficient social network as it is endowed with less redundant contacts. The investment of time and energy in creating and nurturing relations is thus well directed. This type of structure creates space for the emergence of structural holes that are occupied by brokers that inject new and fresh knowledge in the network, which reveals to be more advantageous for the development of innovation. Considering that Aveiro has a higher performance in terms of tourism innovation, it may be concluded that a larger number of non-redundant contacts and the existence of different types of brokers mediating the knowledge and information has a positive impact on the innovation performance of the destination, but also on the prominent role of these brokers that are simultaneously the most central actors. In addition, the brokerage with a significant number of international actors also brings a positive impact to networked innovation, a scenario that is particularly relevant in Aveiro when compared to Douro.

References

ACS, Z. J. & AUDRETSCH, D. B. 1988. Innovation in Large and Small Firms: An Empirical Analysis. American Economic Review, 78, 678-690.

BORGATTI, S. P. & FOSTER, P. 2003. The network paradigm in organizational research: A review and typology. Journal of Management, 29, 991-1013.

BRANDÃO, F., COSTA, C. & BUHALIS, D. 2018. Tourism innovation networks: a regional approach. European Journal of Tourism Research, 18, 33-56.

BURT, R. S. 1992. Structural Holes: The Social Structure of Competition, Cambridge and london, Harvard University Press.

BURT, R. S. 2001. Structural Holes versus Network Closure as Social Capital. In: LIN, N., COOK, K. S. & BURT, R. S. (eds.) Social Capital: Theory and Research. New York: Aldine de Gruyter.

BURT, R. S. 2004. Structural Holes and Good Ideas. American Journal of Sociology, 110, 349-399.

BURT, R. S., KILDUFF, M. & TASSELLI, S. 2013. Social Network Analysis: Foundations and Frontiers on Advantage. Annual Review of Psychology, 64, 527-547.

CHAMINADE, C. & ROBERTS, H. 2002. Social Capital as a Mechanism: Connecting Knowledge Within and Across Firms. Third European Conference on Organizational Knowledge, Learning and Capabilities - OKLC. Athens, Greece, April 2002.

COLEMAN, J. 1988. Social Capital in the creation of Human Capital. American Journal of Sociology, 94, 95-121.

COSTA, C. 1996. Towards the Improvement of the Efficiency and Effectiveness of Tourism Planning and Development at the Regional Level: Planning, Organisations and Networks. The Case of Portugal. Ph.D. Thesis, University of Surrey, England.

COSTA, C., BREDA, Z., COSTA, R. & MIGUÉNS, J. 2008. The Benefits of Networks for Small and Medium Sized Tourism Enterprises. In: SCOTT, N., BAGGIO, R. & COOPER, C. (eds.) Network Analysis and Tourism: From Theory to Practice. Clevedon: Channel View Publications.

FERNANDES, S., BRANDÃO, F. & COSTA, C. 2017. Network-based planning for the sustainable development of tourism destinations: conceptual approach. Journal of Tourism & Development, 27/28, 1719-1731.

GRANOVETTER, M. 1973. The Strength of Weak Ties. American Journal of Sociology, 78 1360-1380.

GRANOVETTER, M. 1983. The Strength of Weak Ties: a Network Theory Revisited. Sociological Theory, 1, 201-233.

HANNEMAN, R. A. & RIDDLE, M. 2005. Introduction to Social Network Methods. Riverside, CA: University of California (published in digital form at http://faculty.ucr.edu/~hanneman/).

KILDUFF, M. & TSAI, W. 2012. Social Networks and Organisations, London, SAGE.

LUNDVALL, B.-Å. 1992. National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, London, Pinter.

LUNDVALL, B.-Å. & BORRÁS, S. 1997. The globalising learning economy: implications for innovation policy, Luxembourg, European Commission, DG Science, Research and Development.

MALERBA, F. 2005. Sectoral systems of innovation: a framework for linking innovation to the knowledge base, structure and dynamics of sectors. Economics of Innovation and New Technology, 14, 63 - 82.
PORTER, M. E. 1990. The competitive advantage of nations, London and Basingstoke, Macmillan.
PUTNAM, R. 2000. Bowling Alone: The Collapse and Revival of American Community, New York, Touchstone.
ROTHWELL, R. 1994. Towards the Fifth-generation Innovation Process. International Marketing Review, 11, 7-31.
SCOTT, J. 2013. Social Network Analysis, Los Angeles, SAGE.
SCOTT, N., BAGGIO, R. & COOPER, C. 2008. Network Analysis and Tourism: From Theory to Practice, Clevedon, Channel View Publications.
SUNDBO, J., ORFILA-SINTES, F. & SØRENSEN, F. 2007. The innovative behaviour of tourism firms - comparative studies of Denmark and Spain. Research Policy, 36, 88-106.
TINSLEY, R. & LYNCH, P. 2001. Small Tourism Business Networks and Destination Development. International Journal of Hospitality Management, 20, 367-378.
UZZI, B. 1996. The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect. American Sociological Review, 61, 674-698.
VONORTAS, N. S. 2011. Innovation Networks in Industry. In: MALERBA, F. & VONORTAS, N. S. (eds.) Innovation Networks in Industries. Cheltenham: Edward Elgar.

HR-Issues of Growth Entrepreneurs in Finland: Recruiting and Retaining Talents

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Abstract: When a small business focuses on growth the one of its main topics is to find personnel who will enhance the growth. Earlier studies indicate that in many fast growing small to medium enterprises the main problem is finding and retaining high quality employees (e.g. Atkinson and Storey, 1994; Fraza, 1998; Hornsby and Kuratko, 1990). Knowledge of HR and leadership might help owner in personnel issues, because growth entrepreneurs must begin to increase their staff and learn how to develop and implement human resource management (HRM) policies. The faster the growth is facing the small firm, the more likely it will experience HR problems. This empirical study focuses on 29 Finnish growth-oriented entrepreneurs' views about HR related issues. They were asked about challenges of growth, what kind of skills they would need, and also what kind of HRM they are using in order to retain their personnel. The entrepreneurs were mostly interviewed at face-to-face and couple of them via Skype or phone. One interview took approximately one hour and the method of interview was half-structured. The interviews were transcribed and then read thru several times. Results supported earlier studies when indicating that there are many problems about finding right personnel. Especially when working at international market the internationally experienced people were highly valued. Additionally, the changing requirements towards personnel was one of the challenging issues. When company is growing, the needed skills are changing as well, and this long-term orientation could be better taken into account when hiring personnel. In order to retain personnel, entrepreneurs had mainly modern leadership skills with good benefits for employees. In order to support growth entrepreneurs, it is important to recognize personnel's needs in different stages of growth.

Keywords: Growth entrepreneurs, HR, recruiting, leadership

1. Introduction

When a small business focuses on growth the one of its main topics is to find personnel who will enhance the growth. This means that owners of such growth companies must learn to communicate their vision, mission and values to their employees along with a clear understanding of how the firm is to achieve these goals (Barrier 1999). Earlier studies indicate that recruiting and retaining high quality staff is a major challenge for fast growing small to medium enterprises (e.g. Atkinson & Storey 1994; Fraza 1998; Hornsby & Kuratko 1990).

Growth in small firms usually involves increasing the number of employees engaged within the business, as well as the overall complexity of the enterprise (e.g. multiple sites, multiple product lines and increasingly complex marketing environments). As the scale and scope of the enterprise increases the owner-manager will experience pressures to delegate responsibility within the firm and build an effective team (Heneman et al, 2000). An educated and skilled labour force is considered to be essential to the success and growth of small business and for businesses to gain some competitive advantage in the global economy (Cosh et al, 1998; Huang 2001). The influence of the human resource capabilities of the small business owner-manager is therefore critical in this process.

The small businesses find usually difficulties when there is competition for new staff and in retaining existing skilled staff (Walker et al, 2007). Small businesses compete for attracting and retaining skilled staff with their larger counterparts, but are easily in a defendant position. Because of the limited resources, it is typical for small firms to focus on short-term needs in their HRM-activities (Anderson et al, 2002). Both their financial and human resources are restricted, which force them to live for the moment. Recruiting in larger business is easier because they usually have the ability to pay more and offer financial and non-financial incentives that are difficult for small businesses to match; uncertainty regarding continuous workflow; perceived difficulty of finding appropriate staff; ability to manage staff and not knowing how to terminate unsuitable staff (Barrett & Mayson 2004; Klass et al, 2000; McElwee & Warren 2000; Storey 2004). These may be hard issues for small business if the owner-manager is not skilled in human resource management.

Additional challenges identified include: time and resources (Klass et al.2000); firm size (Heneman et al., 2000); and cost (Arthur, 1995). More significantly, according to Klass et al. (2000) small businesses may not recognise the complexity of human resource training and expertise, and therefore rely on what they have vicariously learnt from previous work experience. Previous studies indicate that poor managerial competencies have often been linked to small business failure (Gaskillet al., 1993; Jennings and Beaver, 1997; Perry, 2001), so the importance of modern leadership skills and HRM-related knowledge would be helpful when targeting growth of the company.

It has been found that small business owner-managers are reluctant to participate in formal training and development, they do acknowledge that HRM is important to their businesses (Webster et al, 2005). To facilitate greater participation by owner-managers in training activities Ehrich and Billett (2004) have recommended the development of pedagogic principles that are suited to the changing skills development needs of small businesses. Of particular interest to the business owner-manager will be the impact that training will have on the business, not just in terms of the bottom-line, but also for its relevance and application to day-to-day operations. Storey (2004) and Westhead and Storey (1996) have also highlighted that there is not enough emphasis placed on the link between management training of small business owner-managers and business performance. This is despite owner-managers recognizing the importance of developing and maintaining management skills (Loan-Clarke et al, 1999; Smith & Whittaker 1996).

2. HRM models of small enterprises

Despite the growing research interest in small business human resource management (HRM) issues during the past years (Kok & Uhlaner 2001), most HRM models are designed from large companies' point of view (Hornsby & Kuratko 1990; Cassell et al, 2002; Mazzarol 2003). It is not self-evident that the models would be directly transferable to the small business context, which is generally characterized by informality and flexibility (Kok & Uhlaner 2001). The results of HRM would, at least, be unexpected if the HRM models are applied as such without taking the context into account (Storey 2004). However, it is commonly established notion that the formality of HRM practices increases alongside the size of firm's grows (Hornsby & Kuratko 1990; Mazzarol 2003). However, there are still among the biggest companies in the Finland those one which do not have any HR-managers, thus it may depend of the owners education and skills and also field if there will be any formal HRM practices (and still the company may work very well).

The model of "Growth-HR-Management" by Mazzarol (2003) presents of founder-owner entrepreneurs who seek to grow the companies. In the model, the direct and indirect influencing factors of are presented. It is having negative or positive outcomes relating to employee turnover, productivity and commitment. Directly influencing factors are HRM policy and practices such as informal to formal recruitment and incentives, and low to high team building and appointment of managers (Mazzarol 2003). In other words, when the goal is to grow and build HRM policy and practices to support it, and further to ensure the commitment and productivity of employees, the formal HR practices would be very helpful.

There are three things that affect the HR policies and practices directly: 1) owner-manager's commitment to employee partnering, 2) company structure (e.g. ownership, complexity and number of sites) and 3) nature of work environment (e.g. level of specialization, worker skill level) (Mazzarol 2003). Owner-manager's commitment to employee partnering is influenced his/hers personal characteristics which are management style, management education and level of experience as well as personality. In addition, all the indirect influencers are affected by external market conditions. (Mazzarol 2003.)

The important aspect is the role of entrepreneurs' characteristics and level of commitment to employee partnering which has a great influence in HR policies and practices. However, Mazzarol (2003) suggests the process in not straightforward, but will include trial and error process, in which the working policies and wanted growth HR outcomes are sought. Based on this model, it could be suggested that management training focusing on leadership styles and HRD and HRM would be highly recommended and would result on those needed policies and finally in the growth HR management. Mazzarol points out that it crucial for the entrepreneur to let go of micro-management and learn how to delegate responsibilities.

Also Mitchelmore and Rowley (2013) have proposed a entrepreneurial competence model, which is in their case female entrepreneur competence model. It includes four factors; personal and relationship

competencies, business and management competencies, entrepreneurial competencies and human relations competencies. They point out that the first and the last are especially important because of their focus on relationship building and communication. In their study, human relation competencies also "include hiring, staff development, leadership, employee relations and motivating staff" (Mitchelmore & Rowley 2013: 137).

In this study we focus on growth entrepreneurs' experiences of HR, especially related to recruiting and retaining personnel.

3. Method

This empirical study focuses on 29 Finnish growth-oriented entrepreneurs' views about HR. They were representing different fields but common to them was that they were experiencing very fast growth. They were asked about challenges of growth, what kind of skills they would need, and also what kind of HRM they are using in order to retain their personnel. The entrepreneurs were mostly interviewed at face-to-face and couple of them via Skype or phone. One interview took approximately one hour and the method of interview was half-structured. The interviews were transcribed and then read thru several times and using content analyzing methods the results were formed.

4. Results

Using content analyzing method the following themes were found: Recruiting, changing needs related to personnel and how to keep the personnel.

4.1 Recruiting difficulties finding the right people with right attitude

4.1.1 Finding the right know-how

Results indicate that many problems of growth were concerned about finding right personnel and especially when working at international market the internationally experienced people were highly valued. Additionally, mistakes with recruitments were hard to handle. According to Mazzarol (2003) and Fraza (1998) the faster the growth, the more likely the business is to experience human resource problems and one of the main problems is finding and retaining high quality employees.

> *"Last year we went four months without sales, because we did not get enough right kind of people in. Recruiting, recruiting, recruiting. And now we are at that point that we cannot get skilled people to international unit from Finland. There's not enough people. Not enough excellence. It is a bit sad situation but there's nothing we do about it, we just have to look outside the borders." Firm A*

> *"At this point we are not publicly recruiting for the marketing management's position. And how we are going to get the right person for that job, I really can't say how." Firm B*

> *"That is a really tough, recruiting, we have done several mistake recruitments in every market. And just that especially in sales and sales management it is very difficult. But then, if there is any doubts, you just have to put an end to it, admit the mistake and go on from there." Firm C*

4.1.2 Finding people with right attitude

Fast growing enterprises have high expectations for their personnel and some admit that if growth is difficult for themselves as entrepreneurs, so they admit that what can you then expect from the subordinates.

There may be problems with growth when employees have to adapt all the time, and some people cannot handle that.

> *"The founders have been able to handle this deal, but not all employees can adapt. And there is no blame at all, because it looks quite mysterious to us too, but at least we equity tight to this so it's a strong incentive. But it's hard to understand what it is like to come to work for a year that is different each day." Firm D*

> *"But then again, you must be able to handle uncertainty and this constant change and that all these new people come in, and they also have to learn." Firm B*

Other qualities mentioned were right attitude, commitment, interest of own work, and fitting in the firm's culture, entrepreneurial attitude, commitment, independence. For example entrepreneurs were reasoning the importance on fitting in the firm's culture and growing in his/her role the leadership will be easier

> *"I can't hire in my company even one person who doesn't have that fire in their eyes and within them." Firm E*

> *"It's really important that people who we take in, kind of fit into our culture, procedures and thinking, and the can in their own role develop and contribute. Which makes management a bit easier." Firm F*

> *"When we hire people, it is this entrepreneurial attitude that we look for. In a way that is the perhaps the most import thing to get those skills." Firm F*

4.2 Amount of personnel grows – changes are needed

4.2.1 Leadership style should be modified

When firms are growing then entrepreneurs were experiencing difficulties to update leadership, organizing overall and processes.

> *"And then we had this challenge when the number of staff is suddenly increasing, the importance of management so that we can organize all the jobs and we have clear processes described and clear job descriptions… that has taken a lot of time and has caused a lot of sick leaves like in the recent years." Firm G*

4.2.2 Hiring should be done in long term purpose

Additionally, the changing demands towards personnel was one of the challenging issues. When company is growing, certain skills are not needed anymore, and this should be taken into account when hiring personnel for long-term purpose. It has been noted that small firms typically appreciate informal, work-based learning and flexibility and adaptability are more important than explicitly formulated job descriptions and skill specifications. The transmission of tacit knowledge through ad hoc and/or hand-or training is fundamental (Hill and Stewart, 2000).

> *"Many time we have to forecast the growth. Looking back we could have been more brave in the beginning. We kept doing those things we knew how to do and did the in a small way and with care, which of course is also good too." Firm H*

4.2.3 Always too little or too much employees

Also the speed of growth is not appropriate, there are too many or too few employees.

> *"Growth is never just right. Especially in the firm like ours, the production is never the same size as growth, and the number of staff is never in line either. It is a step ahead, behind or totally in the wrong place. So it's such a continuing thing since we have such a long value chain in our possession." Firm D*

4.3 Importance of personnel and keeping them

4.3.1 *Role of personnel at growth*

All the answers here referred the right people, growing those people, keeping those people and focusing on the personnel issues.

> *"In international growth, it really is about the same thing, it depends on the right team and patience." Firm A*
>
> *"It is probably by far the most important lesson, that if a company wants to grow you as a manager have to use your time to help people grow. "Firm A*

"We have structured this and it's our first principle, that for us to grow, the staff needs to grow faster." Firm C

4.3.2 *Retaining personnel with high quality leadership style*

In order to retain personnel, entrepreneurs had mainly very modern leadership skills with good benefits for employees. Entrepreneurs tried hard to keep their employers happy and committed. Several comments were mentioned about doing things together, feeling like a family, empathic spirit, teamwork, growing together.

Everything was concentrated on good feelings and togetherness, openness, discussions and coaching. Hierarchies were not wanted in modern organizations.

"I don't believe in, even in entrepreneurship, in dictatorship or my-way-thinking, making the calls and saying what is done. I believe there needs to be a vision and one has to open so people can challenge it and have the discussions." Firm I

"Our way of working and what I have tried to do is that we always have to act humanely, act according to our values, and respecting others. And I see and at least hope that time of these brilliant pissheads is over." Firm D

"And then that we hire for life, so in a way we try and support each person in their own life so that they are motivated and enjoy this like a home, and that way that long term…" Sales C.

4.3.3 Money was also one way to gain commitment

"And then we have made the business model so that for example our mechanics are satisfied, they earn really well and so on, since they do such a hard job. And then we have created this training system for them that involves wealth planning so that we they start making the money they wouldn't go right away and spend on that…" Firm K

"And it has been clear that we want our people to be part of this. We want offer them a change to subscibe our stocks and in that way engage them but also to give them a feeling that I work for my own company. I think it is for many people, even if they own just a small share, very cool thought that I own some of this place where I work. "Firm L

5. Conclusions

This paper indicates that the Finnish growth oriented entrepreneurs understand the role and importance of personnel at their business, and they have very modern ways to retain their personnel. In many interviews it was clear that personnel are clearly more than only the people who are hired to do some work at their company. Entrepreneurs were sincerely attached to their personnel and wanted that their personnel would feel like to be almost like at home at the enterprise. To give that feeling, they were ready to give many freedoms and monetary assets. However, finding the right personnel with right attitude was not easy, and in some cases the finding the right personnel was so slow that it prevented or did slow down the growth. One possible solution could be that entrepreneurs could be more active with universities and students, so universities could send their students to do e.g. trainee programs at growth enterprises. These start-up enterprises could be great opportunity for young students who would like to want get most out of future possibilities. They could also gain very specialized knowledge and thus gain competitive advantage in the career markets.

Important aspect of entrepreneurship is self-directed learning (Rae & Carswell 2000). According Rae & Carswell (2000), the previous business and commercial experience of the owner or senior managers contributes significantly to the development of 'mental models' that form the basis for action and decisions.

The principal influences on this process are the personal values, self-efficacy and goals of key individuals, as well as their ability to learn to develop their existing capabilities in an active manner. It may be that those people with active learning ways and longer working experience may cope better with demands of growth

entreprise. So active advisory board or mentors could be very helpful when entrepreneurs are trying to solve their e.g. recruiting problems, HR-related issues when their enterprise is growing.

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References

Anderson, V. and Boocock, G. (2002) "Small firms and internationalization: learning to manage and managing to learn", *Human Resource Management Journal*, Vol. 12, No. 3, pp 5-24.

Atkinson, J. and Storey, D. (1994) "Small firms and employment", in Atkinson, J. and Storey, D. (Eds), Employment, the Small Firm and the Labour Market, Routledge, London.

Arthur, D. (1995) Managing Human Resources in Small and Mid-Size Companies, American Management Association, New York, NY.

Audretsch, D.B. and Thurik, A.R. (2001) "What is new about the new economy? Sources of growth in the managed and entrepreneurial economies", *Industrial and Corporate Change*, Vol. 10, pp. 267-315.

Barrett, R. and Mayson, S. (2004) "What are the problems? HRM in small firms", paper presented at the 17th Annual SEAANZ Conference, Brisbane, September

Barrier, M. (1999) "Leadership skills employees respect", *Nation's Business,* Vol. 87, No. 1, pp. 28-30.

Cassell, C., Nadin, S., Gray, M. and Clegg, C. (2002) "Exploring human resource management practices in small and medium sized enterprises", Personnel Review, Vol. 31, No. 6, pp 671-692.

Cosh, A., Duncan, J. and Hughes, A. (1998) "Investing in training and small firm growth and survival: an empirical analysis for the UK", DfEE Research Report RR36, London.

Ehrich, L. and Billett, S. (2004) "Learning new practices in small business: engagement and localised support", *Education & Training*, Vol. 46 Nos 8/9, pp. 501-9.

Fraza, V. (1998) "No small feat", *Industrial Distribution*, Vol. 87 No. 9, pp 48-9.

Gaskill, L.R., Van Auken, H.E. and Manning, R.A. (1993), "A factor analytic study of the perceived causes of small business failure", *Journal of Small Business Management*, Vol. 31 No. 4, pp 18-31.

Heneman, R., Tansky, J. and Camp, S.M. (2000) "Human resource management practices in small and medium-sized enterprises: unanswered questions and future research perspectives", *Entrepreneurship Theory and Practice*, Vol. 25, No. 1, pp 11-26.

Hill, R. and Stewart, J. (2000) "Human resource development in small organisations" *Journal of European* Industrial Training, 24: 2/3/4, pp 105-117.

Hornsby, J. and Kuratko, D. (1990) "Human resource management in small business: critical issues for the 1990s", *Journal of Small Business Management*, Vol. 28, No. 3, pp 9-18.

Huang, T.C. (2001), "The relation of training practices and organizational performance in small and medium enterprises", *Education & Training,* Vol. 43, Nos 8/9, pp 437-44.

Jennings, P. and Beaver, G. (1997) "The performance and competitive advantage of small firms: a management perspective", *International Small Business Journal*, Vol. 15 No. 2, pp. 63-75.

Klass, B., McClendon, J. and Gainey, T. (2000) "Managing HR in the small and medium enterprise: the impact of professional employer organizations", *Entrepreneurship Theory and Practice*, Vol. 25, No. 1, pp. 107-24.

de Kok, J. and Uhlaner, L.M. (2001) "Organizational Context and Human Resource Management in the Small Firm", *Small Business Economics*, Vol 17, pp. 273-291.

Loan-Clarke, J., Boocock, G., Smith, A. and Whittaker, J. (1999) "Investment in management, training and development by small businesses", *Employee Relations*, Vol. 21, No. 3, pp. 296-310.

Mazzarol, T. (2003) "A model of small business HR growth management", International *Journal of Entrepreneurial Behavior & Research*, Vol. 9, Issue 1, pp.27-49,

McElwee, G. and Warren, L. (2000) "The relationship between total quality management and human resource management in small and medium-sized enterprises", *Strategic Change*, Vol. 9 pp. 427-435.

Mitchelmore, S., and Rowley, J. (2013) "Entrepreneurial competencies of women entrepreneurs pursuing business growth", *Journal of Small Business and Enterprise Development*, Vol. 20, Issue 1, pp.125-142.

Perry, S.C. (2001), "The relationship between written business plans and the failure of small businesses in the US", *Journal of Small Business Management*, Vol. 39, No. 3, pp. 201-9.

Rae, D. and Carswell, H. (2000) "Using a life story approach in researching entrepreneurial learning: the development of a conceptual model and its implications in the design of learning experiences", *Education and Training*, 42: 4/5, 220-228.

Smith, A. and Whittaker, J. (1996) "Management development in SMEs: what needs to be done?", *Journal of Small Business and Enterprise Development*, Vol. 5, No. 2, pp. 176-85.

Storey, J. (2004) "Exploring the link, among small firms, between management training and firm performance: a comparison between the UK and other OECD countries", *International Journal of Human Resource Management*, Vol. 15, No. 1, pp. 112-130.

Walker, E., Redmond, J., Webster, B. and Le Clus, M. (2007) "Small business owners: too busy to train?", *Journal of Small Business and Enterprise Development*, Vol. 14, Issue 2, pp. 294-306.

Webster, B., Walker, E.A. and Brown, A. (2005) "Australian small business participation in training activities", *Education & Training*, Vol. 47 Nos 8/9, pp. 552-61.

Westhead, P. and Storey, D. (1996) "Management training and small firm performance: why is the link so weak?", *International Small Business Journal*, Vol. 14, No. 4, pp. 13-24.

Role of Trust in Building a Business Network by Entrepreneurs in Russia

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Abstract: The literature suggests that interpersonal trust is essential for building effective entrepreneurial networks. According to the 2011 World Values Survey and recent national surveys, more than 60% of Russians believe that caution is warranted when dealing with others. Low levels of social trust may affect entrepreneurs' readiness to build networks based on trust, which is defined as a psychological state comprising a willingness to act based upon positive expectations of other person's intentions or behaviour. This paper addresses the role trust plays in the building of business networks by Russian entrepreneurs. It also considers how trust between network participants changes over time. The findings are based on qualitative data gathered from in-depth interviews of 59 entrepreneurs from traditional, low, medium, and highly innovative SMEs. The paper identifies and compares the mechanisms that Russian entrepreneurs representing SMEs in four innovativeness categories use to build trust in their business networks, especially in terms of the cognitive, affective, and behavioural aspects of trust. It also highlights differences in how entrepreneurs representing SMEs in various innovativeness categories use mechanisms of trust to build and govern their business networks. The derived understanding can help entrepreneurial network participants be more effective, especially in terms of avoiding mistakes associated with the underestimation of the importance of trust in building long-term business relations.

Keywords: trust, business network, entrepreneurship, innovativeness, business relationship management, Russia

1. Introduction

The literature accentuates the importance of trust as a driver of networking, where it is seen as a medium through which entrepreneurs gain access to a variety of resources. The essence of networking lies in finding partners and establishing effective ties, thereby allowing companies to achieve their aims in each stage of their development. From this point of view, entrepreneurs' willingness to trust their partners determines how they establish and manage relationships to develop their business. A low level of trust increases operational costs owing to the need to manage threats, verify information, monitor processes and track partners' performance in relation to contractual commitments. A more trusting relationship allows for greater focus on the strategic level and on the opportunities that arise from the relationship. Trust is particularly important for new ventures – in the absence of positive experiences that can serve as a basis for cognitive trust, entrepreneurs must build affective trust with their partners in order to establish good relationships. They can do so by demonstrating a high degree of commitment or by using referrals. Moreover, the literature suggests that trust can develop as a relationship progresses.

However, the extant research does not examine whether the mechanisms of trust vary depending on certain characteristics of the business, such as its innovativeness, or the extent to which the uncertainty associated with the nature of the business affects entrepreneurs' willingness to trust and to accept unstructured, less formal relationships. These issues are particularly interesting in the context of Russia, which is a fast-developing economy. In the span of 26 years, a modest number of small and medium-sized enterprises (SMEs) operating in different markets and with varying degrees of innovation have emerged in Russia, where the economy was previously characterised by a lack of private businesses. The literature emphasises that in developing countries characterised by unstable economic and political situations and by underdeveloped entrepreneurial frameworks, the level of trust in business is generally low. The question is whether it is equally low for various types of business. In other words, does the perceived uncertainty of doing business related to such factors as innovation cause entrepreneurs to treat trust issues differently?

2. Conceptual background

As an entrepreneur's business network is a free association of actors, trust is widely assumed to be essential (Hoang and Antoncic, 2003; Glanville, 2016). Trust is understood as a psychological state comprising a willingness to act based on positive expectations of the other person's intentions or behaviour (Weber et al., 2004; Kucharska, 2017). Trust allows network participants to assume that each party will behave in a predictable and mutually acceptable manner, and that they will act with honesty and integrity (Turyakira and Mbidde, 2014). These expectations reduce transaction costs (Dyer and Chu, 2003). For example, they make the

monitoring and renegotiating of mutual arrangements unnecessary, which is important when faced with time constraints and implied conventions (Młokosiewicz and Misiak-Kwit, 2017). This is particularly true given the highly complex tasks usually solved within an innovative entrepreneurial network, as not all aspects of these tasks can be codified.

The literature views trust as an important social mechanism in networking governance that often relies on "implicit and open-ended contracts" (Hoang and Antoncic, 2003; Glanville, 2016). Trust and a commitment to meeting obligations and keeping promises are important mediating factors that may lead to successful networking. A lack of these elements may lead to a loss of reputation and ostracism (Turyakira and Mbidde, 2014). When an open relationship exists among network actors, a loss of reputation has serious consequences for the likelihood of establishing connections in the future (Newell and Swan, 2000). Smith and Lohrke (2008) distinguish between two dimensions of trust: affective and cognitive. The former, which resides at the interpersonal level in the emotional relationship domain, develops when network partners emotionally invest in relationships. Those investments result in genuine concern for the welfare of network members and a belief in the intrinsic value of those relationships. Moreover, affective trust refers to an expectation of a positive network outcome based on the network partners' constructive attitudes. In contrast, cognitive trust can develop at the interpersonal and organisational levels, and is based on evidence of trustworthiness. This type of trust results from the positive outcomes of repeated interactions.

Trust and commitment should be proactively pursued by all parties concerned in order to ensure the sustainable development of relationships (Turyakira and Mbidde, 2014). When parties trust each other, they are likely to be more willing to engage in network activities through which additional trust may be generated understood as behavioural trust (Newell and Swan, 2000; Gillespie and Mann, 2004). This is particularly applicable in the context of entrepreneurship, where trust serves as an important driver of relationship establishment between entrepreneurs and resource providers because information and evidence regarding new ventures is lacking. Moreover, both parties fear the possibility of risk realisation: entrepreneurs risk losing a viable idea, while resource providers risk wasting resources (Newell and Swan, 2000). However, if relationships are established and go through repetitive stages of negotiation, commitment, and execution, then behavioural trust develops, which then drives the evolution of those relationships (Newell and Swan, 2000). If these interactions occur under the influence of trust and commitment, one could hypothesise that networking evolves due to the entrepreneur's ability to build relationships based on feedback from previously developed networks. This supposition is supported by research showing that serial entrepreneurs build their networks differently than novices (e.g., Aarstad et al., 2015).

In Russia, which has a long history of state dominance in the economy, trust in entrepreneurship and private initiative are lacking (Kharchilava, 2014). According to the 2011 World Values Survey and more recent national surveys, more than 60% of Russians believe that caution is warranted when dealing with others (Krivopuskov, 2013; Public Opinion Foundation, 2013). Low levels of social trust may affect entrepreneurs' readiness to build networks based on trust (Trapkova, 2004). Notably, the formation and development of trustful relations in Russia is poorly understood. The literature indicates that the practice of choosing counterparties on the basis of personal ties is still widespread in Russia (Gudkov, 2012). Contacts are sought out based on the recommendations of relatives, friends, classmates and ex-colleagues. In other words, the source of trust lies in close ties rather than in the business reputation of a person or firm (Kharchilava, 2014). According to Kharchilava (2014), when making decisions about establishing relationships with others, most Russian entrepreneurs rely on the recommendations of people whom they trust. However, the basis for the development of trust is personal business experience. If the entrepreneur has positive experiences of cooperation with a person or organisation, he will prefer to continue that relationship even if someone else offers him more favourable terms (Kharchilava, 2014). This paper's author believes that use of trust by Russian entrepreneurs as a mechanism for establishing and managing business relations is highly complex and largely depends on the type of business and its innovativeness.

3. Research method

To contribute to our understanding of the role of trust as a determinant of the ability and willingness of entrepreneurs to build and manage their networks in Russia, the aim of this research was to identify whether the nature of a business activity (innovative versus conventional) affects the role of trust in creating business networks. To achieve this aim, the following proposition was investigated: entrepreneurs in different

innovativeness categories have different understandings of trust and the mechanisms through which trust can be used as a network-building tool.

Our knowledge of the role of trust in business networks is mainly based on literature focused on Europe and the US. As such, it might be irrelevant in the Russian context, which is characterised by a historically low level of social trust. Therefore, this study started without a clear picture of Russian entrepreneurs' use of trust to build business networks. It was based on a desire to test the proposition using qualitative data collected during in-depth interviews with entrepreneurs. Given this study's interpretive nature, the grounded theory method (Corbin and Strauss, 1998) was chosen. This approach best fits this study, as it allows for insights to be drawn from the data to build an understanding, which then serves as a meaningful guide for additional research-related actions.

The analysis of the qualitative data gathered from about 30 interviews allowed for identification of four patterns of entrepreneurial behaviour (Table 1) based on such criteria as business-model logic, market features, and the scope and characteristics of operating activities. The criteria were adapted from Aulet and Murray (2013), who proposed a set of characteristics differentiating between innovation-driven enterprises from traditional small-business enterprises. Patterns were revealed by comparing the respondents' answers and assigning their firms to the appropriate groups. Notably, each pattern corresponded to a certain level of innovativeness inherent to a particular group's type of business. Thus, four company-innovativeness categories (IC) were identified: very low (pattern 1), low (pattern 2), medium (pattern 3) and high (pattern 4). In the course of additional data collection, interviews were conducted to have at least 10 entrepreneurs in each group.

Table 1: General characteristics of business enterprises, by innovativeness category (IC)

Parameter	**Pattern 1 (IC-very low)**	**Pattern 2 (IC-low)**	**Pattern 3 (IC-medium)**	**Pattern 4 (IC-high)**
Starting point for building a business model	Clients' needs related to the traditional product/service; suppliers or partners selected to address clients' needs	An existing product, and existing relationships with suppliers and partners; value added to augment the quality of the product/service, segment of interested customers is identified later	The company's technological ability to significantly improve the product/service; the segment of interested customers is identified and relevant communication channels are built	A new idea about satisfying clients' (unconscious) needs; leads to the creation of a new product/service; discovery, development and education of the market
Basis of business model	Customer loyalty	Strength of relations with partners	Progressive technologies	Innovation
Degree of novelty	Existing business model to satisfy a particular segment's needs	Incremental innovations	Adaptation of an existing technology, or an architectural or modular innovation; in rare cases, holds a patent for design or useful application	Radical innovation or combination of more than two innovations; holds different patents, sometimes more than one type
Attitude toward technology	Present due to the supplier	Company mostly carries out minor refinements of technology present due to the supplier and partner	Company carries out independent improvements/ adaptations of the technology to create the product/service	Company independently develops the technology and creates the product/service
Market	Traditional, stable market; goods or services for mass consumption, or a niche market requiring customisation	Traditional, stable or weakly growing market; standardised product or service with slightly improved characteristics	Niche market, developing due to technological solutions	Market for a new or highly modified product or service, often accompanied by a new consumption model
Market's geographical range	Local	Regional	Regional, global	Global
Stage of customer-base evolution	Majority; serves customers directly	Majority; a distribution channel for partners	Early adopters and early majority; conducts sales through partners or online	Customer discovery or start of sales
Competitive advantage	Customer loyalty, convenience, quality, individual approach	High-quality services, competitive price, convenient consumption model	Heavily modified, more efficient technology for solving customers' problems	New or radically improved technology

Parameter	Pattern 1 (IC-very low)	Pattern 2 (IC-low)	Pattern 3 (IC-medium)	Pattern 4 (IC-high)
Firm's role in the consumer's value chain	Serves the needs of customers	Links producers of goods/services to clients	Integrates the efforts of a few participants to bring adapted or improved technologies to an existing market	Integrates the efforts of many participants to bring radically improved or new technologies to a new market

As this study was located in the interpretative paradigm, the author was interested in deriving detailed, in-depth answers to the research questions. Thus, in-depth interviews were used as the main data-collection tool.

However, as the study's framework required interviews of a large number of entrepreneurs, a strategy was needed that would reduce the potential for error due to variability in the words used by interviewees, especially in relation to the parameters used for categorisation (column 1, Table 1). Therefore, an interview guide consisting of two parts was developed (Table 2).

Table 2: Interview guide structure

	Section 1	Section 2
Aim	Collect data related to control variables to be used for grouping SMEs and understanding the common features of companies in these groups.	Collect qualitative information related to the research questions.
Question type	Semi-structured.	Open-ended.
Content	Factual information about the SME, its products/services, market, development trajectory, perceived innovativeness.	Qualitative information about networking behaviour and perceived role of trust in building business relationships.

The interviews, which took place from April to September 2017, covered 59 Moscow-based SMEs that launched business activities from 2009 to 2017. A snowball sampling approach was used to find respondents.

The author's personal connections with Russian organisations of innovative development, technoparks and accelerators helped in the data-collection process. Although this technique is prone to bias that is beyond the control of the researcher, it is still suitable for answering qualitative research questions in exploratory research. The data characteristics are described in Table 3.

Table 3: Data characteristics

Degree of novelty	Total SMEs	Interviewees		Sector				
		Male	Female	Production	B2C services*	IT sector	B2B/B2G services**	Wholesale and retail trade
Very low	**20**	9	11	4	8	0	3	5
Low	**17**	13	4	6	5	3	2	1
Medium	**12**	12	0	6	1	5	0	0
High	**10**	10	0	7	1	2	0	0
	59 (100%)	44 (75%)	15 (25%)	23 (39%)	15 (25%)	10 (17%)	5 (8%)	6 (10%)

* Hotel, tourism, education, dental care, restaurant, hookah salon
** Transportation, logistics, legal and accounting, construction, real-estate services

92% of SMEs in the sample were in a "start-of-sales", "market-penetration", "sales-growth" or "scaling and diffusion" stage. In other words, these companies had passed through the initial period of development and were, therefore, able to characterise their networking experiences in various developmental stages. As such, these companies were relevant objects for the purposes of this study.

4. Study results

The study results were obtained by identifying common behaviour patterns in each innovativeness category.

The results of the analysis of respondents' answers regarding proposition are presented in Table 4.

Table 4: The role and mechanisms of trust in building a business network

Parameter	IC-very low	IC-low	IC-medium	IC-high
Role of trust	A basic value and a tool for building relationships with customers, suppliers and partners. Needed to simplify the resolution of problems	Organic part of long-term relationships – without trust, there is no relationship. Trust is subject to continuous re-evaluation based on feedback and experience	Measure of perceived risk in building relationships. Trust is a consequence of honest, successful, long-term cooperation	A relationship's intrinsic binding substance through which energy is transferred between partners. Readiness to start building trusting relations as a result of affective trust
Basis of trust	Experience of conducting similar activities, business practice	Aligned, time-tested relationships and partnerships between organisations along the entire vertical of value creation	Proven professionalism of the partnering companies and the people working in them	Personality of people engaged in the relationship; priority given to building personal relations
Trust in relationships at the personal level	Recommendation is key. Quick establishment of a close, highly trusting relationship is risky. Development of trust is based on positive experience with cooperation	Reliability is key; includes the ability to always consider the interests of the other party in interactions and compliance with agreements Informal relations are less important than formalised relations	Professionalism is key; includes reputation in the professional community, history of personal and professional achievements, positive experience with cooperation in terms of results and ease of communication	Coincidence of personal values is key; includes mutual gravitation in interactions and emerging rapport. Strong personal business reputation and recommendations from trusted people help
Trust in relationships at the organisational level	"Trust, but check" – relations with an organisation are only possible on the basis of reliable information that has been checked through friends and other sources All statements should be supported by documentation	Formalisation of relations and conclusion of contracts serve as the basis for trust Honesty in implementation of contractual agreements, reliability and dependability of compliance with obligations are important	Reputation as a reliable partner and professionalism in conducting business are important. Portfolio of contracts concluded with other organisations in the industry indicates trustworthiness	Recommendations, reputation in the market and previous positive experiences are important. Conclusion of a detailed contract to protect against claims of failing to fulfil expectations Acceptance of the fact that contracts do not always work
Key principles in building relationships	Based on verification by people with whom trust already exists. Trust is a consequence of fair, non-deceiving behaviour of the other party	Based on the calculation and evaluation of benefits. Trust is a consequence of compliance with agreements, which are usually formalised	Based on expectations of long-term synergetic development. Verification through known channels to reduce risk. Agreements not always completely formalised	Based on coincidence of values and attitudes Willingness to trust even if relations are not formalised Observing the balance between how much you are trusted and how much you trust
Expectations from partners	Compliance with timing and financial commitments, and verbal promises; respect the interests of the other party	Legal settlement of relations; absence of deceit; honesty, openness; sincerity; symmetry and equivalence of benefits in relationships	Professional, mutually enriching cooperation; respectful symmetrical, honest and open attitude to work; some readiness to go beyond formal agreements	Involvement and synergy in relationships; mutual consideration of partners' interests; honesty; openness and the absence of hidden intent; compliance with obligations and verbal agreements
Willingness to act based on trust	Medium	Low	High	Extremely high
Evolution of trust	Initially cautious; trust grows over time; easily lost if promises and commitments are not met	Rational selection of a partner; strive to build long-term, trustful relationships; relations either become reliable and trustworthy, or cease due to a loss of trust	Initially prefer to check, but ready to take risks given perceived value of relations; some tolerance of the complexities of interactions, provided that the partner wishes to solve problems	Initial sympathy for a person; relations built on the "person-to-person" level; readiness to build friendly business relations; trust gradually grows due to business achievements; if expectations are not met, the relationship is interrupted

When answering the interview questions, respondents in all categories indicated that trust played a key role in building networks and establishing business relationships. Some respondents noted that trust was important in terms of both the external (e.g., clients, partners) and internal networks (e.g., employees, co-founders):

> *I think that trust plays a paramount role. For us, this is a basic value in relations with suppliers and with customers. (Vladislav, IC-very low)*

> *Trust – it should be part of everything. ... If you have business partners, then you must be sure that the relationships are honest. Employees must be trusted because otherwise you have to do everything yourself... In interactions with co-founders, everything in principle is built on trust. (Vladimir, IC-low)*

> *Trust is very important. To be trusted, you must inspire trust. It is not enough to say, "We have installed our equipment everywhere. We already have a reputation in the industry and, therefore, you must work with us". If partners or customers feel that you are not professional, they will never cooperate with you or order from you. (Andrey, IC-medium)*

> *In principle, I do not communicate with people that I do not trust. In my opinion, common values lie at the heart of trust. When I think about whether I should communicate with a person, I just look at his value system. (Arthur, IC-high).*

These quotes show that trust is perceived as a fundamental value by non-innovative (IC-very low) and highly innovative (IC-high) companies. These companies believe that it is impossible to interact with members of their networks without trust. Although this attitude toward trust reflects the uncertainty associated with the specifics of doing business, the reasons for its existence differ for the two categories. In the IC-very low category, the uncertainty is likely to be explained by the small scale of the business, where most issues are dealt with in an informal way for the sake of simplicity. IC-very low companies need to be sure that they will not be deceived and that any problems that might arise can be resolved through negotiations. In the IC-high category, the uncertainty primarily reflects the high degree of complexity of the company's tasks. Sometimes clear expectations for the partner's contribution or the likely costs of these tasks cannot be formalised in a contract. In such situations, there is no fair assessment because the innovative activity is new. Notably, the dependence of entrepreneurs on other participants of their business network is very high in both cases.

Moreover, the transaction and coordination costs associated with finding the right partner and quickly integrating it into the project to unleash business opportunities are perceived as high. Thus, trust acts as a guarantor in terms of optimising costs and minimising the risks associated with opportunistic behaviour, even if the entrepreneur is not aware of this factor. As entrepreneurs in these two categories are accustomed to relying on their own intuitions in making decisions, their answers reveal that affective trust is highly significant for them:

> *Trust is very important because it is often necessary to negotiate without signing contracts. Accordingly, it is important to understand that you can trust people and to know that you will not be deceived.* (Tatiana, IC-very low)

> *Innovative projects and processes require diverse, multidirectional efforts. We need people who are able to almost instantly integrate into the project, and diverse tasks need to be attacked from different angles. Some type of metaphysical energy should emerge among people if they are to become engaged in something innovative and unpredictable. Trust is a prerequisite for people to exist together in an innovative project.* (Dmitry, IC-high)

For companies in the IC-low and IC-medium segments, trust is necessary for ensuring the effectiveness of key business processes. At the same time, of all of the innovativeness categories, the IC-low segment demonstrated the most rational and prudent approach to all issues, including questions of what constitutes the basis of trust. This type relies mainly on behavioural trust, which suggests that interdependence is not high and that there is a pool of potential partners from which to choose (i.e., transaction costs are not perceived as

very high). However, the reliability and trustworthiness of the partner allow for economising on coordination costs in the long term:

> *Trust always plays a role in establishing contacts and building business relations. However, you cannot just trust everyone and everything. Neither intuition nor emotions work. I would say that you must base all of your decisions on rational considerations and calculations.* (Pavel, IC-low)

As technology companies often enter zones of uncertainty and undertake projects that are not always amenable to detailed planning, they are more willing to enter into new relationships based on trust even though they know that they are taking certain risks. While dependence on a business partner can be assessed as average, the high degree of specificity of complementary competencies that the entrepreneur seeks from the relation is an issue. This explains why it is perceived as appropriate to accept risk. An analysis of the generalised answers of entrepreneurs in this category (see Table 4) suggests that they tend to build business relations by relying on cognitive trust (i.e., before entering into relations), and that they try to find some evidence of trustworthiness to minimise risks and costs:

> *Trust is a risk that you accept. To manage this risk, you should try to assess how much you can trust the partner*. (David, IC-medium)

Respondents in all categories noted the importance of recommendations and information sources, which allowed for assessments of the possibility of establishing a trusting relationship. At the same time, the more high-tech a company was, the more often the respondents found it difficult to find the necessary recommendations given the novelty of the projects. In general, innovative companies demonstrated a higher degree of openness to building trusting relationships with new partners:

> *The most important thing is openness and trust. Without these elements, it is impossible to work in an innovative business.* (Artem, IC-high)

Respondents in all categories indicated that trust grows as relations develop, which emphasizes the role of behavioural trust. In particular, trust grows with the joint acquisition of experience, especially if that experience is gained in difficult situations that can only be solved through the joint efforts of the company and its partners:

> *In my opinion, overly close and trusting relations should not emerge immediately. Finally, trust must be based on positive interactions*. (Elena, IC-very low)

If the experience of working together is positive, the degree of trust is enhanced over time. (Yuri, IC-medium)
If we talk about relationships with new partners that are just joining a project, some kind of sympathy may initially arise, but trust grows gradually and it needs to be won. You have to look at people and try to assess how much you can trust them. There must be a balance between how much you are trusted and how much you trust. I believe that the level of trust in a partner is as high, as the problem that brought the two of you together was important and then you successfully solved it through joint efforts. (Andrey, IC-high)

Respondents in all categories noted that building trusting relationships takes time and that doing so is hard to plan. Not only is a trusting relationship difficult to build, but trust is also easily lost, which can ruin the relationship. Respondents noted that the concept of trust in business includes such factors as fulfilment of obligations, reliability, honesty, openness, sincerity and symmetrical relations. The respondents pointed to deliberate, fraudulent actions as the main reason for loss of trust in a partner. They also highlighted dishonest, unsymmetrical attitudes and a failure to take the mutual interests of participants in the partnership into account:

> *If you have a business partner, he should have an honest attitude towards you and should not put his interests above your interests. Your partner must take your interests into account and treat you fairly, equally and symmetrically.* (Vladimir, IC-low)

Interestingly, while non-technological companies viewed the emergence of mutual, material benefits as the main reason for building trusting relationships, innovative companies pointed to possibilities for the mutual enrichment of ideas and mutual development in the innovation space:

> *I strongly advise you to carefully plan everything when you intend to build a trusting relationship. Consider in advance what you can give in material terms to someone from whom you want something.* (Anna, IC-very low)

> *In general, I build all business relationships as friendly relationships, which, I believe, reflect a higher level of trust – you trust a person unselfishly. There must be some kind of internal chemistry for this to occur. I try to surround myself with people with whom I feel comfortable and who do certain things better than I can. I am better in other ways. We exchange ideas and grow together.* (Dmitry, IC-high)

Non-innovative and low-innovative companies viewed the formalisation of relations in contracts as an important factor in the development of trust:

> *You must trust people. However, in business relationships, I do not advise anyone to negotiate verbally. All words must be backed up by signed agreements*. (Vyacheslav, IC-very low)

> *In addition to verbal agreements and promises, always sign a contract. This will make your trusting relationship even more solid. (Alena, IC-low)*

In contrast, highly innovative companies felt that formal channels and contractual relations would not work unless contact was established with the right people at the right level. Respondents in highly innovative companies pointed out that business relationships had to be built on personal grounds in order to increase trust. In other words, contact with partners should be established at the person-to-person level. According to innovative entrepreneurs, purely formal relationships do not work in business. This behaviour can be explained by the desire to minimise risks and reduce uncertainty. Personal contacts allow partners to bring relationships that have been created on paper to life:

> *We consciously try to transfer communications onto a personal plane*. *(Arthur, IC-high)*

> *A personal component always has a favourable effect on business relations because it helps increase the level of trust. (Andrey, IC-high)*

All respondents pointed out that trust should expand over the course of a relationship through the shared experience of doing business. At the same time, for the overwhelming majority of entrepreneurs, a loss of trust meant the cessation of both personal and business contact.

5. Conclusion

The novelty of this study emerged from the grouping of start-ups into innovativeness categories, and from the identification of common patterns of trust-related networking behaviour in each category and differences among those patterns. This study highlighted the differences in how entrepreneurs in these categories used trust mechanisms to build and govern their business networks.

This paper confirmed the main propositions found in the literature. For entrepreneurs who participated in the study, trust is an important mediating factor that influences networking behaviour. Trust between business participants changes over time, but it does not necessarily *develop* over time. The data analysis also revealed that companies in different categories perceived the basis of trust in different ways and that they had different dynamics when forming trusting relationships. Nevertheless, trustful relations often developed due to interactions aimed at providing mutual assistance, especially in difficult periods. Moreover, relations often faded as a result of a party's failure to live up to obligations. It can be concluded that the level of trust grows when repeated interactions have positive outcomes, thus proving that the behavioural aspect of building trust is important.

The data analysis not only leads to the conclusion that trust is an integral part of professional networking for Russian entrepreneurs, but also highlights different patterns of networking behaviour backed by different attitudes towards trust in the various innovative categories. The highest degrees of readiness to trust and openness to building friendly business relations were demonstrated by innovative companies. For entrepreneurs from this category, the rapport between participants in the relationship, which was based on common values and interests, was of particular importance. These common values and interests related not only to material elements but also to creating something new through joint efforts. The respondents' answers also showed that building trust on the basis of personal relationships was of the utmost importance for innovative entrepreneurs. However, the behaviour of innovative start-ups differed significantly from what is described in the literature. In view of the technological complexity of these businesses, network building cannot be based on recommendations from an individual's close circle. Moreover, professional relations sometimes developed into friendly relations. Thus, for innovative entrepreneurs, the key element in decisions to establish business relations is affective trust.

In contrast, less innovative entrepreneurs are mostly guided by the model described in the literature when establishing and governing new business relations. They rely on the recommendations of those in their close circle as evidence of partner's reliability, try to formalise contractual relations and attempt to rationally assess the benefits of cooperation. In other words, they approach network building from the cognitive side.

The conceptual understanding of the mechanisms of trust used by different types of SMEs developed in this study should be of interest to managers. The discussion of differences in companies' understandings of the appropriateness of trust mechanisms, which give rise to different networking behaviours, should allow managers to avoid common mistakes. Such mistakes often occur because managers fail to consider the possibility that their business partners might be in a different innovativeness category and, therefore, may value different aspects of trust (affective, cognitive or behavioural). As shown in this study, an inability to understand the interests of the other side often creates problems in otherwise trusting relationships. For example, a number of companies belonging to the IC-low category are likely to simultaneously be suppliers for companies in the IC-very low category and distributors for companies in the IC-medium and IC-high categories.

Therefore, an understanding of differences in the mechanisms for building and managing business relationships in all categories can make all value-chain participants more effective.

References

Aarstad, J., Haugland, S. A., Greve, A. (2009) 'Performance Spillover Effects in Entrepreneurial Networks: Assessing a Dyadic Theory of Social Capital', Entrepreneurship Theory and Practice, 34, 1003-1019

Aulet, B. and Murray F. (2013), 'A Tale of Two Entrepreneurs: Understanding Differences in the Types of Entrepreneurship in the Economy', Ewing Marion Kauffman Foundation, https://ssrn.com/abstract=2259740.

Dyer, J.,H. and Chu, W. (2003) 'The Role of Trustworthiness in Reducing Transaction Costs and Improving Performance: Empirical Evidence from the United States, Japan, and Korea', Organization Science, 14 (1), pp. 57-68.

Gillespie, N. A. and Mann, L. (2004) 'Transformational Leadership and Shared Values: the Building Blocks of trust', Journal of Managerial Psychology, 19 (6), pp. 588-607.

Glanville, J. L. (2016) 'Why Does Involvement in Voluntary Associations Promote Trust? Examining the Role of Network Diversity', Sociological Inquiry, 86 (1), pp. 29-50.

Gudkov, L. (2012) 'Trust in Russia: Meaning, Functions, Structure', Public Opinion Bulletin, 2 (112), pp. 8-47.

Hoang, H. and Antoncic, B. (2003) 'Network-based Research in Entrepreneurship: A Critical Review', Journal of Business Venturing, 18 (2), pp. 165-187.

Kharchilava, K. (2014) 'Trust as a Key Element of the System of Values of Corporate Governance', University Bulletin (State University of Management, Russia), 5, pp. 179-182.

Krivopuskov, V. V. (2013) 'Trust in Russian Society in the Post-Soviet Period: Dynamic Characteristic', Humanitarian of the South of Russia, 0 (1), pp. 150-158.

Kucharska, W. (2017) 'Relationships between Trust and Collaborative Culture in the Context of Tacit Knowledge Sharing', Journal of Entrepreneurship, Management and Innovation, 4 (13), pp. 61-78.

Młokosiewicz, M. and Misiak-Kwit, S. (2017) 'The Impact of Trust on Entrepreneurship in Poland', Journal of Entrepreneurship, Management and Innovation, 4 (13), pp. 79-96.

Newell, S. and Swan, J. (2000) 'Trust and Inter-organizational Networking', Human Relations, 53 (10), pp. 1287-1327.

Public Opinion Foundation (2013) Trust in society: On Social, Interpersonal Trust and Willingness to Unite for Joint Action, http://fom.ru/TSennosti/11253.

Smith, D. A. and Lohrke, F. T. (2008) 'Entrepreneurial Network Development: Trusting in the Process', Journal of Business Research, 61 (4), pp. 315-322.

Trapkova, A. V. (2004) 'Social Capital: Theory and Practice. Trust in Russian Small and Medium Business', Social Sciences and Contemporary World, 4, pp. 36-48.

Turyakira, P. and Mbidde, C. (2015) 'Networking for SMES in Uganda: a Conceptual Paper ', African Journal of Business Management, 9 (2), pp. 43-49.

Weber, J. M., Malhotra, D. and Murnighan, J. K. (2004) 'Normal Acts of Irrational Trust: Motivated Attributions and the Trust Development Process', Research in Organizational Behavior, 26, pp. 75-101.

The Small BusinessResponsible Entrepreneurship and Stakeholder Engagement through Digital Media

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Abstract: This research explored the owner-managers' attitudes toward digital media and stakeholder engagement. Its research methodology integrated measures from the technological acceptance model, the pace of technological innovation and corporate social responsibility (CSR), to better understand their rationale for using technology to communicate about commercial, ethical and social responsibility issues. A factor analysis indicated that the respondents were perceiving the usefulness of digital media to engage with marketplace stakeholders. Whilst, a stepwise regression analysis reported positive and significant relationships between the pace of technological innovation and the owner-managers' perceived usefulness of digital media for communication purposes. The results also revealed that young owner-managers from the large SMEs were more likely to utilize digital media than their smaller counterparts. This contribution implies that small and micro businesses are increasingly using digital media to improve their stakeholder engagement. This study indicates that the pace of technological innovation, the SMEs' perceived ease of use of digital media, as well as their commercial responsibility were significant antecedents for the SMEs' online communication.

Keywords: Responsible Entrepreneurship, CSR, Corporate Social Responsibility, Digital Media, Online CSR reporting, Technology Acceptance Model, Pace of Technological Innovation, CSR measures.

1. Introduction

Many corporations are increasingly reporting comprehensive content on their corporate social responsibility (CSR), environmental sustainability and corporate governance issues for the benefit of their stakeholders.

Firms are better able to address, balance, coordinate, and prioritize multiple stakeholder demands through social engagement; all of which help it become more efficient, reputable and successful, in terms of financial performance (Panwar, Nybakk, Hansen and Pinkse, 2017). Therefore, businesses are encouraged to promote their responsible entrepreneurship and to nurture relationships with stakeholders. This contribution posits that online communication enables businesses, including small enterprises to reach wider audiences. The stakeholder engagement through digital media could translate into tangible benefits for a company's reputation, brand image, customer loyalty and investor confidence (Camilleri, 2017), among other benefits.

The corporate communications may be intended to improve their reputation and standing among stakeholders and to lower the criticisms from the public (Camilleri, 2017). Nevertheless, little is known about the small businesses' responsible entrepreneurial practices and on their stakeholder engagement (Panwar et al., 2017; Baumann Pauly, Wickert, Spence and Scherer, 2013). Therefore, this paper builds on previous theoretical underpinnings and addresses a knowledge gap in academic literature as it examines the small firms' owner-managers' perceptions on the 'use' and 'ease of use' of online technology, that could be utilized for the promotion of their enterprises' responsible behaviors among stakeholders.

1.1 The Research Question

The purpose of this study is to examine the SME owner-managers' attitudes toward digital media as they may use it as a vehicle to promote their responsible practices. Specifically, this study integrates the 'pace of technological innovativeness' (Greenhow and Robelia, 2009; Grewal, Mehta, and Kardes, 2004; Garcia and Calantone, 2002), 'the technological acceptance model' (Rauniar, Rawski, Yang and Johnson, 2014; Davis, 1989), and 'technological anxiety' (Garcia and Calantone, 2002) measures to explore the respondents' attitudes toward online media. In addition, it also uses the CSR measures that relate to commercial, ethical and social responsibility (Singh and Del Bosque, 2008). Therefore, this contribution examines the SME owner-managers' stance on technological innovation; as well as their perceived "ease of use" and "use" of digital media. At the same time, it extends the results of previous theoretical underpinnings and prior empirical studies on the related subjects appertaining to the use of digital media for stakeholder interaction, including the communication of commercial, ethical information and social responsibility reporting.

2. Theoretical Background and the Formulation of Hypotheses

2.1 Responsible Entrepreneurship and Stakeholder Engagement

Storey, Emberson, Godsell and Harrison (2006) presumed that a significant factor for the SMEs' engagement in responsible behaviors was that good practices were becoming embedded in their supply chain relationships. In addition, there was mounting pressure from third parties which demanded that SMEs should also follow online and offline networking behaviors of their larger counterparts (see Costa, Breda, Costa and Miguéns, 2008).

However, SMEs possess distinctive characteristics of informality (Daniel, Costa, Pita and Costa, 2017; Russo and Perrini, 2010), the processes which are used to trigger employee involvement in such enterprises may need to be identified against other factors which may be relevant to particular organizational contexts. For instance, the nature of the SMEs small social setting can provide them with an opportunity for enhanced flows of communication, more face-to-face involvement and flexibility in managing human resources. The smaller firms and their practices are usually portrayed contextually, subjectively and/or in interpretational ways. Small businesses may be opposed to the extra administrative burdens in their daily routines. Baumann Pauly et al. (2013) maintained that the consistent handling of CSR in MNCs required them to draft formal CSR policies and procedures. However, the reality is that CSR is different for SMEs than it is for the larger firms (Camilleri, 2018, Russo and Perrini, 2010). Although, the large firms are more likely to address environmental management, employment, local communities and controlling and reporting strategies (Camilleri, 2017: 2015), SMEs often demonstrate a genuine commitment towards the community and society, at large (Russo & Perrini, 2010). The enterprises' owners-managers may conduct their business activities with a conscience, as they are truly concerned of responsible and sustainable behaviors (Jenkins, 2006). They frequently do this without referring to the CSR concept at all, and without communicating what they do (Nielsen and Thomsen, 2009; Fassin, 2008). The SMEs are subject to a number of distinctive and intrinsic characteristics that set them apart from the larger firms (Daniel et al., 2017). Recent studies have indicated that communication of social responsibility practices among SMEs is generally unsystematic and handled in an ad-hoc manner (Nielsen and Thomsen, 2009). Yet, it may be presumptuous to generalise that all SMEs are not communicating their responsible behaviors in an effective way. Arguably, SMEs may enhance their reputation and standing if they disclose their good practices to stakeholders. There are opportunities for them to create good publicity, as they can also raise awareness of their brand and products. Therefore, there is scope for SMEs to formalize their social and environmental behaviours (Camilleri, 2015; Fassin, 2008) through digital media (Penwar et al., 2017).

2.2 The Technological Innovation, Perceived Use and Ease of Use of Digital Media

Digital media has reshaped communication at different levels (Lamberton and Stephen, 2016; McCarthy and Silvestre, 2011). It enabled the emergence of a new participatory public sphere where everybody could dialogically and publicly interact and collaborate in the creation of content. The engagement between the public and the organization is one of the main characteristics of the internet. The public is continuously being presented with the companies' content marketing as the global diffusion of social software like blogs, RSS feeds, wikis, electronic fora, webinars and social media networks have facilitated the organizations' engagement with stakeholders (Camilleri, 2017). Many corporate websites already possess a high degree of interactivity; including their ability to disseminate information and to generate relationships between the different publics and the organization. In this case, the use of the Internet is unidirectional; as its essential objective is to diffuse information. However, in social media platforms, the degree of interactivity is high, and the Internet is used to facilitate conversations between the organization and its stakeholders (Camilleri, 2017).

For this reason, interactive communication is changing the social dynamics (Fieseler and Fleck, 2013). Web-based co-operation and data exchanges have empowered the communication between many businesses and their stakeholders (Fleck and Meckel, 2010). It enables them to engage with online users and to take advantage of the positive publicity arising from real-time word-of-mouth marketing (Camilleri, 2017).

Communication through social media is dynamic in relation to traditional media (Fieseler and Fleck, 2013).

Social media have the technological potential to speed up communication processes, and to increase direct interaction, dialogue and participation across organizations and various audiences. Such interactive communications are referred to as "viral" because ideas and opinions spread like epidemic diseases through the network via word-of-mouth. Hence, the SME owner-managers are encouraged to acquaint themselves with the use of online media to increase their impact of their communications. They can amplify the

effectiveness of their responsible entrepreneurship efforts, whilst engaging with stakeholders through digital media. Yet, recent contributions suggest that the implementation of the businesses' online engagement is neither automatic nor easy (Fieseler and Fleck, 2013). The dialogic features that are enabled by web pages, blogs, and other social media may prove difficult to apply (Moreno and Capriotti, 2009). Although recent research is discussing about the dialogic level of online stakeholder engagement (Camilleri, 2017; Nielsen and Thomsen 2009; Moreno and Capriotti, 2009), little empirical research has measured the enterprises owner-managers' stance on responsible entrepreneurship and CSR communication through digital technologies.

2.3 The Formulation of Hypotheses

This study has investigated the owner-managers' "technology acceptance" (Davis, 1989; Greenhow and Robelia, 2009; Grewal et al., 2004; Garcia and Calantone, 2002). The respondents were expected to indicate their behavioral intention on the "use" and "ease of use" of digital media, including the Internet and social media. This study has also adapted "the pace of technological innovativeness" measure to examine the respondents' engagement with ubiquitous technologies for stakeholder engagement. This argumentation leads to the first two hypotheses:

1. There is a positive relationship between 'the pace of technological innovation' and 'the technological acceptance' of digital media.
2. There is a positive relationship between the pace of technological innovation of digital media and the owner-managers' stakeholder engagement through online reporting of CSR (or responsible entrepreneurial practices).

The technology acceptance model (TAM) has often explained the users' adoption behaviors of technology (Rauniar et al., 2014). This model suggests that there is a causal relationship between the users' internal beliefs, attitudes, intentions and their use of technology. In this light, this model has been purposely chosen to determine why SMEs were accepting or rejecting the use of digital media for stakeholder engagement and CSR disclosures. The perceived usefulness (variable) of digital media is the degree to which a person believes that using this technology would enhance his or her job performance in marketing communications (Davis, 1989).

From the outset, the researcher presumed that the owner-managers would perceive the usefulness and the ease of use of digital media (to communicate their CSR credentials to stakeholders). The technology acceptance model also comprises the perceived ease of use variable, which is the degree to which a person believes that using a system (including websites, search engine optimization, social media, blogs et cetera) would be free of effort. The usage of such online technologies is influenced by the perceived ease of use (Davis, 1989). Therefore, the researcher has investigated the owner-managers' digital skills. Hence, this study hypothesized;

1. There is a positive relationship between perceived usefulness and the perceived ease of use of digital media for CSR reporting (or responsible entrepreneurial practices).

Although potential users may believe that a given innovation is useful; they may, at the same time be wary of digital media. The owner-managers may not be proficient enough or may not possess adequate digital skills and competencies. They may perceive that online technologies may be too hard to use and that the performance benefits of usage are outweighed by the effort of using such applications (Meuter, Bitner, Ostrom and Brown, 2005). Alternatively, they could not dedicate sufficient time and resources to use web technologies. As a result, companies may not always report enough information on their social, ethical and environment-related activities (Singh and Del Bosque, 2008). On the other hand, the literature review suggested that there is scope for the companies of all sizes to engage with stakeholders through digital media.

This leads to the fourth hypothesis that aims to identify the possible antecedents (by using a stepwise regression analysis) of CSR reporting through digital media.

1. The pace of technological innovation, the owner-managers' perceived usefulness and ease of use of digital media, and their ethos on responsible entrepreneurial behaviors are the antecedents for their businesses' stakeholder engagement through digital media.

This research has adopted the digital media measures of technological innovativeness, technology acceptance, technological anxiety as well as CSR items that examined the owner-managers' attitudes toward commercial, ethical and social responsibility.

3. Methodology

The survey questionnaires were distributed by email to business owner-managers who were members in a trade union representing SMEs in the retail and hospitality industries. The respondents' informed consent was obtained after they were informed in writing about the surveys' content, uses of the data, voluntary nature of participation, and confidentiality of identifiable survey information. There was a response rate of 51% (*n* = 202) from all the targeted enterprises in Malta, the smallest European Union country. The rationale behind the selection of the designated profile of owner-managers was to gain a good insight into their ability to make evaluative judgements in taking decisions regarding online communications and on their responsible entrepreneurship. Table 1 presents the socio-demographic profile of the sample:

Table 1: The socio demographic profile of the survey participants

Age		**Gender**		**Education**	
Less than 19 years	2	Male	87	Secondary	13
Between 20 to 29 years	47	Female	115	Post-Secondary / Vocational	123
		(n=202)		Undergraduate	45
Between 30 to 39 years	57			Post Graduate	18
Between 40 to 49 years	43			(*n=199*)	
Between 50 to 59 years	27				
Between 60 to 69 years	17			**Firm Size**	
Over 70 years	8			1 to 10 Employees	71
				11-50 Employees	92
mean:	*37.1 years*			51-250 Employees	39
(n=201)				*(n=202)*	

3.1 The Measures for Digital Media

The researcher has adapted six items from the 'pace of technological innovation' that were intended to measure the practitioners' attitude toward technological change in marketing. This study has also used the 12 items from the technology acceptance model to explore the respondents' attitudes on web technologies (Davis, 1989). Four items were used to examine the respondents' 'technological anxiety'. (Lamberton and Stephen, 2016; Meuter et al. 2005).

3.2 The Measures for Responsible Entrepreneurship

This study has adapted Singh and Del Bosque's 'commercial', 'ethical', 'social' and 'support' dimensions that consisted of 16 items. The 'commercial' dimension measured the owner-managers' perceptions about their economic strategy. The 'ethical' dimension featured items on ethics and regulatory matters as it explored the respondents' attitudes about honesty, integrity and moral principles. The 'social' dimension referred to environmental protection and to discretionary investments in the community at large. The 'support' dimension sought to discover how the respondents perceived corporate communications on commercial, ethical and social issues (Singh and Del Bosque, 2008).

4. Data Analysis

Firstly, the descriptive statistics illustrated the means, standard deviations for all variables. Secondly, a principal component analysis (PCA) has been chosen to obtain a factor solution of a smaller set of salient variables. Thirdly, a multivariate regression analysis has investigated the hypothesized associations by using the stepwise method.

4.1 Descriptive Statistics

All responses were coded using a five-point Likert scaling mechanism. The values ranged from 1 (strongly disagree) to 5 (strongly agree) whereas 3 signaled an indecision. The scale items that were used in this study included; 'the pace of technological innovativeness', 'perceived ease of use', 'perceived usefulness', 'technological anxiety', 'commercial responsibility', 'ethical responsibility', 'social responsibility' and 'support'.

This study is consistent with the extant literature on the 'technology acceptance model' (Davis, 1989, Meuter et al., 2005). As a matter of fact, there were high mean scores of near 4, which reflected the respondents' stance on the use of digital media. The survey participants have indicated their strong agreement with the 'pace of technological innovativeness' (Grewal et al., 2004). Moreover, this study investigated how 'gender' and 'age' could influence the frequency of use of digital media. The results suggested that gender did not influence this choice as there was no statistically significant difference between the groups' means as determined by the Chi square tests. Pearson's Chi-Square $\chi 2$: was 1.150, Df 2. $p = 0.563$. This finding suggested that gender did not significantly influence the frequency of use of digital media. There were no statistically significant differences between different age groups and the frequency of use of digital technology. However, the results showed that the survey participants who were between 30 to 39 years of age (where n=57), who were followed by those who were between 20 to 29 years old (where n=47) were more likely to use their digital media than other groups. Pearson's Chi-Square $\chi 2$ was 3.803, Df 6 and $p = 0.703$. Surprisingly, there were also a few owner-managers who have never used digital media in the past (n=5).

4.2 Data Reduction

Bartlett's test of sphericity also revealed sufficient correlation in the dataset to run a principal component analysis (PCA) since $p < 0.001$. PCA has identified the patterns within the data and expressed it by highlighting the relevant similarities (and differences) in every component. In the process, the data has been compressed as it was reduced in a number of dimensions without much loss of information. PCA has produced a table which illustrated the amount of variance in the original variables (with their respective initial eigenvalues) which were accounted for by each component. A varimax rotation method was used to spread variability more evenly amongst the constructs. There was a percentage of variance column which indicated the expressed ratio as a percentage of the variance (accounted for by each component in all of the variables). Only principal components with eigenvalues greater than 1 were extracted. Table 2 illustrates the number of extracted components from the original number of variables and presents the resulting cumulative percentage of variance for the group of variables (and also reports the related 'loss of information').

Table 2: Data Reduction through Principal Component Analysis

Original Number of Variables		Cumulative Percentage of Variance %	Loss of Information %	Components Extracted
Digital Media	22	62	38	6
Responsible Entrepreneurship and Stakeholder Engagement	12	74	26	4

All constructs were analyzed for internal consistency by using Cronbach's alpha. There were excellent measures that exceeded the recommended reliability estimates. The value of the Kaiser Meyer Olkin (KMO) measure of sampling adequacy was also very acceptable at 0.8. The factors accounted for more than 62% variance before rotation for the digital media variables. Whereas, there was 74% of the variance explained before rotation for the CSR measure. There were ten extracted components from the original thirty-nine variables for the digital media and CSR variables. A brief description of the extracted factor components, together with their eigenvalue and their respective percentage of variance is provided hereunder in Tables 3 and 4.

Table 3: The Extracted Factor Components from the Digital Media Variables

	Use of Digital Media			
		Initial Eigenvalues	% of Var.	Alpha
1	Perceived Usefulness of Digital Media	5.533	25.152	0.812
2	Pace of Technological Innovation	2.378	10.809	0.832
3	Technological Anxiety	1.846	8.391	0.845
4	Easy Interaction with Digital Media	1.662	7.553	0.901
5	Perceived Ease of Use of Digital Media	1.192	5.418	0.874
6	Effective Digital Media	1.119	5.085	0.877

Extraction Method: PCA, KMO = 0.792; Sig:000

Table 4: The Extracted Factor Components from the Responsible Entrepreneurship and Stakeholder Engagement Variables

	CSR Reporting			
		Initial Eigenvalues Total	**% of Var.**	**Alpha**
1	Engagement with Marketplace Stakeholders	8.874	35.024	0.841
2	Valuing Online Reporting of Responsible Entrepreneurship	4.654	20.119	0.784
3	Valuing Online Environmental Sustainability Reporting	1.846	13.454	0.911
4	Engagement with Human Resources	1.162	5.403	0.825

Extraction Method: PCA, KMO = 0.812; Sig: .000

The factor components were labelled following a cross-examination of the variables with the higher loadings.

Typically, the variables with the highest correlation scores had mostly contributed towards the make-up of the respective component. The underlying scope of combining the variables by using component analysis was to reduce the data and to make it more adaptable for the regression analysis.

4.3 Regression Analysis

A stepwise procedure was chosen to select the most significant predictive variables in the regression equations. Therefore, the *p*-value was less than the 0.05 benchmark. This also resulted in adequate F-ratios, implying that only the significant amounts of variation in regression were accounted for. More importantly, in the stepwise procedure the insignificant variables were excluded without appreciably increasing the residual sum of squares. The regression models produced the regression coefficients which represented the strength and the significance of the relationships. Moreover, the socio-demographic control variables were also entered into the regression equations.

H1: The first hypothesis indicated that there was a relationship between 'the pace of technological innovation' and 'technological acceptance' on the use of digital media. The results indicated that there was a positive and significant relationship between perceived usefulness of digital media and the pace of technological innovation where Spearman's rho, adj r2 = 0.173. This relationship was significant at (p <0.05). It transpired that the 'perceived usefulness' was dependent on the pace of technological innovation (t-value = 4.457).

H2: The second hypothesis explored the correlation between the "technological innovation of digital media" with the factor component; namely, "online reporting of responsible entrepreneurship". The results indicated that there were positive and very significant relationships (p <0.01); where Spearman's rho, adj r2 = 0.296. It transpired that small businesses' online disclosures on their social engagement were correlated with the technological innovation of digital media (t-value = 2.53) and also with firm size (t-value = 1.87).

H3: The third hypothesis explored the correlation between the owner-managers' perceived "use" with their "ease of use" of digital media. The results indicated that there were positive and very significant relationships (p <0.01); where Spearman's rho, adj r2 = 0.296. It transpired that the owner-managers were using interactive technology to communicate with their stakeholders, and they were proficient in it (t-value = 2.53). The findings also from the stepwise regression analysis also suggested that the larger firms were more likely to utilize digital media than their smaller counterparts (t-value = 1.87).

H4: The last hypothesis investigated whether the technology acceptance of digital media and the companies' ethos on responsible behaviors would have an effect on their stakeholder engagement. Therefore, the perceived usefulness, perceived ease of use, the pace of technological innovation and technological anxiety; as well as commercial responsibility, ethical responsibility and social responsibility variables were all considered as plausible independent variables in the regression equation. The factor component, 'online reporting of responsible entrepreneurship' was inserted as the outcome variable. There was a positive and significant relationship where Spearman's rho, adj r2 was 0.230. The regression equation indicated that the small businesses' online engagement was dependent on the easy interaction with digital media (Perceived Ease of Use) where t = 6.501; the users' digital skills (Pace of Technological Innovativeness) where t = 4.022; stakeholder relationships (Commercial Responsibility) where t = 1.855; firm size, where t = 0.877; apprehension of digital media (Technological Anxiety) where t = -0.126 and age, where t = -0.114.

5. Discussion and Conclusions

This contribution provides a snapshot of the investigated SME owner-managers' attitudes toward digital media. At the same time, it raises awareness of responsible entrepreneurial initiatives that could be promoted through corporate websites, and other digital channels including social media and blogs. The quantitative results have clearly indicated that the survey participants recognized that digital media could help them promote their social and environmental behaviors. This research reported that the owner-managers perceived the usefulness of digital media, as this technological innovation has helped them to better engage with stakeholders. Previous literature also pointed out that the SMEs owner-managers prefer to learn through networking and from their peers (Costa et al., 2008; Jenkins, 2006). However, the owner-managers of the larger businesses were more capable of using digital media to interact with stakeholders, when compared with their smaller counterparts. Another finding has indicated that the younger owner-managers were more proficient in their use of innovative technologies. This study suggests that many owner-managers were already using the web, and they even perceived its usefulness. Yet there were a few participants who were still apprehensive toward this technological innovation.

The principal component analysis revealed that the businesses' online communications were primarily directed at marketplace stakeholders, including; consumers, suppliers and other businesses. However, their communications on their businesses' social responsibility and environmentally-sound practices also served to engage with other interested groups; including human resources, shareholders and investors, among others.

In conclusion, the regression analysis reported positive and significant relationships between the SMEs' online stakeholder engagement and the pace of technological innovation; and between the SMEs' online engagement and the owner-managers' perceived usefulness of digital media. This study has shown that the pace of technological innovation, the owner-managers' perceived ease of use of the digital media, as well as their commercial responsibility were significant antecedents for their online communication of their responsible entrepreneurship. Arguably, the use of technology is facilitated when individuals will perceive its usefulness and its ease of use (Davis, 1989). In fact, he findings from the second, third and fourth regression equations indicated that the small and micro businesses were using digital media to improve their stakeholder engagement and to communicate about their responsible entrepreneurship issues.

6. Limitations of Study and Future Research Avenues

Previous studies have considered different sampling frames, research designs, methodologies and analyses which have produced different outcomes. Although the number of survey participants were sufficient in drawing conclusions about their attitudes; this study is not amenable in drawing general conclusions in other contexts. The researcher believes that there is scope in undertaking qualitative studies to explore the participants' in-depth opinions and perceptions on the subject. The businesses' overall vision is to a large extent driven by its owner-managers and then trickled down to the mind-sets of the employees. Further research is necessary to identify the organizational aspects that facilitate or hinder the organizational implementation of responsible entrepreneurship and its communication. Abn longitudinal study in this area of research could possibly investigate the opportunities and threats of consistent disclosures of social and environmental behaviors through digital media. It could establish its reputational effects in the long run.

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References

Baumann-Pauly, D., Wickert, C., Spence, L. J., and A.G. Scherer. 2013. "Organizing corporate social responsibility in small and large firms: Size matters", Journal of Business Ethics, Vol. 115, No. 4, pp. 693-705.

Camilleri, M. A. 2015. "Valuing stakeholder engagement and sustainability reporting", Corporate Reputation Review, Vol. 18, No. 3, pp. 210-222.

Camilleri, M. A. 2017. "Unlocking Corporate Social Responsibility Through Integrated Marketing Communication", In Corporate Sustainability, Social Responsibility and Environmental Management: An Introduction to Theory and Practice with Case Studies. Springer Nature, Cham, Switzerland.

Camilleri, M. A. 2018. "Nurturing travel and tourism enterprises for economic growth and competitiveness", Tourism and Hospitality Research, Vol. 18, No. 1, pp. 123-127.

Costa, C., Breda, Z., Costa, R., and Miguéns, J. 2008. "The benefits of networks for small and medium sized tourism enterprises", Network analysis and tourism: from theory to practice. Clevedon: Channel View Publications, pp. 96-114.

Daniel, A. D., Costa, R. A., Pita, M. and Costa, C. 2017. "Tourism Education: What about entrepreneurial skills?", Journal of Hospitality and Tourism Management, Vol. 30, pp. 65-72.

Davis, F.D. 1989. "Perceived usefulness, perceived ease of use, and user acceptance of information technology", MIS quarterly, Vol. 13, No. 3, pp. 319-340.

Fassin, Y. 2008. "SMEs and the fallacy of formalizing CSR", Business Ethics: A European Review, Vol. 17, No. 4, pp. 364-378.

Fieseler, C. and M. Fleck. 2013. "The pursuit of empowerment through social media: Structural social capital dynamics in CSR-Blogging", Journal of business ethics, Vol. 118, No. 4, pp. 759-775.

Garcia, R. and R. Calantone. 2002. "A critical look at technological innovation typology and innovativeness terminology: a literature review", Journal of product innovation management, Vol 19, No. 2, pp. 110-132.

Greenhow, C. and B. Robelia. 2009. "Old communication, new literacies: Social network sites as social learning resources", Journal of Computer-Mediated Communication, Vol. 14, No. 4, pp. 1130-1161.

Grewal, R., Mehta, R. and F.R. Kardes. 2004. "The timing of repeat purchases of consumer durable goods: The role of functional bases of consumer attitudes", Journal of Marketing Research, Vol. 41, No. 1, pp. 101-115.

Jenkins, H. 2006. "Small business champions for corporate social responsibility", Journal of Business Ethics, Vol. 67, No. 3, pp. 241-256.

Lamberton, C. and A.T. Stephen. 2016. "A Thematic Exploration of Digital, Social Media, and Mobile Marketing: Research Evolution from 2000 to 2015 and an Agenda for Future Inquiry", Journal of Marketing, Vol. 80, No 6, pp. 146-172.

Meuter, M.L., Bitner, M.J., Ostrom, A.L. and S.W. Brown. 2005. "Choosing among alternative service delivery modes: An investigation of customer trial of self-service technologies", Journal of Marketing, Vol. 69, No 2, pp. 61-83.

Moreno, A. and P. Capriotti. 2009. "Communicating CSR, citizenship and sustainability on the web", Journal of Communication Management, Vol. 13, No. 2, pp. 157-175.

Nielsen, A.E. and C. Thomsen. 2009. "Investigating CSR communication in SMEs: a case study among Danish middle managers", Business Ethics: A European Review, Vol. 18 No. 1, pp. 83-93.

Panwar, R., Nybakk, E., Hansen, E. and J. Pinkse. 2015. "Does the business case matter? The effect of a perceived business case on small firms' social engagement", Journal of Business Ethics, Vol. 144, No. 3, pp. 597-608.

Rauniar, R., Rawski, G., Yang, J. and B. Johnson. 2014. "Technology acceptance model (TAM) and social media usage: an empirical study on Facebook", Journal of Enterprise Information Management, Vol. 27, No. 1, pp. 6-30.

Russo, A., and F. Perrini. 2010. "Investigating stakeholder theory and social capital: CSR in large firms and SMEs", Journal of Business ethics, Vol. 91, No. 2, pp. 207-221.

Storey, J., Emberson, C., Godsell, J., and A. Harrison. 2006. "Supply chain management: theory, practice and future challenges", International Journal of Operations and Production Management, Vol. 26, No. 7, pp. 754-774.

State of the art Literature Analysis of Innovation Network Management Frameworks

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Abstract: Innovation is one of the main topics pushing economic activities today. The procedure to integrate innovation processes, which need a complex research and development (R & D) environment, is a challenge for enterprises to handle by themselves. As a result, innovation networks are one strategic solution for enterprises and other R & D related organizations and institutes, in order to successfully found and integrate innovation processes within their organization. Followed by further challenges regarding the management of innovation networks, the need of specific innovation network management knowledge and skills become a key competence. The following paper gives a state of the art overview of network management frameworks found in the relevant literature. The particular focus of this Paper lies on the management of innovation networks. The (Innovation) network management frameworks (INMF) of different authors were assembled in various literature research processes. Due to the small amount of INMFs discussed in pertinent literature, general network management frameworks that are applicable to examine innovation networks are identified as relevant as well. All frameworks were selected by their capability of presenting precise understanding about management of innovation networks. Further, the paper analyses all identified management frameworks in order to evaluate the competence of each framework implicating its specific characteristics. The analysis contains a description of all as relevant identified frameworks and elaborates their weaknesses and strengths while taking different innovation and enterprise environments into account. The evaluation process was developed for the specific needs of innovation network management and their individual partners. The conclusion of the paper provides a state of the art compilation and analysis of INMFs. The paper also points out the particular lack of research in this field and gives impulses to develop further ideas and specific INMFs.

Keywords: #Network Management #Innovation #Innovation Network #Literature research #Literature analysis #network management framework

1. Introduction

Even though innovation is one of the big buzzwords when talking about economic performance, the term's definitions are as numerous as its usage. Hauschildt et al. dedicate a whole chapter to the definition, containing a literature overview and the comprehensive approach form different perspectives (Hauschildt 2016, 3 ff.). The foundation of this paper is the definition of the Organization for Economic Co-Operation and Development (OECD).

"An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations." (OECD Publishing 2005, p. 46)

Müller-Prothmann and Dörr set up the often-quoted formula, that innovation is the idea plus the invention plus the diffusion (Müller-Prothmann, Dörr 2014, p. 7).

Especially enterprises with high investments in R & D face several risks when innovating. When innovations do not only turn into new products and services, but also require additional innovations of production, innovation processes claim time and resources. This way, innovations become unaffordable for newcomers and small and medium-sized enterprises (SME). In order to produce innovative, profitable products and reduce needed time for learning and economies of scale, new management approaches such as cooperation, coalitions and innovation networks are needed (Müller et al. 2014, 26 f.; Becker et al. 2011, p. 4).

To establish and sustain an efficiently productive network, special management skills outgrowing general management tasks are required. In addition, as management tasks become more complex, managers need to come up with solutions in a short amount of time. Therefore, pragmatic concepts to structure challenges and to get first solution ideas quickly are needed. That is where management tools (e. g. concepts, standardized processes and instruments) step in (Schawel, Billing 2018, p. 1). The following paper gives an overview on innovation network management research and literature, evaluating the provision of network management

tools, behaviors and their ability to incorporate innovation processes. The objective of the paper is to identify weaknesses and give directions for further research.

2. Evaluation Process

Following, the evaluation process is discussed. Networks became an advantage in competition not only for big players, but especially to SMEs in order to achieve company goals, ensure effective innovation processes, provide needed skills and resources and handle comprehensive projects. Networks require special management tasks in order to be successful and bring targeted advantages. Therefore, Agranoff and McGuire identified four key groups of network management behaviors, which support efficient and successful networks; activating, framing, mobilizing and synthesizing. In order to define these tasks, the authors gathered different tasks mentioned throughout literature and allocated them to the four groups of management behaviors (Agranoff, McGuire 2001, 298 ff.; Keast, Hampson 2007, 16 ff.). To each behavior group there are five different behaviors identified which are used to evaluate the INMFs in chapter 2.1 and 2.2.

2.1.1 Activating (A)

Activating is about (1) identifying the right participants for the network as well as stakeholders. Therefore, managers must know (2) about skills, knowledge and resources (potential) partners contribute to the network.

(3) Deactivating a partner who does not fit to the network anymore might also become as necessary as (4) integrating new participants and competences to the network. Activating also includes (5) forming network process and structure and implementing, arranging, stabilizing and cultivating both (Agranoff, McGuire 2001, 298 f.).

2.1.2 Framing (F)

Tasks of framing activities tend to seem less obvious then activating tasks but are as important. Main tasks are (1) establishing and influencing the operating rules of the network as well as prevailing values and norms.

Managers form the expectations of network participants, (2) influence (perception of) interaction, (3) create and share purpose and vision or (4) bring in alternative views. The aim is to (5) lay ground rules for decision-making in a way every participant is able to identify, work and decide according to the networks purpose (Agranoff, McGuire 2001, p. 299).

2.1.3 Mobilizing (M)

Managers (1) have to induce the commitment of participants and partners to the network and to obtain it constantly from them. (2) They sell new ideas to participants, which support the network and its purpose, (3) influence the development and achievement of common objectives and (4) embed the agreement on role and scope of network operations and the selection of stakeholders outside the network in order to form coalitions.

Mobilizing also means (5) to motivate and inspire stakeholders to keep their commitment and support the network's purpose (Agranoff, McGuire 2001, p. 300).

2.1.4 Synthesizing (S)

Managers (1) have to make sure environment and conditions of the network enable its participants to interact successfully with partners (2) in order to achieve the networks purpose. Different mind-sets and goals of various participants may become blockages to the cooperation. This risk must be minimized. Therefore, managers are urged (3) to establish relationships and interactions, which contribute to the networks purpose.

This can be achieved best by (4) reducing complexity, keep participants informed and (5) carefully choosing roles of participants (Agranoff, McGuire 2001, p. 300).

In this case, innovation networks are the object of investigation, contrary to Agranoff and McGuire. Therefore, innovation management behaviors also have to be considered while evaluating the frameworks. Hauschildt defines innovation management as the dispositive configuration of the innovation process or system in an enterprise. The dispositive configuration includes behaviors as setting and pursuing strategies and goals, decision-making, framing the flow of information, building relations and operating relations in order to put decisions into practice (Hauschildt, Salomo 2011, p. 29).

2.2 Overview innovation network management frameworks incl. strength and weaknesses

In order to get a comprehensive understanding of today's research concerning innovation network management not only network management research but also innovation management research was reviewed. Due to concision of this paper only frameworks regarding to (innovation) network management are analyzed and described further. Therefore, not only the behavior criteria of Agranoff and McGuire are taken into account in this chapter but also management view, concrete management tools and the innovation aspect of each framework are reviewed. For a better understanding, a short description of each framework is added. In chapter 2.2, a more analytical approach is presented. The evaluation aims to give readers insights about which INMFs explain the workflow of innovation network management best and offer strategic management tools.

2.2.1 Systematic framework for developing a network strategy – Juttner and Schlange (1996)

The framework follows three stages:

Stage 1, description, describes context (Network analysis) and actors (analysis of actors and relations).

Stage 2, evaluation, prepares an Interdependence Matrix (incl. dependence and relations) of the network.

Stage 3, interpretation, develops a portfolio of interdependences and interprets the strategic.

The different stages give a better understanding of complex decision processes in the network considering the actors' dependencies as a decisive factor of success.

Strength: The framework gives decision-makers a guideline in order to develop a strategy. It helps managers to analyze the role and impact of network partners and how relations work within the network. The framework enables managers to frame the network's strategy, and therefore vision and purpose. The framework examines the existing network and its participants but does not talk about choosing the right participants. It focuses on the relations, which is important in order to frame and synthesize the network. In terms of mobilization, the framework only covers the strategic development of objectives. Therefore, the framework is helpful in the ongoing process (Jüttner, Schlange 1996, 483 ff.).

Weaknesses: The frameworks lacks to give a guideline in order to establish the network and to mobilize partners. It is more about analyzing the existing network than to give concrete management guidelines.

2.2.2 A conceptual model of alliance network diversity and economic performance – Goerzen and Beamish (2005)

This model evaluates multinational enterprises (MNE) based on the impact of a variety of factors on the economic performance, regarding performance measurement and impact on the network. The diversity of the network has a special interest in this case.

Strength: Goerzen and Beamish look from a firm's perspective on the network of relationships surrounding it.

They aim is to characterize participants and the quality of relationships. Their thesis is that networks benefit from a certain level of heterogeneity. The strong diversity focus gives an excellent base to activate and synthesize the network. The authors point out the importance for managers to handle the risk of difficult interactions between the actors based on their diversity (Goerzen, Beamish 2005, p. 349).

Weakness: Because the focus lies on diversity, this framework does not provide insights on actual management tasks but outlines the risks, such as increasing management costs and diminishing returns.

2.2.3 Cybernetic model for innovation network management – Mirzadeh and Arasti (2012)

Based on the principles of cybernetics, such as the idea of focusing on strategic and feedback mechanisms, the framework examines the management of innovation networks. The framework identifies sophisticated modules; strategy/policy development, main process (primary process), supportive process and feedback process (process/product control). Further, the framework identifies soft supportive processes (culture, HR, R & D, PR etc.) and hard supportive processes (equipment, infrastructure, material).

Strength: By examining three aspects of network management, the model offers various insights of activating, framing, mobilizing and synthesizing the network. Network strategy contains different framing (creating vision and purpose), and mobilizing (whole strategic view on resources and partners) tasks. Network organizations provides insights of activating (introduce participants and processes to build up the network), framing (network governance), synthesizing (network behavior). Network information management offers insights of synthesizing by ensuring the information and communication flow (Mirzadeh et al. 2012, 578 ff.).

Weakness: The framework is highly comprehensive. It misses tasks like deactivating unfitting participants, bringing in alternative views, inducing commitment or choosing positions. The framework lacks constructive guidance as well.

2.2.4 Biplex network model – Vermeulen and Kok (2013)

The Biplex Network model focuses parallel on two different processes and networks: the innovation and the production network.

1. Stage: introduction into production, network actors organize themselves within the production (planning).
2. Stage: the earlier production network merges into the next generation of production, while former processes drain off.
3. Stage: a group of actors leaves the production network to evaluate product definition, market relevance and technical feasibility of the next generation.

Strength: The Biplex network model considers changing relationships during the product lifecycle, which gives insights on different terms of interaction. It also recognizes tasks of activating (choosing participants with the needed resources) and mobilizing (exploit existing resources and skills), but the framework lacks specification of behavior groups (Vermeulen, de Kok 2013, p. 11).

Weakness: The framework focuses on innovation and production processes and referring management tasks (e.g. handling conflicts between the two networks) but leaves out network management behaviors.

2.2.5 Framework for analyzing multi-level innovation networks – Ahrweiler and Keane (2013)

The framework displays the relationship between "cognitive and social aspects of scientific creativity and technological innovation" in three levels:

Concept level: Ideas are generated and clustered to unit-nodes.

Individual level: Unit-nodes (actors of the network) are connected by their similarities within their approaches to solve problems. They refine the developed ideas.

Social-organizational level: The unit-nodes (heterogeneous organizations) are connected by their level of relationship to each other. They work together in teams in order to develop and launch new products.

Strength: Ahrweiler and Keane argue that actors and their relationships are the main issues when establishing an innovation network (Ahrweiler, Keane 2013, p. 75). They recognize tasks of framing, mobilizing and synthesizing by establishing an appropriate social structure and environment in order to encourage creativity.

However, they refer to these behaviors more as network than as management tasks. In addition, they have a strong focus on creating an environment of relations and interactions in order to provide optimal conditions for a productive cooperation (Ahrweiler, Keane 2013, p. 78). Contrary to other frameworks, this framework is strong on creativity, bringing in different views and selling new ideas, which is important to be innovative as a network.

Weakness: The framework does not describe the importance of choosing participants and demand their commitment to the network and its purpose.

2.2.6 Management model for network-cooperation – Schubert (2008)

The author examines concrete management tasks within the network cooperation: Information system: Assembling information relevant for strategy, management, planning and network controlling.

Management: Processing strategic analysis, planning, execution and evaluation of the network. Quality management: Guaranteeing the compliance of the various appointed standards.

Strength: The SWOT-analysis focuses among others on potential participants. Followed by a network analysis during the initiating stage, both stages suggests several tasks of activating behavior. The network planning stage withholds tasks of activating (planning organization and product management), framing (setting goals) and mobilizing (setting goals and managing contracts). The realization stage focuses simultaneously on structural tasks (coordination, resource management, controlling and evaluation), while the network marketing stage is about framing (setting the vision), mobilizing (external communication) and synthesizing (internal communication) the network (Schubert 2008, 55 f.).

Weakness: Schubert's framework gives a wide few on different management tasks but leaves out difficulties networks face as a result of interaction of heterogenic participants. Schubert also shares the perspective of the network, not especially of the management. Therefore, tasks as deactivating participants, bringing in different views or selling new ideas are left out. The framework focuses on networks instead of innovation.

2.2.7 Network Management model – Riemer and Klein (2006)

Accounts the internal structures, strategies and processes of each network actor as well as external factors.
Four network management domains: designing governance structures, coordinating exchanges, fostering social integration, facilitating shared visions/ values.

Three perspective - levels: Network perspective: Management is represented in a PDCA cycle, planning (Plan), implementation (Do), controlling (Control) and reaction (Act). Actor perspective: Strategy, organization and technology of each actor are examined. Environmental perspective: Markets, regulations, laws and behavior of the industry are evaluated.

Strength: The four network management domains are similar to the behaviors of Agranoff and McGuire. Designing governance structures contains several tasks of mobilization and a few activating activities.

Coordinating exchanges and fostering social integration bear some framing and mobilizing tasks but mainly resemble synthesizing activities, while developing and articulating shared visions and values can be assigned to framing (Riemer, Klein 2006, 58 f.).

Weakness: The framework is comprehensive. It addresses network management directly and further encourages the idea of flexibility in order to be innovative even though it is more a general network management framework than specific on innovation. Activating activities seem to be discussed inadequately.

As most frameworks the importance of choosing the right participants or even excluding not fitting participants is not mentioned.

2.2.8 Three-Layer-Model (Drei-Schichten-Model) – Mack (2003)

This framework examines the management relations, transaction relations and the exchange of recourses within the network. The network is split up into three perspectives (Schichten): Management Perspective (Managementschicht): management units und relations and the out coming management process.

Activity perspective (Aktivitätenschicht): value adding elements and transaction relations of the production process.

Recourse/competence perspective: resources and competences and its entanglements as well as the following process of learning.

Strength: The resource and competence perspective sees the network as a constellation of resources and competences every network participant contributes to the network. The framework points out the importance

of the compilation and development of resources and competences (activating), but leaves out management tasks (Mack 2003, pp. 167–168). The activity perspective examines the output of the network in order to satisfy customers. This perspective underlines the importance of mobilizing each member in order to measure up to their commitments but again does not appoint any management tasks (Mack 2003, p. 182). Only the management perspective identifies different management tasks, but focuses on the position itself and its impact on the network.

Weakness: Mack's framework focuses more on production processes than on innovation processes.

2.2.9 Framework for the evaluation of innovation networks – Van der Valk (2011)

The framework examines different perspectives in order to discover concepts that influence the performance of innovation networks. Therefore, Valk et al. suggest a social network analysis to study the impact of knowledge diffusion on the innovation performance. Further, the framework adopts a resource-based view and addresses structure and composition of the network.

Strength: The framework has a strong focus on innovation and activating the right participants and resources. In addition, the commitment of participants is outlined (mobilizing). Therefore, the framework is helpful in order to establish and manage an innovation network on behalf of the named tasks.

Weakness: The framework leaves out general network management tasks and does not give constructive guidence (Valk et al. 2011, 26 ff.).

2.2.10 Orchestrating innovation networks – Dhanaraj and Parkhe (2006)

The framework examines the so-called network orchestration, which contains knowledge mobility – sharing and increasing knowledge within the network, innovation appropriability – exploding profit from innovation, and network stability – allowing a dynamic stability of the network while ensuring the network's profitable continuance. The authors also concentrate on a duality of a low-density/ high-centrality structure (Dhanaraj, Parkhe 2006, 660 ff.).

Strength: The framework focuses on the continuance of the network, while ensuring that its purpose (e.g. innovation) is reached. The authors examine innovation networks in particular. In order to reach its purpose the authors see tasks of activating (examining the contribution of participants, forming structure, buy-in the right competences), mobilizing (induce commitment, agree on objectives, motivate to keep commitments) and synchronizing (establish a profitable environment, ensure a purpose-driven network) as especially important to the network.

Weakness: On the other hand, the authors only look at loose interrelations within the network. Therefore, framing tasks to tighten relationships between members are not discussed. Matching this view, the framework does not take the perspective of the management but sees the hub firm as the responsible "orchestrator".

2.2.11 Integriertes Netzwerkmanagement-Konzept / integrated network management concept- Petry (2006)

This framework, based on Bleicher's St. Galler Management-Concept, sees a significant overlap of network-management- and Business-management-problems and therefore no need for a specific framework. Three levels of network management: Normative (Network contract, governance and culture), Strategic (Network organization and management system, Network strategy, problem solving and managing behavior) and Operative (operative processes and disposition systems, strategy-implementation and order fulfilment and performance and corporation behavior) (Petry 2006, 73 ff.).

Strength: The framework is comprehensive and applicable to different networks. It has a strong focus on framing the network, built up structure and induce commitment of the network participants. The author also points out the similarities between business management and network management.

Weakness: The framework has no view on innovation networks in particular. Further, it focuses on already established networks, and therefore does not consider activating the right participants or deactivating not fitting ones.

2.3 Evaluation of innovation network management frameworks

The following table shows an overview of the identified INMFs containing their operational area as well as the results of the evaluation. Every framework will be rated based on the criteria of Agranoff and McGuire (chapter 2):

- ○ The framework does not meet the sub criterion
- ◔ The framework rarely meets the sub criterion
- ◑ The framework partly meets the sub criterion
- ◕ The framework mostly meets the sub criterion
- ● The framework totally meets the sub criterion

Table 1: Evaluation Network Management frameworks

Model – Author	Area of application	Evaluation			
Network Management		A	F	M	S
Systematic framework for developing a network strategy – (Juttner, Schlange 1996, 483 ff.)	Formulating strategy and the strategic management process	◑	◑	◔	◑
A conceptual model of alliance network diversity and economic performance – (Goerzen, Beamish 2005, 336 ff.)	Measuring the impact of heterogenic relationships on performance	◑	◔	◔	●
Cybernetic model for innovation network management – (Mirzadeh et al. 2012, 583 ff.)	Comprehensive and systematic model for innovation network management	◕	◕	◑	◕
Biplex network model –(Vermeulen, de Kok 2013, 8 ff.)	Managing production and innovation activities in the value Network simultaneously	●	○	◕	◔
Framework for analyzing multi-level innovation networks – (Ahrweiler, Keane 2013, 78 ff.)	Characterizing Innovation Networks	○	◑	◑	◔
Management model for network-cooperation – (Schubert 2008, 55 ff.)	Establishing and organizing networks	◕	◕	◕	●
Network Management model – (Riemer, Klein 2006, 57 ff.)	Different perspectives on management and decision making	◔	●	●	◕
Model – Author	Area of application	Evaluation			
Three-Layer-Model – (Mack 2003, 166 ff.)	Analyzing the configuration process	●	◕	◕	◕
Framework for the evaluation of innovation networks - (Valk et al. 2011, 25 ff.)	Evaluation of innovation networks	●	◔	◔	○
Orchestrating innovation networks - (Dhanaraj, Parkhe 2006, 660 f.)	Network Orchestration	◕	◔	◑	◑
Integrated network management concept- (Petry 2006, 73 ff.)	Managing existing networks	◔	◕	◑	◑

2.4 Comparison of innovation network management frameworks

Four cluster options occurred while evaluating: relation- or process-oriented frameworks, comprehensive or specialized network view, innovation or network oriented management view, degree of management perspective.

Juttner and Schlange focus on the specialty of managing the network's relations but lack examining innovation processes. Contrary, the model merely scratches the surface of the evaluation criteria. The model of Ahrweiler is similarly facile considering the criteria, but has a strong focus on innovation and relations inside the network. The same holds for the model of Valk, which examines especially the establishment of an innovation network and activating partners. All three models take a network instead of the manager's perspective. To be mentioned is Valk's suggested social network analysis, which is one of the few approaches to recommend a management tool. Juttner and Schlange and Schubert are the only other authors mentioning analyzing tools.

Goerzen's model stands out because of its different focus on network diversity and therefore seems to not fit right into the other INMFs. On the contrary, it gives useful insights of synthesizing a network and analyzing the network's environment. Likewise, Petry misses the focus on innovations and fulfills the criteria on the same level as Goerzen but with a stronger focus on framing the network. The models of Vermeulen and Dhanaraj both have a strong focus on activating the network and on the innovation process. Vermeulen names different management tasks, but more with a business management perspective then a network management perspective in particular. Mirzadeh's model fulfills the criteria on a higher level. The model takes the management perspective and considers innovation without giving operational guidelines. Riemer and Klein on the other hand offer operational guidelines and also meet most of the criteria from the management perspective. Mack's and Schubert's models fulfill the criteria the best. While the model of Mack is very simple and easy to adjust, the model of Schubert is much more comprehensive. Still both models have a stronger focus on the network itself then on management guidelines and innovation processes.

Table 1 reveals that activating is the strongest behavior group in six out of eleven Frameworks (some frameworks have up to three strongest behavior groups). Framing counts five frameworks, synthesizing four and mobilizing two. This indicates that network frameworks focus on establishing a new network by activating the right partners and framing the ground rules. Even though, activating and framing are not only to be executed at the start of a network but constantly, mobilizing the partners and their commitment to support the networks purpose seems essential for an on-going effective and successful network. If analyzing not only the winning behavior for every framework, but counting the overall sum of the rating, framing is the least considered behavior. Agranoff and McGuire also mention that framing is the less obvious behavior in network management, but just as important as the others. (Agranoff, McGuire 2001, p. 299)

3. Conclusion

This paper aims a comprehensive literature overview on INMFs as well as an evaluation based on the abilities of each framework to manage a network while ensuring innovative outcomes and covering activating, framing, mobilizing and synthesizing tasks. This "management behaviors groups" were identified by Agranoff and McGuire and are common evaluation criteria throughout English network management literature (Keast, Hampson 2007, p. 366).

As the evaluation shows, state of the art research on INMFs lacks a framework that offers concrete and comprehensive management guidelines referring to the identified behavior groups of Agranoff and McGuire in combination with a focus on innovation networks. Even though Mack's and Schubert's model cover the four behavior groups almost completely, they still show weaknesses in combining all behaviors to full extent, while giving operational guidelines on managing the network and the innovation process. The results show that research activities conspicuously often take the perspective of the network itself instead of the perspective of the manager in particular. Therefore, the focus lies on the required accomplishment of the network instead of craving out the right management tools to achieve the networks purpose.

Due to the conciseness of this paper, innovation management frameworks were not part of the evaluation, but should be considered in further research activities.

Further research activities require a framework that combines all four behavior groups with a management perspective and operational guidelines in order to manage the network and the innovation process. The framework should also be useful to establish, maintain and reconstruct the innovation network. In order to establish a successful innovation network, that enables newcomers and small enterprise to handle innovation processes and established companies to involve the innovative flexibility of smaller and younger enterprises into their innovation processes, further research activities need to meet the described requirements. Also framing needs to receive more attention in network management research in order to build stronger relations within the network by incorporating a structure of purpose and values that allows actors to identify themselves with the network. As shown in 2.3, mobilizing is another behavior lacking attention. Both could be supported by management tools such as the approaches of (social) network analysis suggested by Valk, Juttner and Schlange and Schubert. Therefore, network analysis as well as similar or consecutive ideas are an interesting research field in order to provide useful management tools and guidelines.

References

Agranoff, Robert; McGuire, Michael (2001): Big Questions in Public Network Management Research. In Journal of Public Administration Research and Theory: J-PART 11 (3), pp. 295–326.

Ahrweiler, Petra; Keane, Mark T. (2013): Innovation networks. In Mind Soc 12 (1), pp. 73–90.

Becker, Thomas; Dammer, Ingo; Howaldt, Jürgen; Killich, Stephan; Loose, Achim (2011): Netzwerke – praktikabel und zukunftsfähig. In Thomas Becker, Ingo Dammer, Achim Loose (Eds.): Netzwerkmanagement. Dordrecht: Springer, pp. 3–11.

Dhanaraj, Charles; Parkhe, Arvind (2006): ORCHESTRATING INNOVATION NETWORKS. In The Academy of Management Review 31 (3), pp. 659–669.

Goerzen, Anthony; Beamish, Paul W. (2005): The effect of alliance network diversity on multinational enterprise performance. In Strat. Mgmt. J., pp. 333–354.

Hauschildt, Jürgen (2016): Innovationsmanagement. München: Franz Vahlen (Vahlens Handbücher der Wirtschafts- und Sozialwissenschaften).

Hauschildt, Jürgen; Salomo, Sören (2011): Innovationsmanagement. 5., überarb., erg. und aktual. Aufl. München: Vahlen

Jüttner, Uta; Schlange, Lutz E. (1996): A network approach to strategy. In International Journal of Research in Marketing 13 (5), pp. 479–494.

Keast, Robyn; Hampson, Keith (2007): Building Constructive Innovation Networks. The Role of Relationship Management. In J. Constr. Eng. Manage. 133 (5), pp. 364–373

Mack, Oliver (2003): Konfiguration und Koordination von Unternehmungsnetzwerken. Ein allgemeines Netzwerkmodell. Gabler Edition Wissenschaft. Wiesbaden

Mirzadeh, P.; Moattar Husseini, A.; Arasti, A. (2012): General cybernetic model for innovation network management. In Procedia - Social and Behavioral Sciences 41, pp. 577–586.

Müller, P.; Kasperk, G.; Kampker, A. (2014): Radikale Innovation durch effiziente Netzwerke. In Heike Proff (Ed.): Radikale Innovationen in der Mobilität. Technische und betriebswirtschaftliche Aspekte, Wiesbaden: Springer Gabler, pp. 25–48.

Müller-Prothmann, Tobias; Dörr, Nora (2014): Innovationsmanagement. Strategien, Methoden und Werkzeuge für systematische Innovationsprozesse. 3. Aufl. München: Hanser (Pocket power).

OECD Publishing (2005): Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data. 3rd Edition. Paris: OECD Publishing (The Measurement of Scientific and Technological Activities).

Petry, Thorsten (2006): Netzwerkstrategie. 1. Aufl. s.l.: DUV Deutscher Universitäts-Verlag (Strategische Unternehmungsführung).

Riemer, Kai; Klein, Stefan (2006): Network Management Framework. In Stefan Klein, Angeliki Poulymenakou (Eds.): Managing Dynamic Networks. Organizational Perspectives of Technology Enabled Inter-firm Collaboration. Springer-Verlag Berlin Heidelberg, pp. 17–68.

Schawel, Christian; Billing, Fabian (2018): Top 100 Management Tools. Das wichtigste Buch eines Managers : von ABC-Analyse bis Zielvereinbarung. 6. Auflage. Wiesbaden: Springer Gabler.

Schubert, Herbert (Ed.) (2008): Netzwerkmanagement. Koordination von professionellen Vernetzungen - Grundlagen und Praxisbeispiele. Wiesbaden: VS Verlag für Sozialwissenschaften / GWV Fachverlage

Valk, Tessa van der; Chappin, Maryse M.H.; Gijsbers, Govert W. (2011): Evaluating innovation networks in emerging technologies. In Technological Forecasting and Social Change 78 (1), pp. 25–39.

Vermeulen, B.; de Kok (2013): A value network development model and implications for innovation and production network management. Technische Universiteit Eindhoven

Development of a Methodology to Develop Venture Capital Strategies in Applied R&D Networks

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Abstract: The superior question of this paper is how startups and spin-offs can be supported, and one major goal of this work is to give an overview of existing support mechanisms for new ventures. Through the research of affected stakeholders in the technology transfer process, the characteristics of incubation instruments and the development of the Venture Incubation Canvas, it provides an applied knowledge base for decision makers. The reader should get a picture about how different mechanisms help start-ups in various phases of their venture life cycle and have the necessary tools to create a robust and fruitful incubation business model from the beginning on. The abstract information, principles and the use of the model should be applicable in a general way for different projects and innovation (eco) systems. Since the paper aims at being used in projects in the area of R&D networks, it is important to provide knowledge about the process of transferring technologies into the economy and cast a light on the affected stakeholders. Moreover, a literature review about the different dimensions that are used to define start-up support programs is carried out and existing support mechanisms and best practice examples in the global market are examined. Finally, a practical model is introduced in order to simplify the set-up of an incubation mechanism.

Keywords: incubation mechanisms, venture incubation canvas, technology transfer

1. Introduction

Nowadays, the start-up culture is mostly shaped by digital business models and platform solutions with a focus on decentralization and dematerialization. Lower entry barriers, due to technological developments in the recent decades, make it easier for individuals and young companies to test their ideas, which was one reason for the emergence of a startup sub-culture grounded on a value-based and opportunity-driven entrepreneurial mindset. However, breakthrough innovations are still most often based on technical insights – new products, materials or technological principles. Therefore, intensive technological research still plays a major role, which makes universities and research institutes important partners due to their resources and scientific knowledge for long-term and uncertain technological research and product development. This is why countries around the world are increasingly perceiving science and the transfer of technologies and innovations as important drivers of economic and social transformation processes towards an innovation- and knowledge-based economy (Salomao Martins & Plonski, 2015). One important factor for the successful development and implementation of innovative technologies and products is the support of startup. This paper examines different types of support mechanisms that help start-ups in various phases of their venture life cycle. When starting a business, founders must develop the aspiration, a concept and define their business model as the *pre-startup phase.* At the *start-up phase,* business owners develop, test and validate their product or service with potential customers. Dee et al. (2015) describe the next stages as *early-stage venture*, where financing is provided for further growth due to commercial manufacturing and sales, and *late-stage venture*, where companies have reached a stable growth rate. (Dee et al., 2015).

The principles of technology transfer, as well as various involved stakeholders, their values and the potential conflicts that can arise out of this interaction are outlined in chapter 2. Chapter 3 focuses on the support of new ventures and comprises a literature review about different support programs along with an analysis of best practices and success factors of incubation mechanisms and startups in general. Chapter 4 defines the Venture Incubation Canvas, a practical model, which allows decision makers to create a support mechanism based on their endogenous needs and resources. Chapter 4 also comprises an example of the model by Fraunhofer Venture's instruments, illustrating varied mechanisms and its individual key players, activities, incubatees and incubation goals.

2. Technology Transfer – Make Research Useful

Technology transfer is a specification of knowledge transfer. It is important to understand the present possibilities of transferring technologies and the values and objectives of different stakeholders through a new venture is only one possibility of transferring technology. The techno-economic network (TEN) describes three “poles” in the technology transfer process – the scientific, technical and market pole.

S*cientific pole:* includes various institutions of scientific research, namely academic and non-academic research institutes.

Technical pole: models, prototypes and tests are conceived and developed. Patents, norms and technological rules build a framework, which is mostly found in specialized laboratories, research institutes or manufacturing. M*arket pole: "*refers to users or consumers explicitly generate, express or seek to satisfy demands or needs." (Callon, 1990, p. 134).

TEN helps to understand in which areas and stages technology transfer happens and who the affected stakeholders are. It is also used to interpret where obstacles and different values of stakeholders exist to estimate how these can impede the technology transfer. Technology transfer covers all poles of TEN and can be described as making technological knowledge and developments accessible for the economy and the society. The following forms of technology transfer can be identified (Spath and Walter, 2012; Kenney & Patton, 2009; Debackere and Veugelers, 2005):

- Collaborative research in form of R&D projects or joint ventures of enterprises and the science sector
- Development of formal and informal intellectual property (IP) by the science sector
- Technology-oriented start-ups, founded by researchers or students that gained their knowledge and experience within (non)-academic research institutions
- Technology-oriented spin-offs, founded by researchers or students from (non)-academic research institutions, whereby the technology/knowledge is licensed from the institution to the spin-off
- Transfer of technology-ownership to inventors supported by various incubation mechanisms
- Non-exclusive licensing and public availability of knowledge through open source strategy
- Publication of knowledge and technical insights
- Advanced training and consulting for startups, spin-offs or enterprises
- On-demand research staff for enterprise projects

The final decision on how to transfer technologies is context-based and influenced by the feasibility, the available resources, the expected outcome and the overall mission and vision of the science institution. The possibility to transfer technologies through a new venture seems to be getting more attractive. Siegel and Wright (2015) observe an increase in university startup creation, licensing and patenting in different countries.

Moreover, Festel (2011) states that the gap between innovations from academic and scientific research and the commercialization of industrial applications can be closed more efficiently through new ventures. The process of transforming research results into marketable technologies or products is the most challenging stage in the TEN. Hence, Laredo and Mustar (1996) provide a helpful scheme:

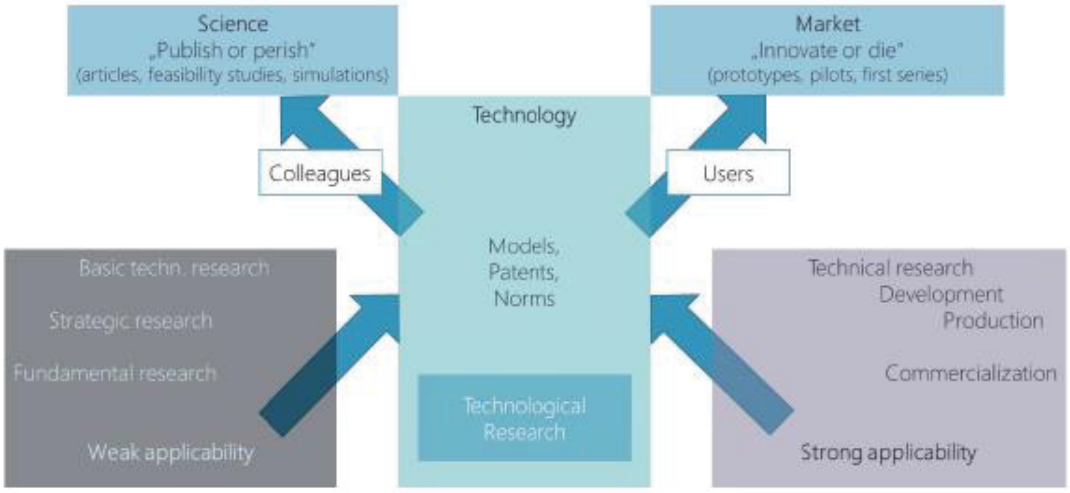

Figure 1: Techno-Economic Network referring to Laredo and Mustar 1996

Huszár et al. (2016) distinguish between the *entrepreneurial scientist*, who plans to commercialize his research results as a new venture and the *traditional scientist* who shows no interest in commercialization. The

entrepreneurial scientist is more likely to have "an important role in spin-off performance through being able to identify and exploit suitable opportunities" (Grimaldi et al., 2011, p. 31). Institutional decision makers have to search for risk-takers and committed staff with the need to return the obtained investment for his knowledge to the society if their aim is a successful commercialization of technologies. However, Spath and Walter (2012) describe both the loss of good and capable researchers and employees and the sacrifice of long-developed research results as problems for science institutes during the technology transfer process.

Expectations and goals might differ between the technical pole and the market pole, especially considering timeframe and financing. Nazaryeva (2015) writes, "while researchers may need funding and industry support when the technology is still in the process of development, the companies expect a final product ready to launch" (p. 63).

3. Incubation – Supporters and their Offers

This chapter looks at the different dimensions of start-up support programs found in the literature. I*ncubation* is the process of growing something under controlled circumstances. *Business incubation* fosters entrepreneurship culture and management activities by providing finance support, coaching, networking and similar services to incubatees (entrepreneurs). The general goal of incubation is to increase business survival rates and foster young firms to grow. The literature on support distinguishes between non-profit and for-profit business models. *Non-profit* incubation programs are mostly run by public entities or academic and science institutions and financed through public grants, membership fees and donations as well as revenues from services, products or events. *For-profit* incubators belong to independent providers, venture capital companies and corporations and realize their funding usually by private investors like Business Angels, Venture Capitalists (VC), corporate VCs or sometimes-public subsidies. Another differentiation made are top-down or bottom-up programs. *Top-down* programs are usually initiated by governments or institutions and backed by law and innovation policies, while *bottom-up* programs are built upon the future client's needs and the discoverable circumstances observed in the environment.

3.1 Incubation Mechanisms

The best-known incubation mechanisms are business accelerators (BAs) and business incubators (BIs).

However, different instruments can also be used to support start-ups as Table 1 shows by giving an overview of the subsequently presented incubation instruments and programs:

Table 1: Typology of Incubation Mechanisms

Incubation Mechanisms	Stage of Intervention	Funding	Time Restriction / Duration
Events and Workshops	pre-startup, startup	hybrid	no
Courses and Consultation	pre-startup, startup	public	no
Competitions and Pitches	all stages	hybrid	no
Co-Working	all stages	hybrid	no
FabLab	all stages	hybrid	no
Technology Transfer Offices	pre-startup, startup	public	yes / short-term
Business Incubators			
With walls	startup, early-stage venture	public	yes / 1-5 years
Virtual Incubators	pre-startup, startup	hybrid	no
Corporate Incubators	startup, early-stage venture	private	yes / 1-5 years
International Incubators	startup, early-stage venture	public	yes / 1-5 years
Business Accelerators			
Accelerator - Investor-led	early-stage venture	hybrid	yes / 3-6 months
Accelerator - Matchmaker	early-stage venture	private	yes / 3-6 months
Accelerator - Ecosystem Builder	startup, early-stage venture	public	yes / 3-18 months
Active Investors			
Founding Angels	pre-startup, startup	private	yes / long-term
Business Angels	startup, early-stage venture	private	yes / middle-term
Venture Capitalists	late-stage venture	private	yes / short-term
Science and Technology Parks	all stages	public	no

Events and Workshops can either support researchers to solve or to develop entrepreneurial scientists, leading to more high-quality spin-offs or start-ups. Additionally, researchers can network with people from different backgrounds and find fitting founding partners.
Courses and Consultation clarify first administrative questions, to learn how to become an entrepreneur and to help founding teams with specific problems they face.

Competitions and Pitches are excellent opportunities for entrepreneurs to "go out" with their idea or product. These competitions can range from a submitted business plan to a pitch in front of an audience or potential investors.

Spaces of Collaborative Innovation, such as *Co-Working, FabLabs & Co.*, allow close and frequent interactions between individuals and create and transmit knowledge (Capdevila, 2013, p. 4).

Technology Transfer Offices (TTO) are independent entities or departments inside a science institution that accompanies scientists and engineers who are willing to found a business. TTOs often intervene in the idea and pre-start-up phase

A *Business Incubator* (BI) is a legal entity that manages a combination of incubation mechanisms, namely legal and business consulting, management and technical support, access to capital and networks, infrastructure and human resources. Four different types of incubators can be identified:

Business incubators (with walls): offer traditional forms of incubation mechanisms with a variety of incubatees inside the provided infrastructure.

Virtual incubators (VI): digitize processes and information and provide services online.

Corporate incubators (CIs): often operating as a unit inside an existing corporation (for-profit).

International incubators: their goal is to offer foreign companies or start-ups a "soft landing", i.e. helping with administrative, legal and taxation questions, as well as the relocation of their families, translation services or language and cultural training (Lewis et al., 2011).

While BIs focus on radical innovations and the survival of new ventures, *Business Accelerators* (BA) focus on scaling a business to foster incremental innovation (Haines, 2014, p. 283) which does not leaves the required room for radical innovation. Lewis et al. (2011) define a BA as a "late-stage incubation program, assisting entrepreneurial firms that are more mature and ready for external financing or a facility that houses a modified business incubation program designed for incubator graduates as they ease into the market." Miller and Bound (2011) describe five main features of the offerings and business models of BAs:

- Open to all, yet highly competitive, application process
- Provision of pre-seed investment (10k€ – 50k€), usually in exchange for equity (5% - 10%)
- Focus on (small) teams not individual founders
- Time-limited support programs ('boot camp') attended by events, intensive mentoring, education, and access to networks (3-6 months)
- 'Cohorts', 'batches' or 'classes' of start-ups rather than individual companies

The rapid validation process for investment and customer acceptance through network development and access to influencers stand out among the advantages of the BA. That results in admission to sophisticated funding opportunities. Among BAs, Clarysse et al. (2015) identified three archetypes:

Investor-led: bridging the gap between the early venture stage and follow-up financing by private investors like venture capitalists, business angels or corporations.

Matchmaker: often implemented in corporations, aim to (1) provide their customers new or improved services and products or to (2) make use of the company's technologies.

Ecosystem builder: are government-backed accelerators that foster innovations, solve societal problems or promote an entrepreneurial culture in strategic areas or industries.

An *active investor* who is supports the new venture beyond transferring and recalling money is an important incubation mechanism. Four types of active investors can be identified:

Founding angels (FAs): identify unmet needs and investigate potentials in their partner's intellectual property portfolios in order to form, fund and manage a new company (Festel, 2011).

Business angels (BAns): are mostly private individuals who invest alone or in syndicates during an early stage in new and growing unquoted businesses who have problems to find investment (see figure 2)

Venture capitalists (VCs) with a typical investment size of ~10k €, <100k € and >500k €: mostly invest in later stages of the venture life cycle and want to see infrastructure, track record and liabilities instead of a big idea.

Public-private venture capital funds (PPVC): e.g. the German High-Tech Gründerfonds (HTGF). Besides an initial 600k € investment for R&D projects, prototyping and market entry, HTGF provides support with recruiting and financial questions and access to a network of entrepreneurs, managers, experts, service providers and investors plus investment managers for exits and IPOs.

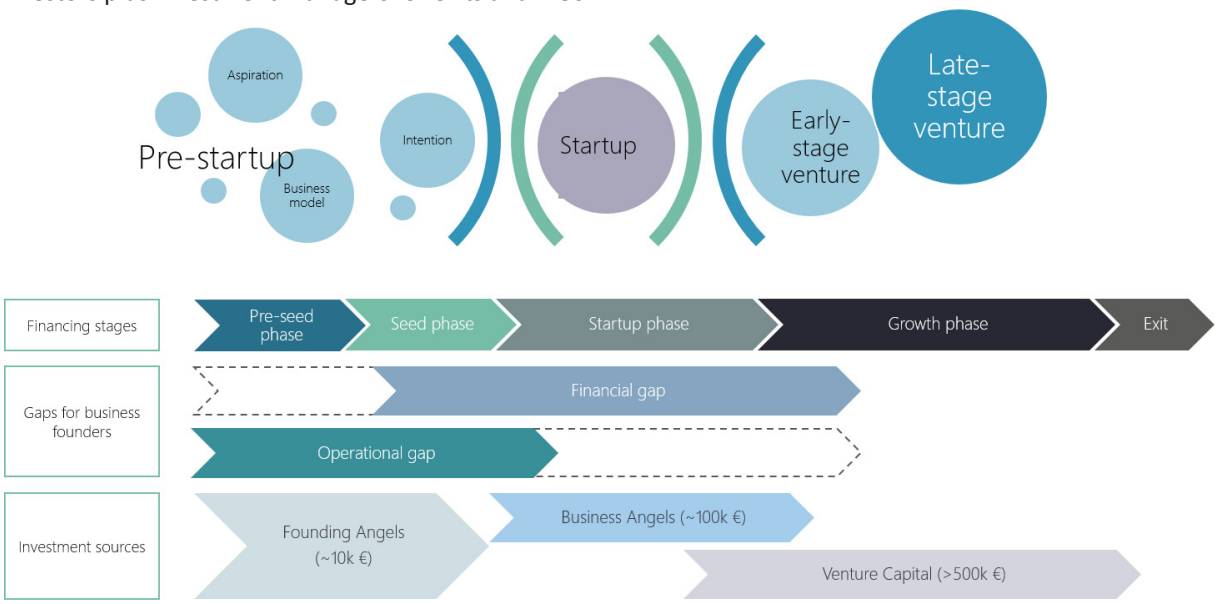

Figure 2: Different investment sources in the venture creation process

Science and Technology Parks are a vibrant mix of policies, programs, spaces and facilities with high standards as well as high-quality value-adding services, (IASP). The infrastructure for incubation combines several of the above-described elements and goals, with a focus on technology transfer and the incubation of innovations and new ventures.

3.2 The Role of Incubation

The literature contains several suggestions on necessary indicators for the success of start-ups or entrepreneurs. Therefore, this paper looks at some general aspects, but always keeps an eye on incubated scientific and technology-based start-ups. Gartner (1985) describes four areas of success: the (1) individual entrepreneur, who brings an entrepreneur background and personality, the (2) process of how the entrepreneur identifies opportunities, develops products and builds an organization, the (3) environment, in form of access to resources and infrastructure, and the (4) organization with all aspects regarding the internal and external business activities and connections.

Research shows that the management and the composition of incubation program's advisory boards serve as excellent success predictor. There are three main sources of success for the incubator: selection process and criteria, business support services, and networks (Yusubova & Clarysse, 2016). Especially the selection process has a determinant impact on the overall success (Ratinho, 2011). In addition, to be successful in transferring

technologies, the management must have a proactive behavior in networking and business support. They need to attract R&D projects and produce useful knowledge, contribute to knowledge transfer and its dissemination and develop activities to promote technical and social events (Amaral, 2015). Moreover, the offered services and its provision, is a determinant of a successful incubation practice and matters more than a host region's innovation capacity or program age or size (Lewis et al., 2011). Relan (2012) argues that financial support without mentoring is insufficient. Another crucial factor to help new ventures to leave the incubation program successfully is business development. It is important to prioritize the activities, get the first clients and support founders in contracting questions, create the business organization and find the next financiers. Incubators should maintain connections to legal and intellectual property specialists. One frequently discussed issue is the venture's length of stay inside an incubation program. For university spin-offs, Rothaermel and Thursby (2005) found evidence that a close connection to a sponsoring institution reduces "the probability of new venture failure and, at the same time, retards timely graduation." Incubation programs create a protective environment as well, which can make the step into the real market more difficult.

However, the regional capacities matter to a successful venture development after an incubation program.

Lewis (2005) states that with the venture's "transition to adulthood," regional capacity (e.g., urbanization, workforce skills, capital access and availability of higher educated employees) matters more for the venture's growth than the incubation program's quality.

Another observable force of incubation programs is their educational path. Even if incubation programs and the incubated companies fail, other cultural characteristics and personality traits have been evoked, namely "taking risks, accepting failure, valuing openness, collaboration and a flat hierarchy, being honest and resourceful and having a sense of equity and a pay-it-forward mentality" (Haines, 2014, p. 280). Almost all researchers agree to the point that specialization is a key for incubation programs' success because of higher levels of economies of scale (Bruneel et al. 2012), a bigger share of tenants with a complete service portfolio and a faster company growth as a result of more intensive service delivery (Ratinho 2011).

Figure 3 gives an overview where instruments are preferably applicable depending on the stage, the relative necessity of resources, the barriers for the ventures acceptance and the supporter's risk in the case of the supported venture's failure.

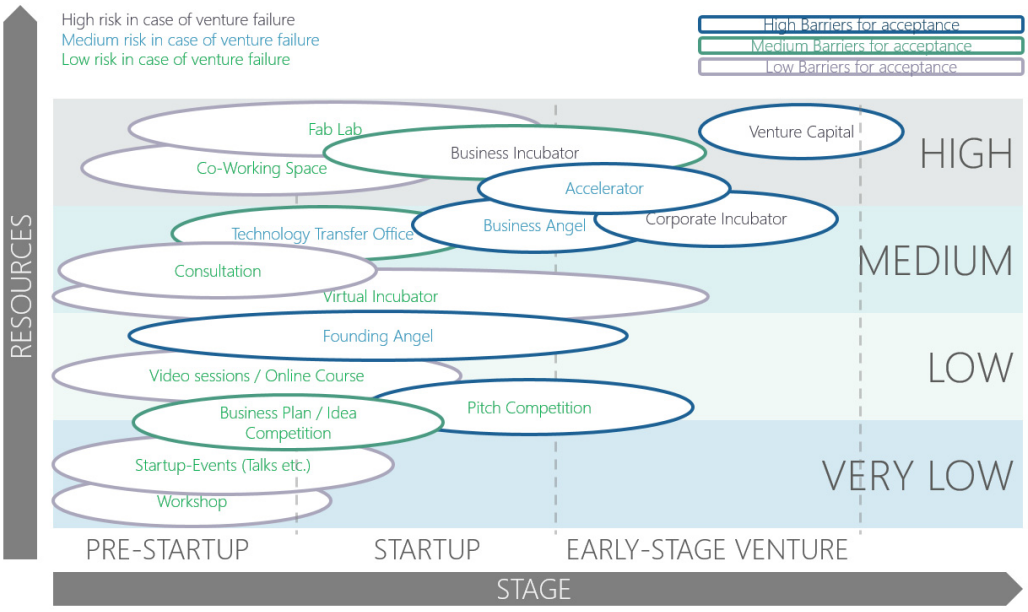

Figure 3: Application of incubation mechanisms depending on the venture stage

4. The Venture Incubation Canvas

Founder of new incubation mechanism occupy the same challenge as founders of new ventures like a financial strategy, a sustainable business model and an offering that delivers and creates value for customers, clients and other stakeholders. Therefore, this chapter extracts single elements of existing incubation business models

and classifies them in a model called Venture Incubation Canvas (VIC). This model enables a simplified, flexible and individual creation of an incubation program for support program managers.

4.1 Elements of Incubation Business Models

Following possible elements of an incubation business model are linked to the VIC's building blocks. In addition to the traditional Business Model Canvas (BMC), the VIC is expanded by the building blocks *financing* and *incubation goals,* due to the strong influence on all other components.

4.1.1 Financing

The funding strategy lays the foundation for all offerings and activities, which can support new ventures or create value in any other kind. At the beginning of the incubation business model generation, decision makers must clarify whether their program is non-profit or for-profit. The motivations for their work are societal, scientific or cultural goals. Anyhow, non-profit incubation program have to build a financially independent business model as well.

4.1.2 Key Players

Program managers have to figure out who their key partners and players are and what they can supply. Key players do not always have to play an active role in the incubation program, but are an important part of the network or play a promotional role. For example, program managers can only introduce investors, experts or mentors to clients if they are able to provide mental or financial support to them. Programs should focus on the creation of alumni networks since they could return value in various forms into the program.

4.1.3 Program Offerings

The incubation literature often classifies the offerings in three main sectors: business support, access to networks and infrastructure. Infrastructure itself is also covered in a separate VIC building block. The combination and characteristic of the provided services let decision makers define their key activities and eventually help describe their incubation value proposition.

4.1.4 Infrastructure and Resources

Incubation programs need infrastructure and resources to work and provide offerings to clients: *Human resources* are partly contained in the building block of key players and influence the activities an incubation program can provide (e.g. high-qualified consultants or experienced mentors). *Intellectual resources* are, for instance, specific knowledge, intellectual property, copyrights, databases and trademarks or brand names. *Physical resources* contain facilities, technological equipment or machinery. *Financial resources* are determined by the building block of funding and the acquisition of key partners. *Cultural resources* describes the culture of the incubator itself which works as an arbiters of cultural capital within new venture by shaping certain values, norms and beliefs (Haines 2014).

4.1.5 Incubation goals

The goals of an incubator are self-defined, can be unique and, in the VIC, influence all other parts of the incubation business model. The purpose of the incubation goals is to highlight the importance of predefined goals.

4.1.6 Incubatees

Incubatees are not just customers who pay for services, but carry resources as ideas, skills, knowledge, experience and diversity. Through fitting selection criteria, the incubation management gathers the right incubatees. The number and the compound of incubatees can become a cultural resource for the incubation business model itself (figure 4). Incubation programs "sell" this resource to investors, government entities or corporations, i.e. all stakeholders that find interest in the created community and ecosystem.

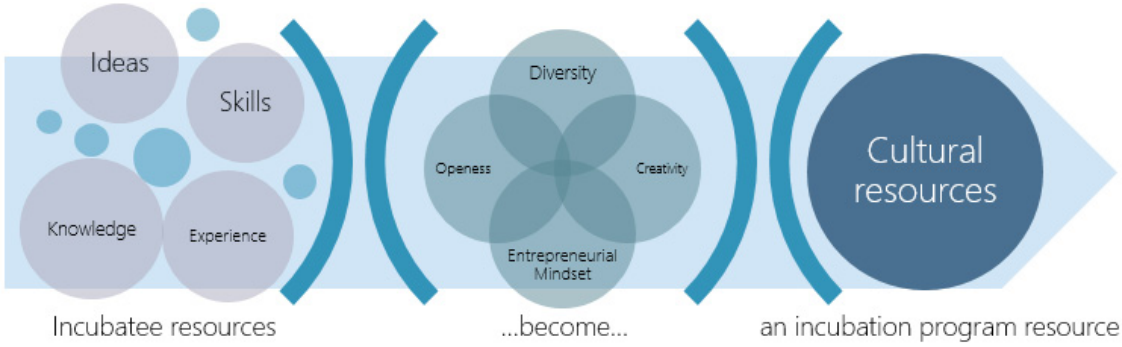

Figure 4: Incubatees as a resource

4.1.7 Selection Criteria and Process

The incubators must build a strategy for their selection process to find the incubatees who fit into the program's culture and help to achieve the defined goals. The selection process reaches from screening a business plan to a multi-stage screening process, where applicants are interviewed and presented to stakeholders.

4.1.8 Touchpoints

Touchpoints represent interfaces between an organisation and their users, customers or other stakeholders, in this case incubators and its clients. Key players need to be reached, e.g. through start-up community platforms, where investors, start-ups and incubators can connect with other entrepreneurs, employees or start-ups, alumni networks or proactive scouting like visiting start-up events, pitch competition or talks.

4.1.9 Revenue Model

If at all, incubation models only receive income from their customers through indirect channels. However, they can look for other sources three different ways of generating income from incubates: growth-driven, fee-driven and independent (figure 5) Dee et al. (2015).

Figure 5: Incubation program's revenue streams

4.1.10 Cost Structure

The cost structure summarizes all the costs that accrue inside the incubation program. Osterwalder and Pigneur (2013) show two forms of cost structures for traditional business models: cost-oriented and value-oriented. Intuitively, incubation models should be value-oriented with excellent services to support young ventures. In the end, incubators have to provide the best possible and tailored services to clients at the lowest costs.

4.1.11 Incubation Value Proposition

The incubation value proposition (IVP) describes the product that an incubator sells through the combination of activities, infrastructure, resources and key players. These offerings impact whether or not founders join the

program. The IVP for an incubation program must provide answers to the questions of who is addressed, what activities are offered and which key player can be included in the programme.

4.2 The Venture Incubation Canvas exemplified by Fraunhofer Venture

Fraunhofer Venture (FV) is a part of the Fraunhofer Society, which focuses on the support and transfer of technologies or products that appeared inside the Fraunhofer Institutes (Fraunhofer-Society, 2016). Figure 6 shows the stage-gate incubation process by FV that accompanies Fraunhofer researchers from the idea over the venture creation to VC investment readiness. Following the different program-steps are described.

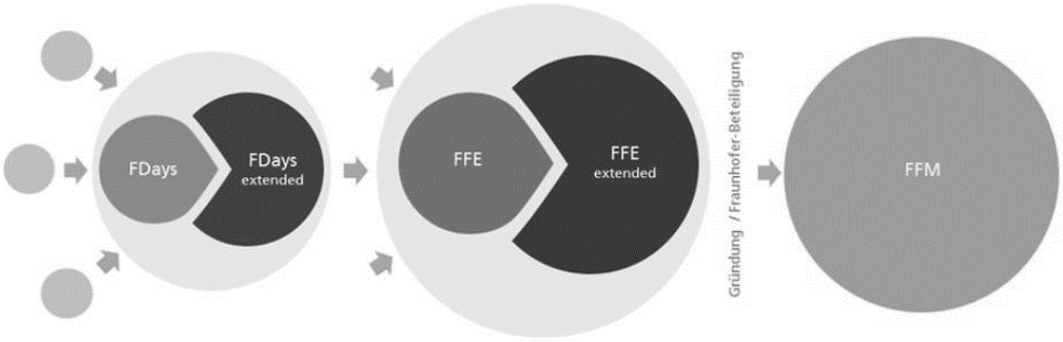

Figure 6: Fraunhofer Venture Support Programs (Fraunhofer-Society, 2016)

1. Idea stage: Fraunhofer researchers are invited to "Business Ideation"- workshops where they can evaluate their idea and detect customer usage, market potential, management team or market entry strategy.
2. FV's FDays: 12-week program with a 15k € project volume where the teams participate "micro-accelerator" in six training days ending in a business model pitch at Demo Day.
3. FDays extended: This additional six-weeks program offers a 20k € partly1 financed project volume for further idea development.
4. FFE ("Fraunhofer fördert Entrepreneure"/"Fraunhofer promotes entrepreneurs"): Successful applications receive a 12-week program with 50k € partly financed project volume in order to create a business plan ready to initialize the venture's spin-off; Resources, infrastructure, legal form and shareholder structure are defined. Researchers reduce foundation-incorporated risks and understand the challenges behind the creation of a new venture.
5. FFE extended: offers follow-up support for further development of technologies and products with up to 100k € project budgets, so the spin-off prepares for VC capability and Fraunhofer Society's participation. At the end of FFE extended, the Fraunhofer participation department decides about a potential interest in the spin-off and participation in the "Fraunhofer fördert Management"/"Fraunhofer promotes management" (FFM).
6. FFM: The program provides a 100k € premium budget for coaching and external expertise and management to support the new venture in order to increase the company valuation for future financing rounds.

5. Conclusion

It was the aim of this paper to develop a methodology to support new ventures in applied R&D networks. This work provided an overview of the technology transfer process through the techno-economic network (TEN) (Callon 1990) framework in order to identify the obstacles and stakeholders involved in the process, understand in which areas and at which stages technology transfer happens and identify who the affected stakeholders are. Next, we looked at the different dimensions of startup support programs, where the popular archetypes of business incubation were described with the use of existing literature and best practice examples. Lack of capital, poor management skills, personal and professional underdevelopment and insufficient understanding of the business environment, plus the specific challenges of their product, are common problems and the reason why many young companies fail (Dee et al., 2015; Etzkowitz, Mello, & Almeida, 2005). This is where business incubation comes in, where governments, academia, science, private

[1] FV assumes 50%, while the respective Fraunhofer institute finances the remainder.

organizations, corporations and investors intervene to support and stimulate the emergence or the growth of businesses and startup ecosystems through investment, business support and facilities (e.g. Clarysse, Wright, & van Hove, 2015). However, while doing the research for this paper, it became apparent that existing mechanisms are not clear to define since they are interpreted differently because of changing market conditions and the need for diversification, but also to match with the existing circumstances inside the ecosystem where incubation programs are applied. For this reason, in chapter four, single elements of the above-described incubation mechanisms are extracted and classified in a model called Venture Incubation Canvas (VIC). Based on that approach, incubation programs' business models should be easier to build, adjust, decouple or extend. Moreover, eventually, it can be stated that "THE methodology" cannot be developed from the outside and a final methodology needs to be developed and implemented by the ecosystem's stakeholders. The key building blocks of an incubation business model are the financing and the incubation goals. Decision makers and stakeholders need to fill the building blocks and create their individual incubation program on this foundation.

References

Bruneel, J., Ratinho, T., Clarysse, B., & Groen, A. (2012). The Evolution of Business Incubators: Comparing demand and supply of business incubation services across different incubator generations. Technovation, 32(2), 110–121.

Callon, M. (1990). Techno-economic networks and irreversibility. The Sociological Review, 38(S1), 132–161.

Capdevila, I. (2013). Typologies of Localized Spaces of Collaborative Innovation. SSRN Electronic Journal.

Clarysse, B., Wright, M., & van Hove, J. (2015). A look inside accelerators: Building Businesses. Retrieved from http://www.nesta.org.uk/sites/default/files/a_look_inside_accelerators.pdf

Debackere, K., & Veugelers, R. (2005). The role of academic technology transfer organizations in improving industry science links. Research Policy, 34(3), 321–342.

Dee, N., Gill, D., Weinberg, C., & McTavish, S. (2015). Startup Support Programmes - What's the difference? Retrieved from http://www.nesta.org.uk/sites/default/files/whats_the_diff_wv.pdf

Etzkowitz, H., Mello, J. M. C. de, & Almeida, M. (2005). Towards "meta-innovation" in Brazil: The evolution of the incubator and the emergence of a triple helix. Research Policy, 34(4), 411–424.

Festel, G. (2011). Founding angels as early stage investment model to foster biotechnology start-ups. Journal of Commercial Biotechnology, 17(2), 165–171.

Gartner, W. B. (1985). A Conceptual Framework for Describing the Phenomenon of New Venture Creation. The Academy of Management Review, 10(4), 696.

Grimaldi, R., Kenney, M., Siegel, D. S., & Wright, M. (2011). 30 Years after Bayh-Dole: Reassessing Academic Entrepreneurship. SSRN Electronic Journal.

Haines, J. K. (2014). Iterating an Innovation Model: Challenges and Opportunities in Adapting Accelerator Practices in Evolving Ecosystems. Ethnographic Praxis in Industry Conference Proceedings, 2014(1), 276–288.

Huszár, S., Prónay, S., & Buzás, N. (2016). Examining the differences between the motivations of traditional and entrepreneurial scientists. Journal of Innovation and Entrepreneurship, 5(1).

IASP. (n.d.). The role of STPs and areas of innovation. Retrieved from http://www.iasp.ws/the-role-of-stps-and-innovation-areas;jsessionid=a5feefe23660475c52253d033b67

Kenney, M., & Patton, D. (2009). Reconsidering the Bayh-Dole Act and the Current University Invention Ownership Model. Research Policy, 38(9), 1407–1422.

Laredo, P., & Mustar, P. (1996). The techno-economic network: a socio-economic approach to State Intervention in innovation. In R. Coombs (Ed.), Technological collaboration. The dynamics of cooperation in industrial innovation. Cheltenham: Elgar.

Lewis, D. A. (2005). The incubation edge: How incubator quality and regional capacity affect technology company performance. Ohio: NBIA.

Lewis, D. A., Harper-Anderson, E., & Molnar, L. A. (2011). Incubating Success: Incubation Best Practices That Lead to Successful New Ventures.

Miller, P., & Bound, K. (2011). The Startup Factories: The rise of accelerator programmes to support new technology ventures. Retrieved from https://www.nesta.org.uk/sites/default/files/the_startup_factories_0.pdf

Nazaryeva, K. (2015). Academic Entrepreneurship in the Context of a Technology Transfer Office: A Case from Brazil: Reprosentralen, Universitetet i Oslo.

Osterwalder, A., & Pigneur, Y. (2013). Business model generation: A handbook for visionaries, game changers, and challengers (1. Aufl.). Hoboken, NJ: Wiley. Retrieved from http://gbv.eblib.com/patron/FullRecord.aspx?p=4037315

Ratinho, T. (2011). Are they helping?: An examination of business incubators' impact on tenant firms. Enschede: University of Twente [Host].

Relan, P. (2012). 90% Of Incubators And Accelerators Will Fail And That's Just Fine For America And The World. Retrieved from https://techcrunch.com/2012/10/14/90-of-incubators-and-accelerators-will-fail-and-why-thats-just-fine-for-america-and-the-world/

Rothaermel, F. T., & Thursby, M. (2005). Incubator firm failure or graduation? Research Policy, 34(7), 1076–1090.

Salomao Martins, P., & Plonski, G. (2015). Science Spin-offs in the Context of Brazilian Academic Entrepreneurship.

Siegel, D. S., & Wright, M. (2015). Academic Entrepreneurship: Time for a Rethink? British Journal of Management, 26(4), 582–595.

Spath, D., & Walter, A. (2012). Mehr Innovationen für Deutschland: Wie Inkubatoren akademische Hightech-Ausgründungen besser fördern können (acatech STUDIE). Untersuchung, Typisierung und internationaler Vergleich der Inkubatorlandschaft in Deutschland (1. Aufl.). s.l.: Springer-Verlag. Retrieved from http://gbv.eblib.com/patron/FullRecord.aspx?p=968725

Yusubova, A., & Clarysse, B. (2016). Success Factors of Business Accelerators in Three European Cities: Paris, London, Berlin. In P. H. C. Phan, S. A. Mian, & W. Lamine (Eds.), Technology entrepreneurship and business incubation. Theory, practice, lessons learned (pp. 35–56). London: IMPERIAL COLLEGE PRESS.

Implementation of Balanced ScoreCard: Simplify strategic thinking development in Portuguese SMEs

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Abstract: The Portuguese business structure is essentially composed of small and medium-sized enterprises (SMEs), which, despite their size, generate employment and contribute to the increase of national income. In many of these companies, some of them having less than ten employees, management and operational functions are often carried out by the entrepreneur. In addition, the entrepreneur does not always have technical knowledge in management, nor do they have the available time (since they have various responsibilities within the company) to develop and implement a management strategy that allows the enterprise to remain in the market while adopting a more conscious, consistent and sustained orientation. Within the scope of the Operational Program for Competitiveness and Internationalization - Portugal 2020, the Balanced ScoreCard (BSC) strategic management instrument was developed and implemented in several companies and sectors of the Portuguese economy. This instrument was crucial in initiating a process of strategic thinking which, quite possibly, would not have happened in such a short time horizon. This research work analyses through an essentially qualitative research the way the BSC instrument was developed and implemented. Another objective is to understand the main advantages of its use and its main application constraints. The data was gathered through a semi-structured interview developed for the owners of four Portuguese SMEs in the northern region Portugal, targeted under the abovementioned programme framework. The results demonstrate the instrument was essential for the development of a structured strategic thinking, as well as for a better performance and, consequently, to the improvement of the competitiveness of the targeted companies. The results also show the instrument had to be adapted and simplified and its implementation has to involve all the employees of the enterprises.

Keywords: Balanced ScoreCard, SMEs, strategic thinking, performance, competitiveness, Portugal

1. Introduction

The Portuguese business structure is composed, from north to south of the country, mainly by micro and small and medium enterprises (SMEs) (Instituto Nacional de Estatística, 2018, Pordata, 2018). In fact, if we look at the Portuguese business structure, micro, small and medium-sized companies hold a majority compared to large companies. Notwithstanding their small size, and since their number is large, they contribute significantly to the Portuguese Gross Domestic Product (GDP) and to employment creation. Thus, according to data published in Pordata (2018), in the year 2016 there were 1,213,107 SMEs in Portugal, corresponding to 99.9% of the total number of companies in the country. In this group, 1,167,993 (96.2%) were micro-sized, 38,866 (3.2%) were of small size and 6,248 (0.5%) were of medium size, according to the data collected from INE (2018). Still, and according to the metadata information of Instituto Nacional de Estatística (2018), a company is considered micro if it has less than 10 employees and a total turnover and/or balance sheet which does not exceed 2 million euros; a company is considered small if it has between 10 and 49 employees and an annual turnover and/or total balance between 2 and 10 million euros; and a company is considered medium if it employs between 50 and 249 people and has an annual turnover between 10 and 50 million euros, or an annual balance between 10 and 43 million euros.

In Portuguese micro enterprises and in SMEs, when the entrepreneur has an average education level and the human resources department does not employ any personnel with qualification in management, the strategic planning of the company is not always considered from a medium to long-term perspective. However, in an increasingly competitive market, it is essential that companies make use of all their skills, both material and technological, as well as their human resources, which are essential to increasing their productivity and competitiveness. Effectively, without these competencies, organizations will not be able to interact in a more

competitive market and thus position themselves sustainably in order to achieve consistent growth and organizational excellence (Requeijo et al., 2018).

With the aim of stimulating smart, sustainable and inclusive growth, the Partnership Agreement between Portugal and the European Commission, called Portugal 2020 is being implemented through 16 Operational Programs to be developed between 2014 and 2020. Among these 16 Operational Programs, the ones that stand out Compete 2020 - Competitiveness and Internationalization Operational Program and the North Region Operational Program 2014-2020.

In order to achieve a more equitable distribution of funds, the Portuguese territory was divided into three distinct zones, taking into account the level of GDP per capita, accordingly: i) regions which are considered to be less developed, showing a GDP per capita of less than 75% of the EU average, which include the North, Centre, Alentejo and Autonomous Region of the Azores; (ii) regions in transition, which show a GDP per capita between 75% and 90% of the EU average, including the Algarve region; and (iii) more developed regions, which show a GDP per capita above 90% and include the Lisbon region and the Autonomous Region of Madeira. The companies targeted in this research are located in the northern part of the country and have been involved in the Compete 2020 Program. As part of the operationalization of this program, the Balanced ScoreCard strategic management tool was developed and implemented in a set of companies, while adapted to the reality of each company.

Therefore, the objective of this research is to identify and understand the benefits from the participation of a group of companies in the operational program Compete 2020 - Competitiveness and Internationalization Operational Program and the North Region Operational Program 2014-2020, during which it was developed and operationalized the Balanced ScoreCard strategic management tool.

Consequently, and to pursuit on the proposed objective, in section two a theoretical introduction to the Balanced Scorecard methodology and its use as a tool for strategic management in micro and SMEs is made according to the relevant existing literature; in the section three the procedures for the development and implementation of BSC in the group of companies involved are explained and in the section four the main conclusions of this intervention and the advantages and gains for the participating companies are described.

2. Balanced ScoreCard as a strategic management instrument

The economic and financial situation is the result of certain decisions that encompass other areas of the company, such as customers, internal processes, and innovation and learning, namely all those involved in the operational process. Hence, it is extremely important to define non-financial indicators that allow the measurement of organizational performance, and to complement the economic vision that only some entrepreneurs adopt in companies (Brandão et al., 2008, Ravi et al., 2005, Davis and Albright, 2004, Norreklit, 2000).

The consideration of non-financial indicators defined alongside with financial indicators allows organizations to align their mission, vision, values, objectives and behaviors, as well as to develop a continuity of improvement of processes, which translates into enhanced products or services and, consequently, in better results and quantifiable successes and failures (Rompho, 2011). This process should be continuous, and organizations should, at the end of each cycle, diagnose, coordinate, monitor and evaluate the results obtained for each defined indicator in order to measure organizational performance. Thus, performance measurement and evaluation provide the necessary feedback, the indispensable understanding, and the motivation required to initiate strategic thinking, structural change, and organizational learning processes.

It is this organizational learning (Brandão et al., 2008), the organization's ability to learn, to change and to adapt itself to new market demands, which makes it assume a more dynamic perspective and which will allow the necessary and essential adaptation to happen in a competitive and sustained way, in a market that is increasingly competitive.

The fundamental issue of the analysis lies in strategic thinking (Valdez et al., 2017), structural change and organizational learning (Brandão et al., 2008), the definition and determination of performance measures

being an essential process for all stakeholders involved to understand, adapt and undertake necessary efforts for the company to achieve the main goal, which is generation of profit.

The success of contemporary organizations depends more and more on the quality of the products and services they offer. However, most of the time this is not in itself a sufficient condition for a company to remain in the market. Considering the reality of the micro and small Portuguese companies, one of the big players in the entire business process is the entrepreneur, often a one-man show and the only person in the company who happens to hold several business functions, ranging from operability to strategy; in many of these cases, strategic thinking, a key factor in the medium and long-term permanence of the company in the market, is being relegated to the background. This characteristic was likewise mentioned by Andersen et al. (2001) and Valdez et al. (2017).

The development and implementation of this tool of strategic management, BSC, enables companies involved, and more specifically the entrepreneur, to stop worrying about the strategy and planning of their business. Moreover, this methodology was developed by Kaplan and Norton in 1992 and was widely used in and by several organizations (from micro to large size), since its main objective was to capture the tool's complexity in a holistic way (Prieto et al., 2006, Rosemann and Wiese, 1999, Andersen et al., 2001, Rompho, 2011, Johanson et al., 2006, Rodrigues, 2018).

Some of the advantages of using this instrument as a strategic management system is that it allows: a reflection and definition of a set of performance indicators and their link to the company strategy (Bhagwat and Sharma, 2007); understanding the relation of operational control to mission, vision and strategy (Fernandes et al., 2006); the correct definition and clarification of cause and effect relationships; attention of entrepreneurs to stay on the most critical aspects associated with their business; and, finally, the fact that its implementation fosters a holistic, broad and integrated vision of organizational performance (Kaplan and Norton, 1995, Rosemann and Wiese, 1999, Johanson et al., 2006, Prieto et al., 2006). In fact, this process allows to understand the important relationship between the different goals and objectives of all the diverse stakeholders in the company, such as managers, customers and employees (Akkermans and Van Oorschot, 2018).

Also, according to Andersen et al. (2001), Valdez et al. (2017) and Fernandes et al. (2006), the BSC implementation both in micro, SMEs and large companies allows to determine the direction the company should follow, a deep acquaintance of the organization, the ability to focus and to prioritize and the agility to change whenever necessary.

Likewise, the BSC seems to be extremely important not only in defining indicators for the four different perspectives already mentioned, but also in the identification of skill gaps at an organizational level, given their complete nature, in accordance with Brandão et al. (2008), Prieto et al. (2006) and Rosemann and Wiese (1999).

3. The implementation processes

The development and implementation of a BSC is a time-consuming process and must follow appropriate procedures. Kaplan and Norton (1995) consider the following steps for their development: preparation, interviews with senior management, executive workshop (first round), interviews (second round), executive workshop (second and third rounds), implementation, and subsequently, periodic reviews. Since in the cases mentioned the process occurred in micro enterprises, companies in which the entrepreneur and manager were one and the same person, the process tended to be simplified (Andersen et al., 2001), having elapsed as described below.

Therefore, the BSC's development and implementation process advanced as follows: an initial meeting was held with the entrepreneur, manager or selected team to follow up the project, during which the entire procedure was explained and the implementation schedule was defined. After that, a timetable was issued, which was signed by all those involved in the process, and a weekly schedule for follow-up and progress meetings was also defined. This procedure occurred according to the aforementioned (Kaplan and Norton, 1995).

The following week a diagnosis of the company was elaborated, which was the starting point for all the work developed. In order to elaborate and to prepare this diagnosis, it was necessary to research, collect and gather all the information related to the company's strategy, which was later used as input in the first phase of BSC development: i) internal to the company: financial plan (if existent), marketing (if existent), balance sheets and income statements for the last 3 years, Simplified Business Information [Informação Empresarial Simplificada] for the last 3 years, quality improvement programs (if existent), customer analysis (sales evolution, margins, payment deadlines, economic and financial situation , etc.) and interviews with senior management; ii) external to the company: competitive analysis, trend analysis, technological evolution analysis, market share evolution, comparison with Banco de Portugal data and sector data (INE and Pordata); and iii) analysis of data of the largest competitors—their characteristics, positioning and analysis by market. After the diagnosis of the company was completed, a working session was held with the remaining employees of each of the companies, with the purpose of integrating them throughout the process, since it held great importance in the development of this instrument and, consequently, in the strategy of the company (Andersen et al., 2001).

Actually, one of the reasons that is pointed out for the failure to implement this instrument in SMEs is lack of involvement of the organization's employees (Rompho, 2011).

The following session had the objective of defining the strategic themes and should validate the following assumptions: there should be no more than 5 strategic themes; strategic themes are realistic and achievable by the organization; themes support and are related to strategic objectives; themes have a positive influence on the organization; themes give direction and impact to what is important; each theme is different; themes have a strategic scope, that is, they are valid for the duration of the context in which they are defined; the themes are consistent with the mission and the vision; the themes have an impact on the financial objectives of the organization.

The subsequent work sessions were aimed at building the mission and operational vision of the business strategy and, later on, at the development of the dashboard, which contains: i) the four distinct perspectives of BSC (Rompho, 2011, Davis and Albright, 2004, Johanson et al., 2006): financial, customers, internal processes, and innovation and learning; ii) the indicators, with their source and metric, for each of the perspectives; iii) the strategic objectives and the respective goals, defined annually and for a time horizon of 3 years; iv) the programs or activities to be developed, for each indicator and/or group of indicators; and finally, v) budgeting. The development of the dashboard took an average of 7 work sessions, of 4 hours each, in each of the companies under contract.

The following table shows some of the indicators defined by the companies, for each of the perspectives, for the construction of the strategic objectives.

Table 1: Indicators defined by companies

Financial perspective	**Customer perspective**
Annual turnover	Overall customer satisfaction
Liquidity	Percentage of customers who would recommend the company
Gross margin	Percentage of customers viewing the company as a partner
Solvency	Return rate of major customers
EBITDA - Earnings before interests, taxes, depreciations and amortisations	Service award rate
	Number of new customers based on annual turnover
Operating result	Increase in the number of new subscribers / year
Net income	Advertising turnover volume increase
Financial autonomy	Frequency of publication
Return on equity	Number of new customers
Return on assets	Number of visiting customers
Results by business area	
Profitability by business area	
Internal processes perspective	**Innovation and perspective**
Number of orders to suppliers	Number of hours of training per year
Value of orders to suppliers	Employee satisfaction
Number of trips made for purchase	Employee stress
Inventory rotation	Evaluation rate of training effectiveness
Days of stock	

Internal processes perspective	Innovation and perspective
Implementation of Safety and Hygiene at Work Internal communication Timely conclusion/delivery of technical pedagogical dossiers National Authority for Civil Protection accreditation Definition of process phases Definition of the procedure in each phase Implementation of defined procedures Definition of the monitoring and control system System implementation Preparation of basic report (with indicators) to present to the bank	

Source: Self elaboration based on information collected from the companies

All the processes were completed by August 2017, and the results were evaluated in March 2018, while the goals of the indicators were updated whenever it was necessary. In an interview with the businessmen, it was concluded that the implementation of this strategic management tool allowed each of the companies involved to define a set of activities that reinforced their presence in a more systematized and sustained manner in a competitive market, while allowing them to rethink their activity, in view of the endogenous and exogenous component of the organization itself. These perspectives were aligned with several researchers like Andersen et al. (2001) and Ravi et al. (2005).

Thus, the companies, after implementing the defined activities, rethought the internal processes inherent to the development of their activity, improved their results, increased the number of clients—in short, improved and reinforced their position in the market in which they operate or have strengthened their performance as well as their competitiveness.

Among other things, the BSC supports organizations to define, implement, maintain and improve proactive strategies to identify and solve internal problems, including financial, customer, and internal processes, as well as learning and development (Ravi et al., 2005, Johanson et al., 2006).

4. Discussion

This paper highlights the importance of the need for adequate strategic management in SMEs, as well as the scarcity of resources, usually human resources, of micro and small enterprises, which convey in the lack of adequate management procedures that would allow these companies not only to stay in the market sustainably but also to develop a growth strategy that would allow them to grow and thrive in competitive markets. In fact, authors like Singh et al. (2018) consider the performance evaluation crucial to competitiveness and to companies' sustainability.

Accordingly, through the participation of micro, small and medium companies in funded programmes, this gap is minimised, and entrepreneurs have access to knowledge transfer, provided by the consultants who intervene in the company, initiating a strategic framework and management thinking process, which otherwise would hardly happen, at least in the short term.

5. Conclusions

In general terms, the following results were achieved within the group of intervention companies: generation of higher value for entrepreneurs, increase in financial and investment capacity, growth in turnover, increase in customer numbers and customer loyalty, achievement of new customers and/or new markets, increase of market share, increase in profitability, increase of productivity, innovations in the production process (internal process), anticipation of the needs of target markets, increase of the number of training hours for human resources, and increased employee satisfaction.

The implementation of the project made it possible for companies to adopt practices that allow them to better adapt to the current competitive requirements, with the definition of new indicators, new goals and new activities that will allow them to consolidate their positions in the market. This idea was also shared by (Requeijo et al., 2018, Valdez et al., 2017, Bhagwat and Sharma, 2007, Rodrigues, 2018).

The improvement of the internal processes is also expected to be reflected in the increase in the number of clients, in a higher percentage of budgets awarded and, consequently, in an increase in the rate of growth of turnover, as well as in the increase of the number of clients. On the other hand, the planned training actions should enable human resources to achieve better satisfaction and motivation and, certainly, better performance and higher productivity.

Therefore, it is concluded that the development and implementation of the Balanced ScoreCard strategic management tool is a great asset for a more systematized and sustained development commitment, which will have repercussions in the future and will bring improvements not only in the short but medium time horizon, since the development of skills resulting from this cooperation has ensured a greater performance of companies and demonstrated that a growing increase in the respective organizational processes is possible, with clear advantages in terms of their performance in the market.

References

AKKERMANS, H. A. & VAN OORSCHOT, K. E. 2018. Relevance assumed: a case study of balanced scorecard development using system dynamics. System Dynamics. Springer.

ANDERSEN, H., COBBOLD, I. & LAWRIE, G. Balanced scorecard implementation in SMEs: reflection on literature and practice. 4th SME International Conference, Allborg University, Denmark, 2001. Citeseer.

BHAGWAT, R. & SHARMA, M. K. 2007. Performance measurement of supply chain management: A balanced scorecard approach. Computers & Industrial Engineering, 53, 43-62.

BRANDÃO, H. P., ZIMMER, M. V., PEREIRA, C. G., MARQUES, F., COSTA, H. V., CARBONE, P. P. & ALMADA, V. F. D. 2008. Gestão de desempenho por competências: integrando a gestão por competências, o balanced scorecard e a avaliação 360 graus. Revista de Administração Pública-RAP, 42.

DAVIS, S. & ALBRIGHT, T. 2004. An investigation of the effect of balanced scorecard implementation on financial performance. Management accounting research, 15, 135-153.

FERNANDES, K. J., RAJA, V. & WHALLEY, A. 2006. Lessons from implementing the balanced scorecard in a small and medium size manufacturing organization. Technovation, 26, 623-634.

INSTITUTO NACIONAL DE ESTATÍSTICA. 2018. Available: http://www.ine.pt/ [Accessed January 15].

JOHANSON, U., SKOOG, M., BACKLUND, A. & ALMQVIST, R. 2006. Balancing dilemmas of the balanced scorecard. Accounting, Auditing & Accountability Journal, 19, 842-857.

KAPLAN, R. S. & NORTON, D. P. 1995. Putting the balanced scorecard to work. Performance measurement, management, and appraisal sourcebook, 66, 68.

NORREKLIT, H. 2000. The balance on the balanced scorecard a critical analysis of some of its assumptions. Management accounting research, 11, 65-88.

PORDATA. 2018. Available: https://www.pordata.pt/ [Accessed January 2].

PRIETO, V. C., PEREIRA, F. L. A., CARVALHO, M. M. D. & LAURINDO, F. J. B. 2006. Fatores críticos na implementação do Balanced Scorecard. Gestão & Produção, 13, 81-92.

RAVI, V., SHANKAR, R. & TIWARI, M. K. 2005. Analyzing alternatives in reverse logistics for end-of-life computers: ANP and balanced scorecard approach. Computers & industrial engineering, 48, 327-356.

REQUEIJO, J. F. G., ABREU, A. J. P. D. C. F., CALADO, J. M. F. & DIAS, A. S. M. D. E. 2018. Six Sigma Business Scorecard Approach to Support Maintenance Projects in a Collaborative Context. Revista Produção e Desenvolvimento, 4, 82-97.

RODRIGUES, A. F. A. 2018. Controlo de Gestão, Balanced Scorecard e a aplicação da metodologia Hoshin Kanri: um estudo de caso na Marinha Portuguesa.

ROMPHO, N. 2011. Why the balanced scorecard fails in SMEs: A case study. International Journal of Business and Management, 6, 39.

ROSEMANN, M. & WIESE, J. Measuring the performance of ERP software–a balanced scorecard approach. Proceedings of the 10th Australasian Conference on Information Systems, 1999. Citeseer.

SINGH, S., OLUGU, E. U., MUSA, S. N. & MAHAT, A. B. 2018. Fuzzy-based sustainability evaluation method for manufacturing SMEs using balanced scorecard framework. Journal of Intelligent Manufacturing, 29, 1-18.

VALDEZ, A., CORTES, G., CASTANEDA, S., VAZQUEZ, L., MEDINA, J. & HACES, G. 2017. Development and Implementation of the Balanced Scorecard for a Higher Educational Institution using Business Intelligence Tools. Development, 8.

Small and Medium Enterprises and New Ventures in Entrepreneurial Ecosystems: The Case of Industrial Districts and Innovative Startups in Italy

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Abstract: To date, contributions in the field of EEs have mainly focused on EEs' definitions, actors, key attributes, and consequences on new ventures' creation and growth. To the best of our knowledge, the few studies that explicitly examine the relations among EEs' actors under-remark the linkages between Small Medium Enterprises (SMEs) and new ventures. We deem that this relation is important, especially for EEs located in countries characterized by an underdeveloped Venture Capital (VC) market, a limited number of large corporations and a massive presence of SMEs, often operating in traditional industries, which are the main engine of local and regional development. This study sets the stage for advancing our understanding of this under-explored relation to stimulate novel directions for academic research and practice-oriented conversations on EEs and, more generally, on regional development. To this end, first, we systematize the (limited) extant knowledge on the relation between SMEs and new ventures in EEs. Then, for the shake of relevance, we provide descriptive evidence of this relation in the context of Italian Industrial Districts (IIDs), a peculiar case of EEs, where Italian SMEs tend to agglomerate. Specifically, by using GIS techniques, we found evidence that Innovative Startups tend to locate within IIDs. Interestingly enough, no evidence supports the view that Innovative Startups operate in the same industry of specialization of the IID. Finally, the study presents a possible research agenda on the topic, which we hope can be of interest for both academics and policymakers.

Keywords: Entrepreneurial Ecosystem, Industrial Districts, Entrepreneurship, Geo-Proximity, Industry Relatedness

1. Introduction & Background

Scholars define entrepreneurial ecosystems (hereafter: EEs) as "sets of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory" (Stam, 2015, p. 5). The concept roots in the regional development and strategy literature (Yun et al., 2017; Erina et al., 2017) and emphasizes that entrepreneurship happens in a community of individuals, organizations, and regulatory bodies located and interacting in specific geographical area (Isenberg, 2010; Acs et al., 2017; Kuratko et al., 2017). Several scholars conceive EEs as complex and "evolving" dynamic systems (Acs et al., 2014; Feld, 2012; Isenberg, 2010; Spigel, 2017). Consequently, Neumeyer et al. (2017) examine EEs as complex social organizations by means of social network data analysis; other researchers introduce system dynamics and simulation methodologies in EE research (Yearworth, 2010; Yun et al., 2017). Despite we do not want to deny the value of these efforts, we recognize that most of the literature has seriously questioned the feasibility of modelling a complex and dynamic system as a whole (Pruyt 2013; Harrison et al., 2007). As suggested by Forrester (2007) - the father of complex modelling - to gain understanding of complex systems we should first focus their smaller parts and key and context-specific relationships (Sterman, 2000; Ghaffarzadegan, 2011).

Expanding on this argument, we contend that we can foster our understanding on *why and how* new ventures are created and growth in EEs by going deeper into the most important relations linking their actors (see e.g., Spigel, 2017 for a similar argument). The growing strand of the research on EEs, which addresses this topic, has, to date, focused on the relationships linking new ventures to incubators, venture capitalists (VCs), local universities, and large corporations. Many contributions recognize the paramount importance of incubators for fostering local entrepreneurship (see for instance Campbell and Allen, 1987); likewise, there is wide consensus on the key role of universities in EEs. Specifically, universities viewed as sources of entrepreneurial opportunities and technical solutions, which stimulate the creation and growth of new ventures. VCs are regarded as key actors in EEs alike. This holds especially true when referring to innovative entrepreneurship as these specialized investors can fill the financial and knowledge gaps that innovative startups experience in their early development stages. Finally, several contributions point to the leading role of large corporations in supporting new ventures in EEs (e.g. Bhawe and Zahra, 2017).

Conversely, the relations linking new ventures, in general, and innovative startups in particular, to SMEs has to date gone largely under-remarked. We consider this an important gap in the literature on EEs. Indeed, evidence exists that many EEs, where the VC market is under-developed and there are few large corporations, are rich in SMEs (often operating in traditional industries), which are deeply embedded in the territory. It is reasonable to imagine that, in these contexts, SMEs can play a leading role in stimulating the creation and growth of new ventures - even of the innovative ones - and can create important synergies with incubators and universities. Indeed, as we explain in the following, despite suffering from liability of smallness, SMEs can be focal resource-providers and privileged partners for new ventures and innovative startups, with which they can establish win-win relations. This study is a first attempt to fill this gap.

To this end, first, we discuss why the relations between SMEs and new ventures can be key in EEs, also systematizing the (limited) available knowledge on the topic. Then, we provide descriptive evidence pointing to this relation in the relevant context of the Italian Industrial Districts (IIDs), a peculiar case of EEs, where Italian SMEs, operating in the same industry, tend to agglomerate (Becattini, 1989).

The remainder of the study consists in four sections. Following the introduction section, Section 2 illustrates the Research Design. Section 3 illustrates the results. Finally, Section 4 discuss the results and conclude the study, focusing on its academic contribution and relative policy implications.

2. Research Design

2.1 The Empirical Setting

The academic relevance of the Italian case is threefold. First, VC market in Italy is underdeveloped and there is also a limited range of large corporations: these characteristics provide fertile ground for the interaction between innovative new ventures' and SMEs - typically populating an Italian Industrial District (IID) - a crucial element for the growth of a local EE. Second, IIDs represented a successful story of entrepreneurship, extensively debated in literature (e.g. Becattini, 1989; Camagni & Capello, 1988; Pyke et al. 1990), that led Italy to be the 6th economy (by GDP) in the World. The Italian Industrial Districts experienced several crises and transformation phases to date, but still represent an important engine for the Italian economy. Third, we are currently witnessing a new big wave of innovative and growth-oriented entrepreneurship. As a result, more than 8,000 innovative start-ups had registered and claimed to be innovative, according to the Italian Chamber of Commerce Firms Register. For a more detailed description of the new Italian legislation on 'innovative start-up', see Colombelli (2016), and Calcagnini et al. (2016).

2.2 The Database

Data on innovative new ventures and Industrial Districts (IIDs) in Italy informed our analysis. Specifically, data on innovative new ventures was collected from the Italian Chamber of Commerce Firms Register - Special section (Register). As a result, the data set includes 8406[1] firms established in Italy between 2009 and 2017, distributed across 110 NUTS3[2] (provinces) and classified by industry through ATECO[3] 2007 codes. Data on 141 Industrial Districts, also distributed across 110 NUTS3, were collected from ISTAT (The Italian Institute of Statistics).

2.3 Measuring Geographical Proximity and Industry Relatedness

We express distance in kilometers and travel time in hours. Distance is as a continuous measurement of geographical proximity (Ellwanger and Boschma, 2015) and it has been calculated by means of the great distance formula (Pearson, 2011). Latitude and Longitude geographical coordinates were collected for each innovative startup and industrial district. As a further measure of geographical proximity, we also calculated the shortest travelling time by car (Fritsch and Schilder, 2006) using Google.maps, an on-line route planning tool.

[1] Updated to 29/12/2017.

[2] NUTS stands for Nomenclature of Units for Territorial Statistics, geographical nomenclature subdividing the economic territory of the European Union (EU) into regions at three different levels: NUTS 1, 2 and 3 respectively, moving from larger to smaller territorial units. (Source EUROSTAT).

[3] Italian version of the European nomenclature, NACE Rev. 2, published in the Official Journal of 20 December 2006 (Regulation (EC) no 1893/2006 of the European Parliament and of the Council of 20 December 2006).

After measuring spatial distance, we were able to identify the closest IIDs for each innovative new venture. In accordance with our research interest, we then measured whether there is industry relatedness between innovative new ventures and their closest IID. Industry relatedness is commonly measured by indicating whether two activity codes belong to the same level within the hierarchy of an industrial classification system (e.g. Frenken et al., 2007). Some scholars also use other specific measures for relatedness, such as product-relatedness (see for instance Neffke et al., 2011) or technological-relatedness (e.g. Ahuja and Katila, 2001). Since, the latter is more appropriate for large firms rather than small ones (Aghasi et al., 2017) (as in our sample) and no data is available on products, we measure industry relatedness based on ATECO codes. Despite its weaknesses (e.g. Markides and Williamson, 1996), ATECO classification is the only consistently available information for our sample. ATECO codes discriminate the core business activities of a firm to the division (2-digit), group (3-digit), class (4-digit), category (5-digit) and subcategory (6-digit) level. Since many firms in our sample do not present data in terms of group, class, category and subcategory, we focused on divisions. Thus, we operationalized industry relatedness with mutually exclusive binary variables, as a widely accepted and used measure in literature (e.g. Ellwanger and Boschma; 2015). Specifically, we measure industry relatedness between the new ventures and the closest IID based on the following variable: INTRA_Division, equal to 1 if the innovative new venture shares identical first two digits of its ATECO code (division) with at least one of the IID's codes, zero otherwise.

3. Empirical Evidences

In accordance with the main interests of the present study, we closely look at the geographical proximity and industry relatedness. Table 2 and Table 3 illustrate the distribution of the spatial distance between Industrial Districts (IIDs) and innovative new ventures in kilometers, as well as in terms of travel time (hours). According to ISTAT, the average geographical area occupied by IID in Italy is 400 km^2. As, methodologically, we localize each IID with the geographical coordinates of the center of the geographical area that it covers, it is reasonable to assume that - within 10 km distance from an IID - the new venture is located in an IID's geographical area. Results in Table 2 illustrates that this is the case for 18% of the total sample of new ventures. Furthermore, we find that the 73% of the total sample of innovative new ventures is located within 40 km from the closest IID. Thus, we may consider reasonable that - within 40 km distance - two entities can be accounted as being in geographical proximity. Similarly, while considering travel time.

Table 2: Distance between Industrial Districts and Innovative new ventures*

	<10 Km	*10-40 Km*	*40-100 Km*	*100+ Km*
Number of innovative start-ups	1465	4615	1535	712
Percentage	18%	55%	18%	9%
Cumulated	18%	73%	91%	100%

*Number of Observations: 8327

Table 3: Travel time between Industrial Districts and Innovative new ventures*

	<30 mins	*30-60 mins*	*60-120 mins*	*120+ mins*
Number of innovative start-ups	4296	3118	308	605
Percentage	52%	37%	4%	7%
Cumulated	52%	89%	93%	100%

*Number of Observations: 8327

Once identified the closest IID for each new venture, we measured their distance in terms of industry. As shown in Table 4, results clearly indicate a certain distance in terms of industry between new ventures and their closest IID.

Table 4: Industry Relatedness between Industrial Districts and Innovative new ventures

	Intra-Division
Number of innovative start-ups	447
Percentage	5,37%
Cumulated	5,37%

*Number of Observations**:** 8327

4. Discussion and Conclusion

The Entrepreneurial Ecosystem Research, though being an emerging field, can count on numerous and precious contributions within the field of entrepreneurship. For instance, the body of knowledge dealing with entrepreneurial dynamics such as new venture creation is extensive. To foster our understanding on *why and how* new ventures are created and grow in EEs, scholars should focus on the most important relations linking their actors (Spigel, 2017). The growing strand of the research on EEs, which addresses this topic, has, to date, focused on the relationships linking new ventures to incubators (Campbell and Allen, 1987), venture capitalists, local universities, and large corporations (Bhawe and Zahra, 2017). In accordance with Acs et al. (2017), Anselin et al. (1997), and Florida et al. (2017), EE are territory and context specific. Thus, the key relations in EE should consider local and contextual dimension - as a dominant logic in entrepreneurship. In the light of these arguments, we contend that scholars investigating EEs characterized by an underdeveloped Venture Capital market and a low number of large corporations should focus on the key relation between SMEs and innovative new ventures. In this study, we aim at opening a debate and provide further research direction to explore such key relation in EE. By introducing the theoretical setting (in Section 1), we provide initial argumentations on the main features and differences characterizing SMEs and innovative new ventures, and thus, why partnerships and collaboration among those key players in EE may work and should be encouraged by specific policy measures. To further this debate, we need both qualitative and quantitative studies. For instance, exploring cases of partnerships between SMEs and innovative new ventures may enhance our understanding of the mutual benefits they may exploit. Beside successful case history, also worst cases and failure cases should be investigated. As regard, several studies are needed focusing on specific context and industry of reference in order to further our understanding on good, best and bad practices while SMEs and innovative new venture are partnering.

Along debated in literature, the “serivatization process” involves many SMEs operating in manufacturing (e.g. Vandermerwe and Rada, 1988; Baines, et al., 2009) and may also represent a promising avenue to further EE’s research. SMEs typically are more product than service oriented. However, today customers require additional services that may complete the product, expand its uses and scope. In some cases, products are replaced by services. In other words, companies are selling the usage of a product rather than selling it. The *serivatization process* may represent a specific type of collaboration project leading to mutual benefits for SMEs and innovative new ventures. Many companies, in order to face new trends and threats and be sustainable, are required to build additional services around a focal product (Coreynen, Matthyssens, and Van Bockhaven, 2017). This process is not easy for “giant” companies and similarly for SMEs. Future research may investigate whether innovative new ventures may support IIDs’ SMEs through their servitization process. Moreover, scholars that are demonstrating a major attention on digital entrepreneurial ecosystem may find of a great interest to investigate the role of “digital servitization process” (Opresnik and Taisch, 2015) as factor enabling SMEs and innovative new ventures collaboration and ultimately fostering digital entrepreneurial ecosystem.

Recently emerged another hot topic that deserves great attention while dealing with EEs: how entrepreneurial dynamics can be governed (see e.g. Colombo et al., 2017) and what are the key actor that may have a major role here: nobody - “invisible hand”? (Isenberg, 2010), policy makers? (Stam, 2015), universities? large corporations? (Bhawe and Zahra, 2017), investors? (Colombo and Murtinu, 2017), joint ventures (Audretsch and Link, 2017); and in which phase of the EE evolutionary process? (Colombelli et al., 2017). In this study, we highlight that also SMEs may play a major role in EE. Future research should focus, not only on how SMEs may favor the birth and growth of innovative new ventures, but also, their supportive role to other EEs’ key players

such as incubators, angels, VCs etc. In addition, we argue that a promising research direction will investigate whether SMEs may replace some of the key players aforementioned and compensate to the absence of an active venture capital market. Here, qualitative and especially quantitative studies are required to foster our current knowledge on the topic.

In this study, we also started to search for "signal" of connection between SMEs and innovative new ventures. Specifically, we provide descriptive evidences on the geographical and industry proximity between SMEs and innovative new ventures. Our descriptive evidence suggest that innovative new ventures tend to agglomerate within or close by IIDs - typically populated by SMEs operating in the manufacturing sector. A large body of literature argue that effective collaboration may be favored by geographical proximity (e.g. Rallet and Torre, 1999; Knoben and Oerlemans, 2006). However, several other forms of proximity exist (Boschma, 2005) that need further investigations such as industry proximity. As regard, we find no evidence on industry relatedness between innovative new ventures and IIDs. Scholars, while adopting different theoretical lens, have along debated around industry relatedness as factor fostering rather than depressing the potential advantages of collaborations between organizations. For instance, organizational learning theorists suggests that interactions among industry related companies may favor the exploitation of synergies leading to better innovative and economic performance (Cohen and Levinthal, 1990). Conversely, some scholars argue that being too industry-related may reduce the learning opportunities and affect innovation performance (Sapienza et al., 2004; Cloodt et al., 2006). Similarly, scholars following a Resource-Based-View perspective argue that resource relatedness may enhance collaborations among companies. Conversely, the economic theory of complementarities informs about the benefits of resource complementarity in alliances and acquisitions (Harrison et al., 1991; Tanriverdi and Venkatraman, 2005). We recognize that the first evidence we find deserves a deeper investigation that may confirm or not our result.

References

Acs, Z.J., Autio, E. & Szerb, L. 2014, "National systems of entrepreneurship: Measurement issues and policy implications", Research Policy, vol. 43, no. 3, pp. 476-494.

Acs, Z.J., Stam, E., Audretsch, D.B. & O'Connor, A. 2017, The lineages of the entrepreneurial ecosystem approach, Small Business Economics.

Aghasi, K., Colombo, M.G. & Rossi-Lamastra, C. 2017, Acquisitions of small high-tech firms as a mechanism for external knowledge sourcing: The integration-autonomy dilemma, Technological Forecasting and Social Change.

Anselin, L., Varga, A. & Acs, Z. 1997, "Local geographic spillovers between university research and high technology innovations", Journal of Urban Economics, vol. 42, no. 3, pp. 422-448.

Baines, T.S., Lightfoot, H.W., Benedettini, O. & Kay, J.M. 2009, "The servitization of manufacturing: A review of literature and reflection on future challenges", Journal of manufacturing technology management, vol. 20, no. 5, pp. 547-567.

Becattini, G. 1989, Riflessioni sul distretto industriale marshalliano come concetto socio-economico, Stato e mercato.

Bhawe, N. & Zahra, S.A. 2017, Inducing heterogeneity in local entrepreneurial ecosystems: the role of MNEs, Small Business Economics.

Boschma, R. 2005, "Proximity and innovation: a critical assessment", Regional Studies, vol. 39, no. 1, pp. 61-74.

Calcagnini, G., Favaretto, I., Giombini, G., Perugini, F. & Rombaldoni, R. 2016, "The role of universities in the location of innovative start-ups", The Journal of Technology Transfer, vol. 41, no. 4, pp. 670-693.

Camagni, R. & Capello, R. 1988, Italian success stories of local development: theoretical conditions and practical experience, Universita {Luigi} {Bocconi {Milano mimeo.

Campbell, C. & Allen, D.N. 1987, "The small business incubator industry: micro-level economic development", Economic Development Quarterly, vol. 1, no. 2, pp. 178-191.

Cloodt, M., Hagedoorn, J., Van Kranenburg & H. 2006, "Mergers and acquisitions: Their effect on the innovative performance of companies in high-tech industries", Research policy, vol. 35, no. 5, pp. 642-654.

Cohen, W.M. & Levinthal, D.A. 1990, Absorptive capacity: A new perspective on learning and innovation, Administrative science quarterly.

Colombelli, A. 2016, "The impact of local knowledge bases on the creation of innovative start-ups in Italy", Small Business Economics, vol. 47, no. 2, pp. 383-396.

Colombelli, A., Paolucci, E. & Ughetto, E. 2017, Hierarchical and relational governance and the life cycle of entrepreneurial ecosystems, Small Business Economics.

Colombo, M.G., Dagnino, G.B., Lehmann, E.E. & Salmador, M. 2017, The governance of entrepreneurial ecosystems, Small Business Economics.

Colombo, M.G. & Murtinu, S. 2017, "Venture capital investments in Europe and portfolio firms' economic performance: Independent versus corporate investors", Journal of Economics & Management Strategy, vol. 26, no. 1, pp. 35-66.

Coreynen, W., Matthyssens, P., Van Bockhaven & W. 2017, "Boosting servitization through digitization: Pathways and dynamic resource configurations for manufacturers", Industrial Marketing Management, vol. 60, pp. 42-53.

Ellwanger, N. & Boschma, R. 2015, "Who acquires whom? The role of geographical proximity and industrial relatedness in Dutch domestic M&As between 2002 and 2008", Tijdschrift voor economische en sociale geografie, vol. 106, no. 5, pp. 608-624.

Erina, I., Shatrevich, V. & Gaile-Sarkane, E. 2017, "Impact of stakeholder groups on development of a regional entrepreneurial ecosystem", European Planning Studies, vol. 25, no. 5, pp. 755-771.

Feld, B. 2012, Startup communities: Building an entrepreneurial ecosystem in your city, John Wiley & Sons.

Florida, R., Adler, P. & Mellander, C. 2017, "The city as innovation machine", Regional Studies, vol. 51, no. 1, pp. 86-96.

Forrester, J.W. 2007, System dynamics-a personal view of the first fifty years, System Dynamics Review, 23, 2-3.

Frenken, K., Van Oort, F. & Verburg, T. 2007, "Related variety, unrelated variety and regional economic growth", Regional Studies, vol. 41, no. 5, pp. 685-697.

Fritsch, M. & Schilder, D. 2006, Is venture capital a regional business? The role of syndication (No, 09).

Ghaffarzadegan, N., Lyneis, J. & Richardson, G.P. 2011, "How small system dynamics models can help the public policy process", System Dynamics Review, vol. 27, no. 1, pp. 22-44.

Harrison, J.R., Lin, Z., Carroll, G.R. & Carley, K.M. 2007, "Simulation modeling in organizational and management research", Academy of Management Review, vol. 32, no. 4, pp. 1229-1245.

Isenberg, D.J. 2010, "How to start an entrepreneurial revolution", Harvard business review, vol. 88, no. 6, pp. 40-50.

Knoben, J. & Oerlemans, L.A. 2006, "Proximity and inter-organizational collaboration: A literature review", International Journal of Management Reviews, vol. 8, no. 2, pp. 71-89.

Kuratko, D.F., Fisher, G., Bloodgood, J.M. & Hornsby, J.S. 2017, The paradox of new venture legitimation within an entrepreneurial ecosystem, Small Business Economics.

Markides, C.C. & Williamson, P.J. 1996, "Corporate diversification and organizational structure: A resource-based view", Academy of {Management} journal, vol. 39, no. 2, pp. 340-367.

Neumeyer, X., He, S. & Santos, S.C. 2017, June), The social organization of entrepreneurial ecosystems.

Opresnik, D. & Taisch, M. 2015, "The value of big data in servitization", International Journal of Production Economics, vol. 165, pp. 174-184.

Pearson, C.H. "Latitude, Longitude", And {Great} {Circles}.{Available} at .{Accessed} on, .

Pruyt, E. 2013, Small system dynamics models for big issues: Triple jump towards real-world complexity, .

Pyke, F., Becattini, G. & Sengenberger, W. (1990), Industrial districts and inter-firm co-operation in {Italy}.

Rallet, A. & Torre, A. 1999, "Is geographical proximity necessary in the innovation networks in the era of global economy?", GeoJournal, vol. 49, no. 4, pp. 373-380.

Sapienza, H.J., Parhankangas, A. & Autio, E. 2004, "Knowledge relatedness and post-spin-off growth", Journal of Business Venturing, vol. 19, no. 6, pp. 809-829.

Spigel, B. 2017, "The relational organization of entrepreneurial ecosystems", Entrepreneurship Theory and Practice, vol. 41, no. 1, pp. 49-72.

Stam, E. 2015, "Entrepreneurial ecosystems and regional policy: a sympathetic critique", European Planning Studies, vol. 23, no. 9, pp. 1759-1769.

Sterman, J.D.J.D. 2000, "Business dynamics: systems thinking and modeling for a complex world (No", HD30, vol. 2.

Tanriverdi, H. & Venkatraman, N. 2005, "Knowledge relatedness and the performance of multibusiness firms", Strategic Management Journal, vol. 26, no. 2, pp. 97-119.

Yearworth, M. 2010, July), Inductive modelling of an entrepreneurial system.

Yun, J.J., Won, D., Park, K., Yang, J. & Zhao, X. 2017, "Growth of a platform business model as an entrepreneurial ecosystem and its effects on regional development", European Planning Studies, vol. 25, no. 5, pp. 805-826.

Peripheries in Peripheries – Within-Region Differences in Financial Constraints

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Abstract: Earlier literature has analysed regional finance gaps by comparing metropolitan areas with peripheral areas on a relatively high level of aggregation and most often in a U.S. or U.K. venture capital context. Financial capital has been found to be concentrated in metropolitan areas and access to capital easier because entrepreneurs leverage on proximity to capital providers. However, regardless of whether it is metropoles, when there is an urban centre of a certain size or relative dominance in a region, it can be hypothesized that financial capital is likely to be attracted to this urban centre even within a peripheral region. The literature has been silent regarding financial 'centres' within peripheral areas. Survey responses from managers in 834 firms are used in the empirical analyses. We find that even within the periphery there is a periphery-core difference. We also find indications of differences in whether firms are financially constrained depending on the levels and types of geographical aggregation that are used in the models. Intra-regional differences accentuate the need for considering the appropriate regional level of policy making and the policy instruments. The paper contributes specifically to the analysis of geographical scale in regional financial constraints. The issue of scale is in the core of economic geography yet often disregarded both in research and in the process of designing regional policies.

Keywords: regional development, financial constraints, entrepreneurship innovation, periphery, economic geography, public policy

1. Introduction

The literature on financial constraints has primarily focused on characteristics and behaviour of firms pertaining to their liabilities of smallness and newness, or to their risk profile stemming from their industry, market, or innovativeness. However, additional characteristic of financially constrained firms concerns their location. Regional innovation policies at super-national, national, and regional levels of aggregation have therefore introduced an array of regional innovation financing instruments and –institutions such as regional venture capital funds, Regional Development Agencies, regional loan funds, ERD funding etc.

Despite the policy interest, we know relatively little on this aspect of financial constraints, and the studies we do have suffer from fundamental limitations. Generally, the approach adopted in the literature consists of analysing regional disparities with respect to financial capital between prosperous and peripheral regions. For example, Zhao and Jones-Evans (2017) study differences in access to finance in Nuts1 regions in the UK. The present paper adopts a novel approach by exploring whether there are intra-regional differences in the financial gaps between firms in urban areas and firms in peripheral areas even *within* a peripheral region. Hence, when Zhao and Jones-Evans find that access to finance is difficult in Wales compared to other regions in the UK it would perhaps be more interesting to know if there are e.g. differences between Cardiff in Wales and the rest of Wales, or if the patterns found for e.g. Scotland hide within-Scotland differences.

Therefore, the core research question and hypothesis tested in this paper is that in the context of an urban centre of a certain size or relative dominance, financial capital is likely to be attracted to such an urban centre despite the general tendency for the capital in a country to be clustered in the major city. If so, then the use of only averages to compare regions defined at a high level of aggregation, and possible by political-administrative boundaries may be misleading or may render incomplete results and lead to inexpedient policy conclusions. Earlier studies have called such research (Lee and Drever, 2014, Zhao and Jones-Evans, 2017), however, most data sources do not allow a sufficient geographical break down.

Our study has several contributions. A large share of the earlier studies of access to finance in a geographical perspective focus on venture capital finance, fx Boston and Silicon Valley in the U.S. or Cambridge and the Southeast region in the U.K. These are places in which industrial evolution and finance functions well, and they are not representative for the vast majority of regions. Even if specialised forms of finance like venture capital may be important to industrial evolutionin these areas the broad majority of firms do not access venture capital rather relies on bank finance. By incorporating all types of finance for investment purposes, we obtain

more complete information on the access to finance landscape. We focus on cities in Denmark that in an international context are relatively small, which in itself is novel in this literature. Finally, our data allows a geographical break down that entail small areas. The analysis is based on data from surveys of 834 private firms in North Jutland covering different aspects of access to capital. Our case region is well suited for answering the question of a potential 'second-order' periphery, as it is a peripheral area in Denmark but has a clear urban centre. Denmark is said to have relatively small regional differences, which makes it an expedient context to study these problems in because potential problems, if identified in this context, are likely to be stronger in other countries.

2. Earlier literature on the geography of financial constraints

The economic geography literature on financial constraints has generally been relatively scarce (Pollard, 2003). Likewise, the entrepreneurial finance literature has not sufficiently examined the geographical aspects of finance (Mason, 2010). Studies of the geography of venture capital shows that a disproportionate share of financial capital is managed and invested in metropolitan areas (Martin et al., 2003; Mason and Harrison, 2002), and the location of venture capital firms has typically been in metropoles. Not only quantitative, also qualitative differences persist; the venture capital funds in more peripheral areas involve public funds to a greater extent, and (related) the differences in amounts invested persist to a larger extent than the number of investments (Mason and Pierrakis, 2013). The informal venture capital market is generally regarded as more evenly dispersed (Harrison et al., 2010), but there is also a concentration of this type of finance, again in the UK in the London and Southeast regions (Jones-Evans and Thomson, 2009). The concentration of financial capital in prosperous, urban areas is found in virtually all countries but to a varying degree. Comparing concentrations of financial capital in the U.K. and Germany, Martin et al. (2003) found that German financial capital is less concentrated and involves a greater number of financial centres. This finding may relate to differences in political-administrative structures and to different city structures, as there are relatively many larger cities dispersed throughout Germany.

Several studies of the geography of entrepreneurial finance have found that investors prefer investing in firms that are not excessively distant from their own locations. Preference for proximity to investee firms stem from the fact that transaction costs and search costs are reduced with close spatial proximity. Investors monitor their portfolio firms by providing guidance and act as a sounding board to the management of a firm. Some of the information in this interaction, such as budgets, progress reports and similar codified information can be transferred across distance by mail. However, to build a business relationship with a portfolio firm, investors engage in personal interactions with the portfolio firm to facilitate the transfer of tacit knowledge. Because tacit knowledge is dependent on the building of common means of understanding, communication and, above all, personal trust, tacit knowledge is often spatially grounded (Gertler et al., 2000; Zook, 2002, 2004). Such personal interactions require a certain frequency of face-to-face interaction, which adds to transaction costs.

Transaction costs related to post-investment monitoring may be reduced by spatial proximity, geographical proximity is also important prior to the investment process. Because investors use referrals and their networks to both generate a deal flow and assist the due diligence process, local informants reduce search costs. Information on the potential of investment opportunities is not publicly available and is often spatially bounded (Zook, 2004, Kolympiris et al., 2017) and interpreted by actors in the same socio-economic context (Allessandrini et al., 2010, Wray, 2012). Moreover, interactions between parties (i.e., a financier and a firm in this case) are also affected by social, institutional, organisational and cognitive proximity (Boschma, 2005), not only spatial.

Depending on the extensiveness of networks of financial community, intermediaries and firms, the pure awareness of sources of capital may also differ (Mason and Harrison, 1998, Mason, 2007). Demand for finance may differ between localities, as business activities are often unevenly distributed (Mason 2007, Lee and Drever, 2014, Lee and Brown, 2017). Earlier literature (Lee and Brown, 2017) has found that both actual and the non-articulated demand for external finance differ between peripheries and urban centres, both types of demand being less in peripheries.

In sum, we hypothesize that

1. Within peripheries concentration of capital and resulting distances between investor and investee leads to relatively higher financial constraints outside urban areas

2. The possible effect in Hyp.A is enhanced by firms' innovativeness, smallness, newness, actual short-term economic performance, projected short-term economic performance.
3. Demand for external finance is lower for firms in peripheries of the periphery

3. The data and case region

The *data* are based on surveys of private firms with at least five employees in North Jutland, Denmark. The respondents were asked about their views of the past and future development of a number of variables including innovation and access to financial capital. In turbulent periods of time as in financial crisis especially issues of access to finance are affected, which means that responses from a single year may not be representative. As our primary interest is not on the level of financially constrained firms per se but rather the relative proportions (periphery – center) the effects from financial crisis is reduced as it affects firms in both sub-samples. Only to the extent that the crisis has different effects on urban and rural areas the analyses should account for the effect of the crisis. We reduce this possible effect by using data from surveys in several years. In order to maximize the number of observations and to eliminate possible effects from variations over time we cluster the responses from four consecutive years, 2010-13 and obtain a total of 834 responses. Data collection methodology and questions were constant over all year. Firms were phoned to ask for participation in the survey, then emailed a questionnaire. The core question re dependent variable was: 'Did your firm during the past year experience problems in obtaining external finance for development activities?' Yes/No/Did not apply/DKNA.

Response rates are incomparable to other surveys that rely on random sampling. In our case response rates may be interpreted and measured during the process of phoning firms to ask for participation, or they could be interpreted as the share of respondents who accepted to participate in the survey, but nevertheless did not fill in the on-line questionnaire. The firms included in the gross sample represent approximately 30% of the employment in the region.

Our *case region* is located in the north of Denmark and has traditionally been characterised as a peripheral area within Denmark, evidenced by economic indicators of regional development. Aalborg is the metropolitan centre of the region. By January 2017, the city had 139,000 inhabitants. The cities of Frederikshavn, Hjørring and Hobro may thus be classified as urban areas, although they only have 23,500, 25,700 and 12,000 inhabitants, respectively. In many contexts such cities would be classified as villages. In this small region (in a small country with only one large city, Copenhagen), these cities are relatively large and contain several well-known and relatively large firms.

4. Empirical analyses

We split the sample of firms in different geographical areas (as explained below) and estimate a model that takes into account multivariate and interaction effects and control for possible effects from differences in firm characteristics. In robustness checks, different geographical aggregations are tried out.

4.1 Geographical scale

The test of the overall hypothesis regarding the relevant geographical scale of financial constraints is based on two geographical aggregations stemming from three geographical areas. The first area is Aalborg as the urban centre. The second area is the three above-mentioned areas that are smaller but perhaps still urban. The third area contains the residual peripheral areas within North Jutland. Our sample is split in 31% of firms in the Aalborg city, 17% in the semi-sized towns, 52% in the remainder of the region.

4.2 Variables

The answers to survey questions are self-reported and subjective; however, there is no reason to believe that a potential bias from this should be either particularly severe or systematically distributed in the geographical areas we compare. Table 1 provides an overview of variables used in the analysis. The dependent variable is a dichotomic variable based on the respondents' statement on whether the firm has in the latest year experienced financial constraints on their development activities. Firms were also asked about how dependent their development activities were on external finance. In our analyses we use this variable for filtering out firms who do not feel constrained, however, we perform analyses on the full sample as well.

Table 1: Measurement of variables

Variables	*Indicator*
Independent	
Geographical areas	Aalborg, Aalborg+Semi-urban, Peripheral. Based on post codes
Size of firm 'firm size'	Log of number of empl. in full time equivalents
Innovation intensity 'e_inno'	No of innovations per employee
Age of firm 'firm_age'	Log of years since establishment
Short term economic performance 'r_result_n'	experienced improved/unchanged/worsened development in economic results in the quarter prior to the survey
Short term economic prospects 'r_result_p'	foresee improved/unchanged/worsened development in economic results in the next quarter following the survey
Industry 'firm indu_ 1,2'	NACE2 sectors
Organisational form	Subsidiary etc
Incremental innovation 'innoinc_ln'	Has incremental product, service-, process innovation within the past year
Radical Innovation 'innorad_ln'	Has radical product, service-, process innovation within the past year
Dependent	
Constrained access to capital	Perception of the constraint – Yes/No/do not know.
Filter	
Need for finance	External finance valued highly in development processes

4.3 Empirical approach

The literature has discussed potential endogeneity problems in analyses of financial constraints (Mina et al., 2013, Lee and Drever, 2014, Lee and Brown, 2017, Zhao and Jones-Evans, 2017), that is, firms who do not demand external financial capital will not feel constraints on their financing and should therefore be accounted for in the empirical analyses. One could assume that potential endogeneity problems are similar across sub-regions but in recent literature (Lee and Brown, 2017) we do have indications of different patterns in the demand for finance among firms in the peripheral and urban regions, and therefore choose both to do a two-stage estimation to account for potential differences in demand for finance, and to use a filtering variable for the same purpose.

4.4 Correlations and frequencies

Table 2 and 3 shows correlations between our main variables. The survey includes a selection question regarding whether firms express demand for finance and we proposed that this may work as a selection devise for disregarding firms who were not in demand for finance. In the second correlation table this selection is applied, reducing the focused sample to 399 firms.

Table 2: Correlation Coefficients (full sample)

	constraints	need_finance	firm_size_ln	firm_age_ln	r_result_p	r_result_n	e_inno	innoinc_ln	innorad_ln	region1	region2	region3	region12	region23
constraints		0.485***	-0.150***	-0.091***	-0.088**	0.087**	0.054	0.013	0.022	-0.091***	-0.006	0.089**	-0.089**	0.091***
need_finance	0.485***		-0.074**	-0.043	-0.150***	0.096***	-0.008	0.089***	-0.015	-0.101***	-0.009	0.100***	-0.100***	0.101***
firm_size_ln	-0.157***	-0.067*		0.294***	0.037	-0.055	0.155***	0.145***	-0.043	-0.039	-0.043	0.068**	-0.068**	0.039
firm_age_ln	-0.075**	-0.040	0.293***		0.040	0.028	0.020	0.061*	-0.002	-0.035	0.081**	-0.030	0.030	0.035
r_result_p	-0.088**	-0.150***	0.025	0.035		-0.361***	0.064*	-0.005	0.067*	0.022	0.006	-0.025	0.025	-0.022
r_result_n	0.087**	0.096***	-0.035	0.032	-0.361***		-0.050	0.004	-0.042	-0.033	-0.016	0.043	-0.043	0.033
e_inno	0.054	-0.008	0.145***	0.019	0.064*	-0.050		-0.051	0.214***	0.079**	-0.056	-0.031	0.031	-0.079**
innoinc_ln	-0.004	0.068*	0.178***	0.055	-0.013	0.012	-0.027		0.009	-0.167***	0.095***	0.082**	-0.082**	0.167***
innorad_ln	0.046	0.015	0.003	0.020	0.036	-0.039	0.160***	0.248***		0.101***	0.094***	-0.164***	0.164***	-0.101***
region1	-0.091***	-0.101***	-0.037	-0.042	0.022	-0.033	0.079**	-0.092***	0.047		-0.305***	-0.692***	0.692***	-1.000***
region2	-0.006	-0.009	-0.045	0.096***	0.006	-0.016	-0.056	0.054	0.088**	-0.305***		-0.477***	0.477***	0.305***
region3	0.089**	0.100***	0.068**	-0.034	-0.025	0.043	-0.031	0.044	-0.110***	-0.692***	-0.477***		-1.000***	0.692***
region12	-0.089**	-0.100***	-0.068**	0.034	0.025	-0.043	0.031	-0.044	0.110***	0.692***	0.477***	-1.000***		-0.692***
region23	0.091***	0.101***	0.037	0.042	-0.022	0.033	-0.079**	0.092***	-0.047	-1.000***	0.305***	0.692***	-0.692***	

Lower-triangular cells report Pearson's correlation coefficients, upper-triangular cells are Spearman's rank correlation

*** p<0.01, ** p<0.05, * p<0.1

We note from table 2 and 3 that correlation coefficients are all below the 0.5 threshold indicating no multicolinarity issues. In table 2 firm characteristics like size and age and economic results correlate with constraints. The table also provides the first indications of regional differences in financial constraints: the Aalborg city region is significantly and negatively correlated with constraints, whereas the peripheral parts of the region is positively and significantly correlated. The results regarding the need for finance variable are also interesting. Age does not seem to matter for demand, but unsurprisingly economic results do. Correlations with regions are highly significant indicating demand variations among regions. In the reduced sample (table 3) firm size is still correlated with constraints. Although the expected signs are at the regional correlations with constriants the statistical significance is no longer there.

Table 3: Correlation Coefficient (reduced sample)

	constraints	firm_size_ln	firm_age_ln	r_result_p	r_result_n	e_inno	innoinc_ln	innorad_ln	region1	region2	region3	region12	region23
constraints		-0.185***	-0.117**	-0.026	0.063	0.095*	-0.056	0.047	-0.074	-0.003	0.067	-0.067	0.074
firm_size_ln	-0.207***		0.271***	0.051	-0.062	0.181***	0.166***	-0.059	-0.070	-0.078	0.121**	-0.121**	0.070
firm_age_ln	-0.094*	0.260***		0.090*	0.047	0.039	0.084*	0.026	-0.042	0.112**	-0.048	0.048	0.042
r_result_p	-0.026	0.032	0.087*		-0.339***	0.097*	-0.049	0.027	-0.047	-0.039	0.071	-0.071	0.047
r_result_n	0.063	-0.031	0.052	-0.339***		-0.076	-0.052	-0.022	-0.047	0.048	0.005	-0.005	0.047
e_inno	0.095*	0.187***	0.042	0.097*	-0.076		-0.082*	0.256***	0.067	-0.035	-0.033	0.033	-0.067
innoinc_ln	-0.062	0.214***	0.058	-0.048	-0.042	-0.058		0.020	-0.195***	0.065	0.123**	-0.123**	0.195***
innorad_ln	0.062	0.053	0.009	0.028	-0.036	0.177***	0.330***		0.112**	0.107**	-0.180***	0.180***	-0.112**
region1	-0.074	-0.058	-0.055	-0.047	-0.047	0.067	-0.100**	0.068		-0.267***	-0.681***	0.681***	-1.000***
region2	-0.003	-0.084*	0.120**	-0.039	0.048	-0.035	0.009	0.061	-0.267***		-0.523***	0.523***	0.267***
region3	0.067	0.115**	-0.043	0.071	0.005	-0.033	0.082	-0.107**	-0.681***	-0.523***		-1.000***	0.681***
region12	-0.067	-0.115**	0.043	-0.071	-0.005	0.033	-0.082	0.107**	0.681***	0.523***	-1.000***		-0.681***
region23	0.074	0.058	0.055	0.047	0.047	-0.067	0.100**	-0.068	-1.000***	0.267***	0.681***	-0.681***	

Lower-triangular cells report Pearson's correlation coefficients, upper-triangular cells are Spearman's rank correlation

*** p<0.01, ** p<0.05, * p<0.1

In table 4 we list results from comparing constraints and demand in different regional aggregations. In the top part of the table we compare Aalborg and the rest of the region, and in the lower part of the table Aalborg is merged with the semi-sized towns. Both demand and constraints are shown for the full and reduced sample. T-tests indicate that there is a difference in demand between periphery and urban areas the demand being less in peripheries. Constraints also display a difference, however, in the reduced sample the statistical significance disappears. This is partly caused by the fact that the number of observations is less than half of the full sample, but it also indicates differences between firms in these two types of regions.

Table 4: Frequency analysis

	Rest of NJ	Aalborg	Difference	(p-value)
Firm in need for external finance	0.51	0.40	0.11	0.00
Firms experienced finance constraints (no selection)	0.20	0.13	0.08	0.01
Firms experienced finance constraints (selection)	0.39	0.31	0.08	0.14

	Rest of NJ	Aalborg + semi	Difference	(p-value)
Firm in need for external finance	0.53	0.43	0.10	0.00
Firms experienced finance constraints (no selection)	0.20	0.13	0.08	0.01
Firms experienced finance constraints (selection)	0.40	0.33	0.07	0.18

4.5 Regression results

Finally, Table 5 and 6 provides the results of the estimations of a random effect logit model. Again, we estimate both the full sample models and the reduced model.

Table 5: Financial constraints, Full sample

	(1) constraints	(2) constraints	(3) constraints	(4) constraints	(5) constraints	(6) constraints
_lfirm_indu_1	-0.887	-0.628	-0.671	-0.671	-0.663	-0.628
	(-0.987)	(-0.705)	(-0.752)	(-0.752)	(-0.738)	(-0.705)
_lfirm_indu_2	-1.466*	-1.179	-1.125	-1.125	-1.160	-1.179
	(-1.762)	(-1.408)	(-1.344)	(-1.344)	(-1.376)	(-1.408)
firm_size_ln	-8.578***	-8.326***	-8.283***	-8.283***	-8.402***	-8.326***
	(-3.187)	(-3.052)	(-3.055)	(-3.055)	(-3.102)	(-3.052)
firm_age_ln	-1.066	-1.178	-0.969	-0.969	-0.841	-1.178
	(-0.480)	(-0.530)	(-0.433)	(-0.433)	(-0.376)	(-0.530)
r_result_p	-0.351	-0.371	-0.392	-0.392	-0.401	-0.371
	(-0.816)	(-0.860)	(-0.906)	(-0.906)	(-0.925)	(-0.860)
r_result_n	0.932**	0.918**	0.907**	0.907**	0.906**	0.918**
	(2.053)	(2.019)	(1.995)	(1.995)	(1.988)	(2.019)
e_inno	1.331**	1.338**	1.312**	1.312**	1.298**	1.338**
	(2.428)	(2.449)	(2.402)	(2.402)	(2.375)	(2.449)
innoinc_ln	0.560	0.449	0.469	0.469	0.497	0.449
	(0.329)	(0.263)	(0.274)	(0.274)	(0.289)	(0.263)
innorad_ln	1.414	1.371	1.547	1.547	1.615	1.371
	(0.618)	(0.596)	(0.669)	(0.669)	(0.695)	(0.596)
_lfirm_regi_2	0.273					
	(0.417)					
_lfirm_regi_3	1.459**					
	(2.430)					
region1		-1.181*	-1.386**			
		(-1.940)	(-2.185)			
region2			-0.863	0.523		
			(-1.184)	(0.639)		
region3				1.386**		
				(2.185)		
region12					-1.192**	
					(-2.194)	
region23						1.181*
						(1.940)
_cons	-0.508	0.080	0.152	-1.234	0.117	-1.101
	(-0.314)	(0.049)	(0.094)	(-0.732)	(0.072)	(-0.654)
/						
lnsig2u	2.586	2.608	2.598	2.598	2.619	2.608
	(-3.455)	(-2.455)	(-2.604)	(-2.604)	(-2.627)	(-2.455)
_diparm1:sigma_u	3.643	3.683	3.666	3.666	3.705	3.683
	(-1.897)	(-1.333)	(-1.421)	(-1.421)	(-1.418)	(-1.333)
_diparm1:rho	0.801	0.805	0.803	0.803	0.807	0.805
	(-21.706)	(-15.630)	(-16.483)	(-16.483)	(-16.847)	(-15.630)
N	834	834	834	834	834	834

Table 5 shows that firm size is still highly significant and in accordance with extant literature smaller firms are more constrained. Both economic results and innovation intensity are also significant. The same pattern applies regarding regional differences. Coefficient for Aalborg city ('region1') has negative sign, for periphery positive, indicating a significant difference between regions in how financially constrained they are; in the periphery more firms are constrained. In this model we also try out a different geographical aggregation where the basic is municipalities rather than postcodes. This aggregation is expected to be less precise compared to the city-oriented aggregation based on postcodes. The regi_3 variable covers areas south of Aalborg, which can be characterized as peripheral in North Jutland. There is a positive and significant coefficient for this region, however, not for the area north of Aalborg.

Table 6: Financial constraints, Reduced sample

	(1) constraints	(2) constraints	(3) constraints	(4) constraints	(5) constraints	(6) constraints
_Ifirm_indu_1	-0.889	-0.608	-0.681	-0.681	-0.682	-0.608
	(-0.987)	(-0.688)	(-0.762)	(-0.762)	(-0.762)	(-0.688)
_Ifirm_indu_2	-0.951	-0.674	-0.591	-0.591	-0.598	-0.674
	(-1.140)	(-0.802)	(-0.698)	(-0.698)	(-0.708)	(-0.802)
firm_size_ln	-7.367***	-6.996***	-7.101***	-7.101***	-7.122***	-6.996***
	(-2.777)	(-2.633)	(-2.662)	(-2.662)	(-2.675)	(-2.633)
firm_age_ln	-2.080	-2.146	-1.827	-1.827	-1.804	-2.146
	(-0.892)	(-0.922)	(-0.776)	(-0.776)	(-0.769)	(-0.922)
r_result_p	0.323	0.311	0.279	0.279	0.280	0.311
	(0.645)	(0.620)	(0.554)	(0.554)	(0.556)	(0.620)
r_result_n	0.808	0.784	0.794	0.794	0.796	0.784
	(1.636)	(1.590)	(1.601)	(1.601)	(1.604)	(1.590)
e_inno	1.118*	1.108*	1.093*	1.093*	1.090*	1.108*
	(1.952)	(1.936)	(1.905)	(1.905)	(1.901)	(1.936)
innoinc_ln	-0.942	-1.149	-1.277	-1.277	-1.276	-1.149
	(-0.485)	(-0.590)	(-0.650)	(-0.650)	(-0.649)	(-0.590)
innorad_ln	2.024	1.731	2.045	2.045	2.056	1.731
	(0.771)	(0.663)	(0.776)	(0.776)	(0.781)	(0.663)
_Ifirm_regi_2	-0.199					
	(-0.298)					
_Ifirm_regi_3	1.064*					
	(1.698)					
region1		-0.846	-1.137*			
		(-1.333)	(-1.676)			
region2			-1.052	0.084		
			(-1.383)	(0.101)		
region3				1.137*		
				(1.676)		
region12					-1.102*	
					(-1.887)	
region23						0.846
						(1.333)
_cons	2.219	2.466	2.574	1.437	2.573	1.620
	(1.340)	(1.510)	(1.561)	(0.839)	(1.559)	(0.953)
/						
lnsig2u	2.052	2.052	2.068	2.068	2.071	2.052
	(-2.142)	(-1.460)	(-1.645)	(-1.645)	(-1.653)	(-1.460)
_diparm1:sigma_u	2.790	2.790	2.812	2.812	2.816	2.790
	(-1.535)	(-1.047)	(-1.170)	(-1.170)	(-1.174)	(-1.047)
_diparm1:rho	0.703	0.703	0.706	0.706	0.707	0.703
	(-10.259)	(-6.993)	(-7.928)	(-7.928)	(-7.975)	(-6.993)
N	399	399	399	399	399	399

Table 6 shows results for the reduced sample. Generally the significance and size of coefficients drop indicating that the heterogeneity in demand has a substantial impact on results, in line with findings in other literature (Lee and Brown, 2017). Our frequency analyses did, though, indicate that in our case demand in the periphery seem to be higher than in the urban centres, contrasting findings in Lee and Brown (2017). Overall results still hold. Firms in Aalborg city are less constrained, in periphery more constrained. In the semi-sized towns there is no significant coefficient. Firm size remains highly significant. Increased innovation intensity is, as in the full sample model, associated with more financial constraints. Incremental and radical innovation variables have the expected sign – radical innovation rendering more constraints – but none of these two variables are statistically significant. Overall, the results reveal parameter estimations on our variables of primary interest in

line with the proposed hypothesis. Specifically, the variable representing the urban area defined as Aalborg in addition to the semi-sized towns is negative and significant indicating that firms in the urban area is less constrained than in the periphery. However, the geographical aggregation where Aalborg is defined as the only urban area has stronger significance and larger coefficient.

5. Conclusions, discussion, and policy implications

We found in the empirical analysis of the 'periphery of the periphery' of financing' hypothesis, evidence that the perceptions of the extent of a possible financial constraint in the North Jutland region differed between firms that are located in urban centres and peripheral areas, especially if urban areas are considered to be the primary centre, Aalborg. Thus, intra-regional financial constraints do appear to differ between these two geographical areas. Apparently, Aalborg is considered the primary growth pole as firms in the semi-sized towns also reported significantly higher financial constraints. It was clear that some of the differences were driven by differences among regions in how much firms demand external finance. The size and level of significance of coefficients decreased when firms with less dependence upon external finance were filtered out. Using different forms of geographical aggregation changed results.

Generally the results show that geography is important; the level and type of geographical aggregation is vital to a meaningful discussion of the financial constraints that firms face. This message may be simple but is important and should not be overlooked because the results have implications for the assessment of the need and rationale for policies. Usually averages are used in access to finance analyses and in the policy process, however, this study points to a potential second-order problem: the averages comparing the major metropolitan area in a country and peripheries may find disparities between their respective accesses to capital. However, if intra-regional differences exist, then the need for policy may be enhanced or should be re-oriented. The typical method of comparing means across regions may obfuscate the real problems, as firms within regions in peripheries may differ in terms of financial constraints depending on whether they are located in a central urban area or not, rather than if they are located in the peripheral region as such.

Generally, our findings suggest the substantial need for a research agenda on the extent of intra-regional disparities. Related, the findings spurred interest in testing even more types of geographical aggregation such as including individual firm level indices for location in dense business environments.

A number of limitations apply to this study. Because we used a case from Denmark in this paper, one may question the generalisability of the results. However, replicating this study in other geographical contexts with larger disparities is likely to render even stronger results.

References

Alessandrini, P., Presbitero, A.F., Zazzaro, A., 2010. Banks, distances and firms' financing constraints. Review of Finance, 13, pp. 261-307.

Boschma, R., 2005. Proximity and Innovation: A Critical Assessment. Regional Studies, Vol. 39, 1. pp. 61-74.

Gertler, M., Wolfe, D. and Garkut, D., 2000. No place like home? The Embeddedness of innovation in a regional economy, Review of International Political Economy 7:4, pp. 688-718.

Hall, B., 2010. The financing of innovative firms. Review of Economics and Institutions, 1(1).

Harrison R.T., Mason, C.M. and Robson, P., 2010. Determinants of long-distance investing by business angels in the UK. Entrepreneurship and Regional Development, Vol.22, No.2, pp. 113-137.

Jones-Evans, D. and Thompson, P., 2009. The Spatial Dispersion of Informal Investment at a Regional Level: Evidence form the UK, European Planning Studies, Vol.17, No.5, 659-675.

Kolympiris, C., Hoenen, S., and Kalaitzandonakes, N., 2017. Geographic distance between venture capitalists and target firms and the value of quality signals. Industrial and Corporate Change, pp. 1-32.

Lee, N. and Brown, R. 2017. Innovation, SMEs and the liability of distance: the demand and supply of bank funding in UK peripheral regions, Journal of Economic Geography Vol. 17, pp. 233-260.

Lee, N. and Drever, E., 2014. Do SMEs in deprived areas find it harder to access finance? Evidence from the UK Small Business Survey. Entrepreneurship & Regional Development, Vol. 26, no. 3-4, pp. 337-356.

Martin, R., 1999. The new economic geography of money, in Martin, R. (ed.) Money and the space economy, Wiley, New York, pp. 3-27.

Martin, R., Berudt, C., Klagge, B., Sunley, P. and Herten, S., 2003. Regional Venture Capital policy UK and Germany compared. Anglo-German Foundation for the study of Industrial Society.

Mason, C. M. and Harrison, R.T., 1998. Financing entrepreneurship: Venture capital and regional development. In: Money and the space economy, Martin, R. ed. 157-183, Wiley, New York.

Mason, C. M. and Harrison, R.T., 2002. The geography of venture capital investments in the UK, Trans Inst Br Geogr, No. 27, pp. 427-451.

Mason, C.M. and Pierrakis, Y., 2013. Venture Capital, the Regions and Public Policy: the UK since the post-2000 Technology Crash. Regional Studies 47, no.7, pp.1156-1171.

Mason, C.M., 2007. The geography of venture capital investments. In Landström, H. (ed.) Handbook of venture capital research. Edw.Elgar.

Mason, C. M., 2010. Editorial Introduction: Entrepreneurial finance in a regional economy. In: Venture Capital: An International Journal of Entrepreneurial Finance, Vol.12, No. 3, 167-172.

Mina, A., Lahr, H., and Hughes, A., 2013. The demand and supply of external finance for innovative firms. Industrial and Corporate Change, Vol. 22, No. 4, pp. 869-901.

Pollard, J.S., 2003. Small firms finance and economic geography, Journal of Economic Geography, 3, 429-452.

Sokol, M., 2013. Towards a 'newer' economic geography? Injecting finance and financialisation into economic geographies. Cambridge Journal of Regions, Economy and Society, 6, pp. 501-515.

Wray, F., 2012. 'Rethinking the venture capital industry: relational geographies and impacts of venture capitalists in two UK regions', Journal of Economic Geography, 12, pp. 297-319.

Zhao, T. and Jones-Evans, D. (2017). SMEs, banks and the spatial differentiation of access to finance. Journal of Economic Geography, 17, pp. 791-824.

Zook, M. A., 2002. Grounded capital: venture financing and the geography of the Internet industry, 1994-2000, Journal of Economic Geography, 2, pp. 151-177.

A Risk Management Framework for Implementation of Emerging Technologies

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Abstract: With many industries facing disruption of existing business models, emerging technologies (ET) becomes a critical choice. This paper is presenting and discussing a risk management framework for ET based on Failure Mode Effect Analysis (FMEA) and ISO 31000:2018. This paper is based on (1) a literature review on FMEA and ISO 31000 particularly related to technologies in early stages of conceiving, design and appropriation, (2) a case study of ET and risk in heavy mechanical manufacturing, (3) a set of micro-cases from the industry. Two models are proposed. First, an overall model framework is defined connecting early stages of technology screening, scouting, foresighting to the ISO 31000 framework extending this with continuous improvement of the model and the handling of the ET elements. Second, FMEA is suggested extended with an uncertainty factor to be multiplied onto the risk priority number (RPN). The uncertainty factor is closely linked to the ISO 31000 framework in parameters like e.g. novelty of the ET, growth predictions, duration of the ET study, industrial impact, ambiguity of definitions. ET is inherently associated with risk but often not a managed risk, extending ET risk focus into FMEA and ISO 31000 is providing a clearer and more uniform RM throughout the innovation life cycle. The presented framework can support better decision making and adherence to standardized risk management in later stages of development and implementation of the ET. FMEA can connect ET to other risk management, risk mitigation and continuous improvement approaches such as design, project or production FMEA. Introducing a common language in early stages of innovation can "lower the barrier" for SME's and organisations in emerging economies to access ET rightfully.

Keywords: Risk Management**,** Emerging Technologies, ISO31000, FMEA, Management of Technology

1. Introduction

Risks are an ever-pressing concern in every implementation process and can ultimately end up threaten the entire investment of a project, but as all projects worth pursuing involves risk, Risk Management (RM) have become a closer and closer integrated part of Project Management (PMI, 2017; Bentley, 2010). A multitude of different tools and approaches has been developed for handling RM over the years. However, academic research involving RM approaches specifically for Emerging Technologies (ET) seems fairly lacking. This creates even larger barriers between high uncertainty ET and successful implementation of these in an organization, partly because of a lacking way of structuring the RM approach, and partly because traditional tools for planning, assessing, handling and monitoring risks simply are not adapted for the uncertainty following ET.

Implementing ET means commercializing it, which means that even though the technology itself is not rapidly changing, the contextualized utilization might differ significantly. Bonnin Roca et. al. (2017) describes this as: "Commercializing an emerging technology that employs an immature production process can be challenging particularly when there are many different sources of uncertainty". This implicates that the uncertainty characteristics of ET necessitate a new approach to RM specifically tailored to these types of risk profiles. The purpose and outcome of this article is to examine and investigate, if the RM approach is different, when dealing with emerging technologies, and conclusively create a risk management framework for emerging technologies (Stilgoe et al., 2013), thus leading to the research question: What is the relationship between risk management and emerging technologies, and how to accommodate for high uncertainty?

Most academic research on RM focuses on, what is defined as "traditional occupational risks" (TR) (Brocal et al., 2017), which in its nature is foreseeable with the right historical information; in other ways the estimates for future events relies heavily on historical events. When dealing with TR this may be quite logical but "new and emerging risks" (NER) are rarely a substantial foundation of historical experience. Here traditional RM approaches seems to lack the predictive power, when the technology is rapidly changing.

There do exist standards for RM, including the ISO 31000 standard (ISO, 2018), but also this is criticized for being too rigid and unable to evolve with the ever changing environment and best practice (Olechowski et al., 2016). This article will therefore seek to investigate, which value the ISO 31000 can bring to RM of ET, and where the standard will prove itself inadequate.

2. Literature review

2.1 Emerging Technologies

Emerging Technologies has been in the centre of innovation studies for decades however precise definitions lack (Green et al., 2005). Despite numerous suggested definitions, a broad consensus about what ET really is, are still to be drawn within academic communities. Rotolo et al. (2015) suggest to define ET in a context independent setting, through an extensive literature review with definition below. This shows the variety of understandings, as to how different authors have interpreted ET. Based on this analysis the definitions of ET have then been compiled and redefined with regards to five attributes, namely: (i) Radical novelty, (ii) Relatively fast growth, (iii) Coherence (iv) Prominent impact, (v) Uncertainty and ambiguity. The conclusion is a synthesized and general applicable definition of ET stating: *"...a relatively fast growing and radically novel technology characterised by a certain degree of coherence persisting over time and with the potential to exert a considerable impact on the socio-economic domain (s) which is observed in terms of the composition of actors, institutions and the patterns of interactions among those, along with the associated knowledge production processes. Its most prominent impact, however, lies in the future and* so in the emergence phase is still somewhat uncertain and ambiguous" (Rotolo et al., 2015). Cozzens et al. (2010) defines ET as "a technology that shows high potential but hasn't demonstrated its value or settled down into any kind of consensus". ET is characterised by are uncertainty, network effect, unseen social and ethical concerns, cost, limitation to particular countries, and a lack of investigation and research (Halaweh, 2013). ET is typically associated with scientific innovation with potential to create new industries or transform existing ones (Day and Schoemaker, 2000). Dedehayir and Steinert (2016) define ET by consumers 'must have' aptitude in line with Gartners Hype-Cycle.

In order to understand ET as a definition in the light of RM, the term needs to be re-contextualized to the company setting. This means, creating a tool allowing technology to be easily categorized as either emerging or mature. Becker (2010) have stressed the importance and the potential of failure, if employees are not adequately attuned for change. According to (Dietrich and Cudney, 2011) need for new production technology can originate from one or more of four needs: (1) Lower priced parts. (2) Reduction in lead-time. (3) Quality performance increase. (4) Increase in production flexibility.

To meet a specific need as well as justifying ET in a supply chain, it is argued ET should be evaluated on a variety of levels in order to ensure that the ET is implemented in a timely manner with acceptable affordability and supportability. According to (Ratcliff, 2009) the levels in which one would evaluate the previously mentioned parameters are manufacturing and the technology readiness level. The most obvious risk therefore arise when there is an unequal equilibrium between the technology readiness level and the manufacturing readiness level.

In the context of implementation, ETs is not about formulating a clear definition, but rather how to make it accessible in a Project Management perspective, to distinguish between emerging and mature technologies.

2.2 Risk Management

Risk Management (RM) is a widely understood term, from a highly strategized way of controlling a project from early start to post-project events, RM have become an embedded part of many projects (Themsen and Skærbæk, 2018; Villa et al., 2016). Risk is an inherent part of any project; implementations that does not contain any risk are generally considered non-value adding for an organization (Ward and Chapman, 2003; Szymanski, 2017). The more risky a project is, the more value it can add to the organization. RM is a way to increase the likelihood of success of the tasks during the whole process of project execution (Olechowski *et al.*, 2016). Uncertainty assessment have become a more central focus in Project Management (Ward and Chapman, 2003). Amongst researchers, RM as a term has not reached a broad consensus, which is why it is important to clarify what the characteristics of RM are (Ahmed, 2017).

RM is defined by (ISO, 2018) as *"coordinated activities to direct and control an organization with regard to risk"*. To understand the definition, some underlying terminology has to be presented. RM is a proactive

process of looking forward to reduce or eliminate threats before they occur. A risk has been defined as either *"an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective"* (PMI, 2017) or as *"an uncertain event or set of circumstances that, should it occur, will have an effect on the achievement of the project's objectives"* (Hillson, 2012). Academics differentiate between uncertainty and risk (Szymanski, 2017), depending on whether or not it is measurable.

Studies show that usage of RM is not widely applied by Project Managers (Raz et al., 2002; Brookes and Clark, 2009). Nevertheless it can be assumed that when dealing with ET in a well-thought and structured way some aspects of RM should present itself. Risk identification is one of the fundamental parts of RM. It is divided into two distinct phases:

1. Initial risk identification, occurs when organization haven't ever assess the risks in a structured way.
2. Continuous risk identification, namely, recognition of new risks which arise after initial risk identification and changes to them (HM Treasury, 2004).

RM presumes the general assumptions in the project, and creating the outlines and objectives. After targeting the risks, these decisions can be made: (1) Acceptance: major consequences are taken into consideration, at the same time there is no action taken. (2) Transfer of risk: shift the risk to another entity able to neutralize the risk. Insurance, can be an example of this approach. (3) Reduction: this action aims to lower the probability of threat or eliminate it. Expanding the resource repository could be an example of this approach. (4) Avoiding: prevention or elimination of the risk in the entire process (Szymanski, 2017).

The ISO 31000:2018 standard provides users with a state of art approach regarding RM. In general terms RM refers to the architecture, which consist of RM principles, a RM framework and RM processes. The model of this ISO standard is illustrated in Figure 1. For RM to be effective, an organization should at all levels comply with principles mentioned in figure 1 (de Oliveira et al., 2017). The framework assists in assessing and managing risks effectively through the RM process at varying levels. The RM process should be comprised of different activities to assure that it is an inherent part of management, culture and is reflecting the Business Processes of the organization (ISO, 2018).

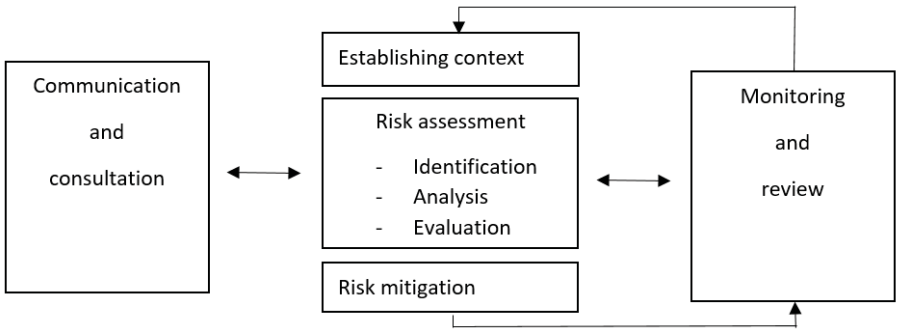


Figure 1: The ISO 31000 risk management framework

FMEA is a systematic and analytical tool, of a proactive nature, which is utilized as an evaluation of potential process or product failure modes (Card et al, 2012). FMEA stands for and facilitates the process of: (1) Targeting the threats. (2) Identifying actions that reduce or eliminate the chance of failure. (3). Documentation of the process (Reid, 2005). Through quantitative assessment, FMEA allows identification of risk. Listing the Failure Modes that are understood by the circumstances that potentially can cause a more severe failure. Failure Effect define the consequences of failure modes to occur. Risk Group presents who in the organization is affected by the failure mode and Risk Causes reflect the factors which caused the failure.

The Risk Priority Number (RPN) is calculated by placing three subjective ratings: severity (S), occurrence (O) and detection (D) on scale from 1 to 10. It is suggested that the ratings should be based on 10 point scale to increase the accuracy of the results. By multiplying the estimated numbers, result from 0 to 1000 of risk severity reveals (Reid, 2005). In Table 1 a simplified FMEA model is illustrated. A critique of the FMEA can be made, due to the fact that it does not take uncertainty into consideration, in situations where estimations are based on risky assumptions. Consequently, the FMEA might therefore not be a good fit for ET.

Table 1: FMEA framework

FAILURE MODE	FAILURE EFFECT	S	RISK GROUP	RISK CAUSES	O	CONTROL	D	RPN

3. Method

The study has dealt with the methodological challenge of seeing little scholarly references on the link between RM and ET. Use of analogues, empirical approaches and inductive elements have been found useful along application of validation and triangulation principles of multi-method approaches (Saunders and Lewis, 2009).

The empirical data consists of two parts. (1) A case study developed from interviews and action research in a large engineering and manufacturing company. (2) A micro-case summary.

The questions concerning RM are constructed using the themes in figure 1 combined with questions regarding ET. The interviews should help gain an understanding of the practical implications of using RM when implementing ET, and whether the companies have a combined approach. The interviews have four overall themes; Risk Design, Risk Assessment, Risk Implementation and Risk Monitoring. Within each of the four themes, questions are formulated regarding ET e.g. in Risk Design: *"How would you describe the maturity of the technology at the start of implementation?"* and in the case of Risk Monitoring *"Do you keep an eye on the risk profile on technologies, you have previously worked with?".*

To summarize, the paper represents the outcome of a broad qualitative, case-based, socially inspired study in a range of Danish companies

4. Case study

4.1 Case: AR in MechCorp

MechCorp is a global leader in renewable energy, but is in many ways organized as a mechanical manufacturing organization. MechCorp has decided to start using Augmented Reality (AR) as an Emerging Technology. AR will entail a rethinking of the relationship between product engineering, production planning, engineering-to-product knowledge transfer and work instructions, and workforce skill management.

Engineering processes must onwards not only produce mechanical artefacts, but also work instructions according to quality standards and a digital transformation to the AR context of the manufacturing.

The AR system works like this: The engineering design processes using PTC Creo (CAD/PLM/PDM) follow usual processes but will always work in 3D. The 3D drawings are converted into a semi-animated format in PTC Vuforia. This is converted into an animated format using Unity or PTC ThingWorx. Work instructions are connected to the 3D objects. Workers wearing AR goggles will be presented for relevant work instructions when looking at designated objects through camera object recognition. In the actual case, work instruction for electrical connections are in focus. Thousand are connections are to be made on each product, the AR system will guide workers for each assembly process and replace hundreds of pages of manuals.

The AR system represent an ET for MechCorp as the company is striving for reduced tact time of complex assembly processes that are too costly to automate. Benefits of the ET will be faster and more precise work instructions to workers by avoiding workers need to retrieve information for each assembly. Also, workers tend to internalize work instructions and work from experience only. This is problematic as the number of identical products is very low. Risk of selecting AR as ET is e.g. (1) failure to reduce tact time leading to loss of competitive edge, (2) negative economy of needing to produce ever more complex work instructions, (3) MechCorp follow a strategy is "everything digital" – no room is left to fail the strategy, (4) defects related to workers not using correct work instructions. As MechCorp is in a highly competitive market, AR is seen very critical to sustained success, and risks of implementation AR will have serious consequences.

4.2 Micro-case studies

The MechCorp case is supplemented by a range of primary "micro-case" studies stated in table 2 from companies in Denmark. The cases were collected by the authoring team but not elaborated further due to space constraints.

Table 2: Selected micro-cases involving ET and RM

Company	Emerging technology	Risk assessment	Risk management
Software consultancy	Virtual reality	Lack of business cases Lack of technical skills	Budget control Skill build-up with universities
Industrial cutting tool manufacturer	3D printing	Lack of precision Too costly	Post-processing Assurance to alternative technologies
Agricultural feeding machinery producer	Internet-of-things	Lack of dynamic capabilities	Organisational improvement and training
Heat exchanger producer	Robots	Too complex	Validations using 3D scanners
Bank	Pay-by-car	Cheating Malfunction	Compliance reviews Testing

5. Risk management framework development

In developing a framework for RM in ET it is necessary to deal with the multitude of uncertainty, bias and "inflated expectations". A framework for RM must be relevant and meaningful and be based on measureable and objectively identifiable decision parameters. The suggested framework consists of five phases, subdivided into respectively the pre-project, project and post project, see Figure 2; these five phases are directly constructed from the ISO 31000 with an embedded iteration from "Continuously improve the Framework" to both the "Design"- and "Mandate & Commitment"-phase. Between the pre-project and project, we see a decision gate, where the technology emergence is evaluated, with the purpose of deciding whether or not this framework is right for the project.

It should be seen as an overlay on an existing Project Management process, and can be applied for both rigid state gate models and agile Project Management approaches; whether used on individual iterations or the project in its entirety, the *framework* aims to be a guideline choosing the RM approach, building on common standards.

5.1 Mandate and Commitments

As technologies have a broad range of characteristics, it is important to gain insight of the technology's capabilities, as it can affect the company's ongoing effectiveness and further commitment. As a part of the pre-project, the company should therefore answer questions related to the chosen technology. To help assess these characteristics the Gartner's Hype Cycle might be useful. The following questions should be answered:

- What is the radical novelty (newness) of this technology?
- What are the predictions of future growth of the chosen technology?
- Has the technology been used and explored throughout a long period of time?
- Have or will the technology cause a big impact on the industry you are working in?
- How is the technology connected with uncertainty and ambiguity?

5.2 Project emergence evaluation

The purpose of the project emergence evaluation gate is to evaluate intended technology for implementation is an ET or not, Table 4a and 4b. The framework is therefore based on an evaluation along the attributes of the y-axis in regard to risk (Low, medium & high), multiplied by the potential impact on the organization. The sum conclusively tells whether it is an ET or not. Table 3 is a representation of how the sum can be interpreted in regards using the *Risk Management Framework for implementing Emerging Technologies* or not.

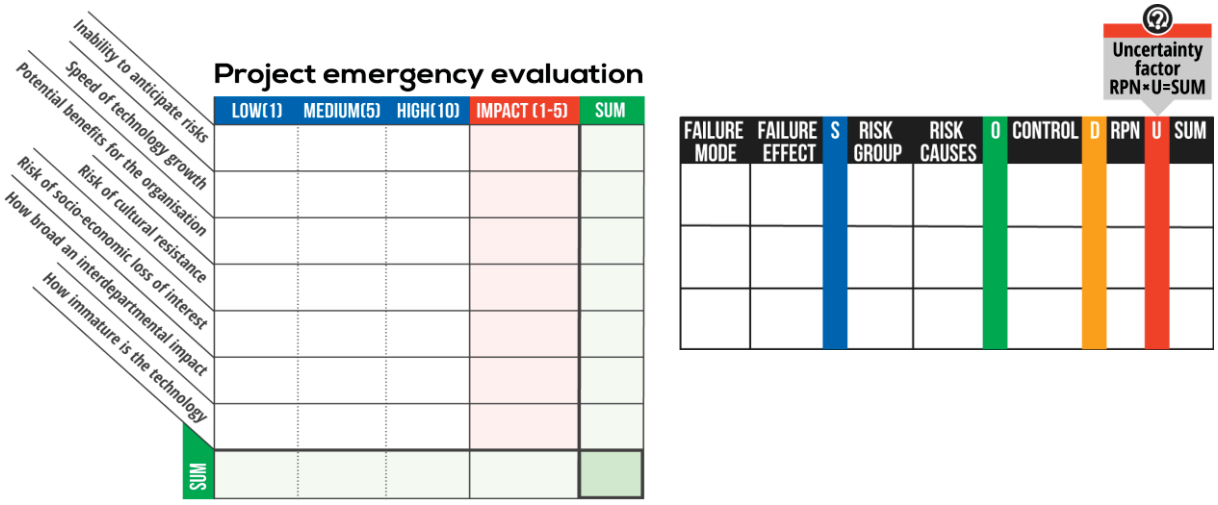
Table 3: The project emergence decision table

Use the RM framework	SUM > 175
Uncertain	100 ≤ SUM ≤ 175
Don't use the RM framework	SUM > 100

The project emergence evaluation gate is built on the foundation of the technology readiness assessment matrix, but in a more simplified company specific context (Cox, 2008). The attributes on the horizontal axis are derived from the literature review in which a clarification of ET in the light of RM is evaluated, that is, the risks that ET can impose within an organization.

It is important to note that the impact is a property based on the company's individual impact evaluation. The evaluation of the same technology can vary between companies. The tool is therefore suggested powerful in cases where the company is uncertain whether the technology is an ET or not.

Tables 4a and 4b: Project emergency evaluation tool and modified FMEA table



5.3 Designing the approach

The purpose of this phase is to design the RM framework for ET. To do so, the company needs to "[...] understand both the external and internal context of the organization" (ISO, 2018). In order to understand the organization's external and internal factors a SWOT analysis (Carpenter and Sanders, 2001) could be the structural base of this design, which will give the company the possibility to easily construct their own approach towards accommodating potential risks when implementing ET. This is illustrated in Figure 2.

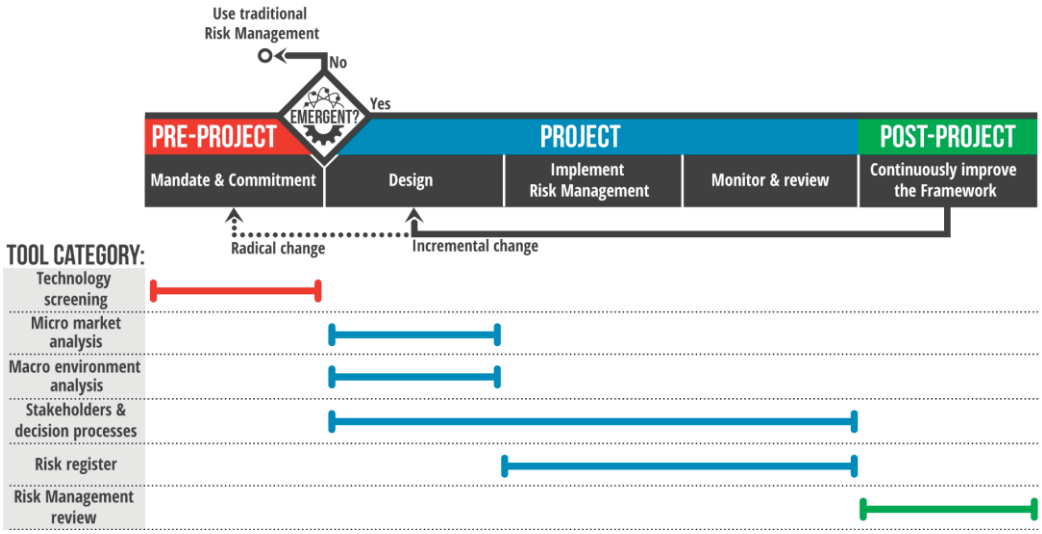


Figure 2: Risk Management Framework for implementing Emerging Technologies

To evaluate the organizations internal factors; resources, capabilities, core competencies and policies should be investigated. To do so tools such as stakeholder- or value chain analysis could be used (Carpenter and Sanders, 2001).

To evaluate the organizations external factors, the environment and competitors should be investigated. Tools such as the PESTEL analysis and Porter's Five Forces could be used (Carpenter and Sanders, 2001). Various tools are to be appropriately selected for each phase as illustrated in Table 5.

Table 5: Risk review methodologies

Tool category	Utilized tools	Influenced phases
Technology screening	Technology roadmap Comparison matrix Gartner Hype Cycle *(Dedehayir & Steinert, 2016)* technology maturity assessment	1
Macro environment analysis	PESTEL	2
Micro market analysis	SWOT Porters 5 forces	2
Stakeholders and decision processes	Power/interest matrix *(Treasury, 2015 / orange book)* Action process map and decision gates Disaster recovery plan Supply- and valuechain impact	2,3,4
Risk register	FMEA *(Daimlerchrysler, 2005) (Card. et al, 2005)* PRINCE2 Risk Register (*PRINCE2: A Practical Handbook, Colin Bentley)* Risk Matrix (severity/likelihood) *(Talbot, 2012)*	3,4
Risk management review	Risk register evaluation → Estimations vs occurrence Risk Management KPI's	5

5.4 Implementing Risk Management

According to the ISO 31000 standard, implementing Risk Management consists of six parts (ISO, 2018): (1) Planning: The appropriate timing? (2) Mapping processes and policies (3) Compliance with requirements (4) Ensure roles and decision making (5) Information and training sessions (6) Accordance with stakeholders.

When dealing with ET, process mapping becomes a particular valuable tool, for defining patterns of action for scenarios of different failure modes. The following tools are therefore recommended; A continuation of the stakeholder analysis, FMEA (Reid, 2005) and Risk identification process map (Merna and Al-thani, p. 50, 2008).

As earlier stated in the RM literature review, the FMEA has certain shortcomings. Therefore, when dealing with ET, an extra factor needs to be added, which is the uncertainty factor "U". The uncertainty factor should be multiplied with the RPN result, in order to account for the overall uncertainty of the technology. For example, if a failure mode with a relatively low RPN still have a high uncertainty, this will be leveled to be more realistic.

5.5 Monitor and review

The company should measure, monitor and review their activities throughout the whole process. Following actions should continuously be taken in order to ensure effectiveness of RM and support high performance:

- Defining RM Key Performance Indicators(KPI's)
- Progress measurements and deviations monitoring
- Review compliance with RM policy and report progress
- Assess the effectiveness of RM (ISO, 2018).

To monitor and review the framework the tools; Risk Response Process Map (Carpenter and Sanders, 2001) and FMEA should be considered.

5.6 Continuous improvement

After assessments made during the Monitoring and review phase, further improvements and changes can be conducted. In case of necessity of serious changes, as presented in the framework, incremental or radical changes can be implemented. When this occurs, the process should be of an iterative nature upon building the framework, where the process either start again at step 5.1 or 5.3, dependent on the changes. To evaluate and improve the framework the following questions should be answered:

- What was the framework missing and how can these be addressed based on these shortcomings?
- Which improvements could be applied to each phase of the framework?
- Did the project encounter unforeseen risks and how well were these risks managed?
- Did the description of the project change compared to the finished project?
- Did the framework lack any tools?

6. Discussion and conclusion

Risk Management Framework for implementing ET is derived empirically. Scarce explicit knowledge was shared with regards to RM during the interviews. More interviews and studies of motivational and behavioural factors should be conducted in order to establish a bigger empirical foundation, as to how RM is applied in practice. Consequently, the chosen tools in the framework may therefore be subject to further adjustments in future research.

Overall it is paradoxical to impose an RM framework to ET that by nature is uncertain. However, as many organisations increasingly rely in ET, professionalization of ET is expected to include the ability to do RM. Application of the framework needs to be tested in practical environments, to secure its usability and improve upon it.

The research indicates that in order to effectively manage risks in projects concerning ET, a framework needs to be highly applicable in a practical environment. This means detecting projects dealing with ET. From various definitions and varying company perceptions of what categorizes an ET, to what sort of implications in regards to RM companies should be aware of, the definitions have been synthesized into seven definitions to help ease the assessment:

- Inability to anticipate risks
- Speed of technology growth
- Potential benefits for the organisation
- Risk of cultural resistance
- Risk of socio-economic loss of interest
- How broad an interdepartmental impact?
- How immature is the technology?

Traditional RM approaches lacks a way of dealing with the increased uncertainty derived from projects with ET, due to the absence of historical foundation; in other words, the approach have to change, to accommodate for the relational gap between RM and ET. The paper proposes a strategized way of structuring the RM approach, when dealing with high degrees of uncertainty and ambiguity, derived from a systematic literature review and qualitative case studies. This is addressed with a *Risk Management Framework for implementing Emerging Technologies* based on the ISO 31000:2018, Failure Modes and Effect Analysis (FMEA). The framework consists of the following five phases: (1) Mandate and Commitment, (2) Design, (3) Implementing Risk Management, (4) Monitor and review and (5) Continuously improve the framework.

References

Ahmed, R. (2017) “Risk Mitigation Strategies in Innovative Projects”, In: Key Issues for Management of Innovative Projects, InTech.

Becker, K. (2010) “Facilitating unlearning during implementation of new technology”, Journal of Organizational Change Management, Vol 23, No. 3, pp 251–268.

Bentley, C. (2010) PRINCE2 A Practical Handbook 3rd Edition, Butterworth-Heinemann, Oxford.

Bonnín Roca, J. et al. (2017) “When risks cannot be seen: Regulating uncertainty in emerging technologies”, Research Policy, Vol 46, No. 7, pp 1215–1233.

Brocal, F., Sebastián, M. A. and González, C. (2017) "Theoretical framework for the new and emerging occupational risk modeling and its monitoring through technology lifecycle", Safety Science, Vol 99, pp 178–186.
Brookes, N. and Clark, R. (2009) "Using Maturity Models to Improve Project Management Practice", POMS 20th Annual Conference, pp 1–12.
Card, A.J., Ward J.R. and Clarkson P.J. (2012) "Beyond FMEA: The Structured What-If Technique (SWIFT)", Journal of Healthcare Risk Management. Vol 31, No. 4, pp 23-29.
Carpenter, M. A. and Sanders, W. G. (2006) Strategic management: Concepts and Cases, Pearson, London.
Cox, T. (2008) "What's wrong with risk matrices?", Risk analysis, Vol 28, No. 2, pp 497-512.
Cozzens, S. et al. (2010) "Emerging technologies: Quantitative identification and measurement", Technology Analysis and Strategic Management, Vol 22, No. 3, pp 361–376.
Day, G. S. and Schoemaker, P. J. H. (2000) "Avoiding the Pitfalls of Emerging Technologies", California Management Review, Vol 42, No. 2, pp 8–33.
Dedehayir, O. and Steinert, M. (2016) "The hype cycle model: A review and future directions", Technological Forecasting and Social Change, Vol 108, pp 28-41.
de Oliveira, U., Marins, F., Rocha, H. and Salomon, V. (2017) "The ISO 31000 standard in supply chain risk management", Journal of Cleaner Production, Vol 151, pp 616-633.
Dietrich, D. M. and Cudney, E. A. (2011) "Methods and considerations for the development of emerging manufacturing technologies", International Journal of Production Research, Vol 49, No. 10, pp 2819–2831.
Green, I., Millea, J. and Putland, G. (2005) "Emerging Technologies: A Framework for Thinking", [online], http://www.det.act.gov.au/__data/assets/pdf_file/0019/17830/emergingtechnologies.pdf.
Halaweh, M. (2013) "Emerging Technology: What is it?", Journal of Technology Management & Innovation, Vol 8, No. (3), pp 19–20.
Hillson, D. (2012) PROJECT RISK MANAGEMENT: Past , present and future views from the chair, Association for Project Management (APM).
HM Treasury (2004) The Orange Book Management of Risk: Principles and Concepts, HM Treasury, London.
ISO (2018) ISO 31000 Risk Management – Guidelines 2nd Edition, ISO, Geneva.
Merna, T. and Al-thani, F. (2008) Corporate Risk Management, John Wiley, Chichester.
Olechowski, A. et al. (2016) "The professionalization of risk management: What role can the ISO 31000 risk management principles play?", Int'l Journal of Project Management, Vol 34, No. 8, pp 1568–1578.
Project Management Institute (2017) A guide to the project management body of knowledge (PMBOK® guide) 6th edition, PMI, Inc, Philadelphia.
Ratcliff, A. (2009) 'OSD Manufacturing Technology Overview New Orleans , LA', (May).
Raz, T., Shenhar, A.J. and Dvir, D. (2002) "Risk management, project success, and technological uncertainty", R&D Management, Vol 32, No. 2, pp 101–109.
Reid, R. D. (2005) "FMEA — Something Old , Something New", Quality Progress, Vol 38, No. 5, pp 90–93.
Rotolo, D., Hicks, D. and Martin, B.R. (2015) "What is an emerging technology?", Research Policy, Vol 44, No. 10, pp 1827–1843.
Saunders, M. and Lewis, P. (2009) Research Methods for Business Students, 5th Edition, Peason, Harlow.
Stilgoe, J., Owen, R. and Macnaghten, P. (2013) "Developing a framework for responsible innovation", Research Policy, Vol 42, No. 9, pp 1568-1580.
Szymanski, P. (2017) "Risk management in construction projects", Technological and Economic Development of Economy, Vol 21, No. 1, pp 65–78.
Themsen, T. and Skærbæk, P. (2018) "The performativity of risk management frameworks and technologies", Accounting, Org. and Society (in press).
Ward, S. and Chapman, C. (2003) "Transforming project risk management into project uncertainty management", International Journal of Project Management, Vol 21, No. 2, pp 97–105.
Villa, V., Paltrinieri, N., Khan, F. and Cozzani, V. (2016) "Towards dynamic risk analysis", Safety science, Vol 89, pp 77-93.

Knowledge Bases and Variety of Networking Behaviour among Research-Based Spin-Offs

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Abstract: The paper addresses the role played by research-based spin-off firms (RBSOs) as knowledge dissemination mechanisms, through their position in knowledge networks. Previous research found that, despite the continued relevance of links with research organisations, these firms frequently play an intermediary role between academia and industry, and started characterising the forms assumed by that role (Conceição, Sousa and Fontes, 2017; 2018). This paper extends this approach by proposing that the composition and structure of the knowledge networks and the position occupied by RBSOs are not homogeneous, but vary between industries, being associated with the nature of the knowledge prevalent in that industry. For this purpose, the paper draws on the notion that innovation process in firms and industries are strongly shaped by their specific "modes of knowledge creation" or "knowledge bases", which have been categorised as analytical, synthetic or symbolic (Asheim and Coenen, 2005). According to the literature these modes of knowledge creation influence the nature of interactions that take place (Moodysson et al, 2008; Plum and Hassink, 2011; Salavisa et al, 2012) and, therefore, they are expected to introduce some differentiation in the knowledge networking behaviour of the RBSOs. The empirical research is based on the data on the publicly funded collaborative research and technology development projects established by the population of RBSO created in Portugal until 2007, encompassing both domestic projects, funded by national programmes (237 projects) and international projects, funded by European Framework Programmes (216 projects) and covering a broad spectrum of industries. The industries were classified according to their knowledge bases. The knowledge networks, associated with the participation of RBSO in those projects, were (re)constructed and analysed using a set of measures from social network analysis, with a view to uncover and assess their composition and structure. The results show that, despite RBSOs common academic origin, there some differences in the structure of the knowledge networks of firms in different industries, in particular between those characterised by an analytical knowledge base (of which biotechnology emerges as the most paradigmatic case) and a synthetic knowledge base. These differences have implications for position and role of RBSOs in the networks.

Keywords: Analytical vs. synthetic knowledge bases; Knowledge network, Research-based spin-offs; Social network analysis

1. Introduction

This research addresses the roles played by firms whose activities are based on knowledge generated in research organisations. The literature offers different definitions and labels for this category of organisations.

In this paper we define them as firms whose creation was based on the formal and/or informal transfer of knowledge or technology generated in public research organisations (Djokovic and Souitaris, 2008; Mustar et al, 2006; Pirnay et al 2003) and label them research based spin-offs (RBSOs).

There is now a significant body of research on this group of firms, which have addressed their genesis, advantages or disadvantages and roles played (for reviews see, for instance Grimaldi et al, 2011; Miranda et al, 2017; Mustar et al, 2008; Rasmussen, 2018; Wright, 2014). The literature generally agrees that these firms can offer relevant contributions to innovation and technological development, although there is some debate on the extent and conditions in which these are achieved. Given RBSOs particular strengths and weaknesses, some authors have argued that one key role of these firms is to act as conveyors of knowledge across organisations, by accessing, transforming and translating knowledge between different knowledge, organisational and cultural contexts (Autio, 1997; Fontes, 2005; Harrison and Leitch, 2010; Perez and Sanchez, 2003; Walter et al, 2006). Accordingly, it has been argued that RBSOs impact is more clearly expressed through the value they create in knowledge and innovation networks (Conceição, Sousa and Fontes, 2017; 2018; Hayter, 2016; Rasmussen, 2018). But while there has been some recent research in the networking behaviour of RBSOs (Hagedoorn et al, 2018; Aaboen et al, 2016; Fontes and Sousa, 2016; Benghozi and Salvador, 2014), it only rarely addresses RBSOs knowledge networks.

Previous research addressing this issue found that RBSOs frequently play an intermediary role between academia and industry and started characterising the forms assumed by that role (Conceição, Sousa and Fontes, 2017; 2018). This paper extends this approach by proposing that the composition and structure of the knowledge networks and the position occupied by RBSOs are not homogeneous, but vary between industries, being associated with the nature of the knowledge prevailing in that industry. For this purpose the paper draws on the notion that innovation process in firms and industries are strongly shaped by their specific "modes of knowledge creation" or "knowledge bases", which have been categorised as analytical, synthetic or symbolic (Asheim and Coenen, 2005). According to the literature, these modes of knowledge creation influence the nature of interactions that take place (Moodysson et al, 2008; Plum and Hassink, 2011; Salavisa et al, 2012) and, therefore, they are expected to introduce some differentiation in the knowledge networking behaviour of the RBSOs.

The empirical research is based on data on the publicly funded collaborative research and technology development (RTD) projects established by the population of RBSO created in Portugal until 2007. The analysis encompasses both domestic projects, funded by national programmes (237 projects) and international projects, funded by European Framework Programmes (216 projects). The knowledge networks, associated with the participation of RBSO in those projects, were (re)constructed and analysed using a set of measures from social network analysis, namely for studying their composition and structure. The RBSO selected operate in a broad spectrum of industries, which were classified according to their knowledge bases.

The final goal is to understand whether different knowledge base affect the networks established by RBSOs, with impact on the roles played by these firms.

2. Conceptual Framework

2.1 RBSO intermediate role

Research-based spin-offs (RBSO) have been found to play an important role as knowledge transfer mechanisms (Bathelt et al, 2010; Helm and Mauroner, 2007). In fact, RBSOs are set-up to commercially exploit the results of academic research, transforming it in technologies, products or services and making them accessible to the society. Moreover, if successful in their endeavour, RBSOs are likely to continue acting as sources and disseminators of new knowledge over time. The effectiveness of RBSO as a "bridge" between academia and the industry depends on entrepreneurial actions, such as opportunity identification, risk taking, resource mobilisation that can be more effectively achieved through networks (Grandi and Grimaldi, 2003; Walter et al, 2006).

Previous studies (Conceição, Sousa and Fontes, 2017; 2018) indicate that the parent research organisation is an important actor in most firms' national knowledge networks. Moreover, half of these spin-offs only establish formal technological relationships with research organisations, reproducing a frequently depicted pattern among RBSOs. However, the other half was found to also establish relationships with non-academic organisations. Among these, a still substantial number emerge as a central element in tripartite technological relationships, including the RBSO, research organisations and firms or other organisations located downstream. This result points to a bridging role of RBSOs in entrepreneurial ecosystems, connecting academic and downstream organisations. Furthermore, when considering the network formed by the RBSO and its partners, several spin-offs are found to occupy a position as brokers between the other network actors, potentially facilitating the circulation of knowledge across them (Conceição et al, 2018).

Concerning the broader knowledge networks established by Portuguese RBSOs in the context of collaborative RTD projects at National and European levels, the authors concluded that these RBSOs have the conditions to play an intermediary role relatively to other Portuguese organisations, which can assume different forms in diverse contexts (Conceição, Sousa and Fontes, 2017). In the networks formed in the context of national projects they are frequently in a position to bridge between research organisations and firms. In the international networks formed in the context of European Union projects, where RBSOs will tend to assume a less relevant position, their most important role is as connectors and/or conveyors of advanced knowledge produced these international contexts and the Portuguese organisations with whom they collaborate, either in the EU projects or in other Portuguese projects (Conceição, Sousa and Fontes, 2017).

In order to better understanding the intermediate role played by RBSOs, it is crucial to assess whether are these roles are uniformly performed across the whole population of RBSOs, or differ between industries. The argument of this paper is that it is likely to be the latter case. The rationale is that the composition (i.e. the type of organisations involved) and structure of knowledge networks is associated with the nature of knowledge, which is likely to vary between industries. This will influence the type of partnerships established and the conditions in which RBSOs interact with their environment, thus affecting the roles these firms play towards other organisations. This argument is supported by the knowledge bases literature, according to which the contents of knowledge relationships are determined by firms and industries specific knowledge bases (Asheim and Coenen, 2005; Plum and Hassink, 2011). Thus, industries with different knowledge bases are expected to differ with regard to the structural dimension of knowledge networks (Martin, 2013).

2.2 Knowledge bases Literature

The principal contribution of the knowledge bases literature was to advance the idea that innovation process of firms and industries are strongly shaped by their specific knowledge bases (Asheim and Coenen, 2005; Asheim and Gertler, 2005). The knowledge base approach was presented as an alternative to conceptualizations of knowledge such as high- tech, medium- tech and low- tech (OECD, 1996) and tacit versus codified knowledge (Boschma, 2018; Moodysson et al, 2008), which these authors considered insufficient to fully explain the nature of the processes at work.

This literature distinguishes three kinds of knowledge base: analytical (science based); synthetic (engineering based); and symbolic (creativity based). An *analytical knowledge base* is depicted as having the following features: innovation relies on the creation of new knowledge; scientific knowledge is very important; collaboration between firms and research organisations is relevant; knowledge creation is based on deductive processes and formal models and appeals to abstract "know-why"; codified knowledge is dominant due to the existence of extensive patenting and publication activities (even if tacit knowledge is also present); and the outcome is more frequently radical innovation. A *synthetic knowledge base* is described by the following aspects: innovation is mostly based on existing knowledge, either through application or novel combinations; knowledge creation arises from specific problem solving, through inductive processes of testing and experimentation; interactive learning with clients and suppliers is more relevant; tacit knowledge is dominant; and the outcome is mainly incremental innovation (Asheim and Gertler, 2005; Moodysson et al, 2008). Finally, the concept of *symbolic knowledge base*, which was introduced later, is related with processes that deal with the creation and communication of cultural meanings, symbols, ethics and aesthetics. In this sense, symbolic knowledge is mainly (but not exclusively) tacit, closely linked to specific socio-cultural contexts and difficult to transfer directly across the geographical space (Manniche, 2012).

2.3 Knowledge bases & knowledge networks

The distinct modes of knowledge creation associated with the different knowledge bases impact on the way firms develop their knowledge networks (Moodysson et al, 2008; Plum and Hassink, 2011; Martin, 2013). Thus, knowledge interactions with universities and other research-oriented organisations are more frequent in the analytical mode, acting as complementary sources to internal R&D activities. Relations with research organisations are also present in the case of the synthetic mode, but interacting with clients and suppliers for problem solving, often through face-to-face exchanges and/or informal bartering, is more relevant. The more formalised and codified nature of the knowledge being produced in the analytical mode makes personal interactions less important than in the synthetic mode, and also invites (or even recommends) a greater formalisation of the knowledge exchanges.

Plum and Hassink (2011), drawing on data on two groups of German firms (biotechnology and automotive), predict and empirically corroborate the existence of sharp differences between knowledge networks associated with each knowledge base - analytical and synthetic. Knowledge networks differ across fundamental dimensions: composition, link content, average importance of the relations and geography.

Comparing the two networks, they found that: the share of universities is much higher in biotechnology networks, while ties with suppliers and customers predominate in automotive networks; the average importance attributed to each kind of partner for the firms' innovative performance is also distinct across the two groups, although not so strikingly; the content of the ties differs, with a much higher share of 'scientific oriented' ties on total ties in biotechnology networks, and a much higher share of 'practical oriented' ties in automotive networks; finally, regarding the geographical reach, a clear difference occurs, with a much higher

share of international connections, and particularly of extra-European connections, in biotechnology firms, versus the overwhelming dominance of regional and domestic connections in automotive networks.

Similarly, Martin (2013) argues that industries with different knowledge bases diverge, not only with regard to the type of knowledge involved in innovation activities, but also with regard to the nature of innovation networks, namely their structural, relational and geographical dimensions. This author defends that, in the case of an analytical knowledge base, the innovation networks involve a relatively small number of actors and an intensive collaboration between those actors, based on formal collaboration between organizations, or, less formalized, within communities of scientists knowledgeable in a particular issue-area. As analytical industries deal with scientific knowledge that is not dependent on a particular geographical or social-cultural context, cooperation and knowledge exchange can take place between scientists and research units that are widely dispersed across great distances (Martin, 2013). Regarding the synthetic knowledge base, Martin (2013) defends that networks are predominantly national or regional. Synthetic industries are constantly engaged in solving engineering problems, which require know-how and practical skills. In this sense, the importance of tacit knowledge and interactive ways of learning implies that spatial proximity plays an important role for collaboration and knowledge exchange. Companies are more likely to engage in intensive cooperation with suppliers and customers, which are located within the regional or national milieu, where a common institutional framework facilitates interactive learning and knowledge exchange (Martin, 2013). Concerning the third type of knowledge base, the author argues that innovation in symbolic industries is dominated by creativity and artistic skills, while the dominant mode of innovation is flexible and based on temporary and project-based cooperation. The importance of cultural knowledge and sign values suggest that cooperation and knowledge exchange takes place first and foremost within the regional milieu, while national or international collaboration is less frequent (Martin, 2013).

This literature supports our argument that RBSOs in different industries are likely to have different knowledge bases and establish different networks. In fact, although RBSOs are companies created to explore knowledge and technologies developed in research organisations, and thus are often analysed as a group, the literature has shown that they not necessarily homogenous organisations (Conceição et al, 2012). In particular, they can use different types of knowledge in their innovation activities and thus establish different types of knowledge relationships (Lubik et al, 2013; Conceição et al, 2012; Bathelt et al, 2010). With respect to evidence on network differences at the industrial level, research that specifically compares the RBSOs networks in different industries is scarce. However, a comparison between innovation networks of biotechnology and software found differences between them, in particular in networks concerned with formal exchange of technological knowledge (Salavisa et al, 2012).

Thus, this paper draws on the knowledge base concept to uncover eventual differences between the knowledge networks formed by Portuguese RBSO in different industries, as a basis to understand whether the intermediary roles previously identified are dissimilarly distributed across industries. For this purpose, two industries are considered: biotechnology with an analytival knowledge base and environment and energy with a synthetic knowlwdge base.

While biotechnology was considered as representative of an analytical knowledge base in research on the knowledge networks of technology-intensive companies (Salavisa et al, 2012), the case of the energy and environment industries has not been previously addressed (to the best of our knowledge). However, some evidence on the characteristics of the knowedge developed/applied and the innovation activities conducted in these industries suggests they are more likely to fall within the synthetic knowledge based category. In fact, energy and environement industries are highly multidisciplinary, but predominantly encompass engineering activities, supported on disciplines - e.g. electrical, electronics and information engineering, mechanical engineering, materials engineering, environmental engineering - that are classified as under the “Engineering and technology” label in the OECD Fields of Science classification (OECD, 2007). This is the case even for some of the renewable energy technologies that have registered the greatest development in Portugal – wind and wave energy – therefore providing opportunites for the emergence of RBSOs (Fontes and Sousa, 2017). The knowledge base underlying wind energy technology was described as mostly encompassing disciplines such as mechanical and electrical engineering mixed with software and aerodynamics (Bergek and Jacobsson, 2003). Wave energy technologies are also reliant, to a great extent, on similar disciplines. This is supported in Portugal by the fact that the disciplinary bases of the main research centres where technologies were developed are mechanical engineering or naval engineering. Moreover, as the renewable energy technologies

mature and utilities and other large firms occupy dominant positions, a significant part of the opportunities open to RBSOs in this field rest on developing advanced solutions for more specific problems associated with the operation of the technologies (efficiency, costs, reliability) or with grid integration, due to the renewable energies distributed and intermittent nature (Fontes and Sousa, 2017).

Another growing area of opportunity for new firms is the broad field generically identified under the "energy efficiency" designation, which has equally application-oriented and combinatorial characteristics. The activities conducted by RBSOs operating under the "environmental" label are also mostly concerned with solving complex problems in the areas of waste and water treatment or air quality in buildings, and will equally entail, to a large extent, applying existing knowledge and specialised competences to develop new solutions. Thus, in both cases, the activities are likely to involve combining, in new ways, knowledge originating from a variety of disciplines; interaction with users will be relevant given the problem solving perspective; and the knowledge produced will tend to be more context-specific and tacit, even if they may occasionally need to resort to scientific research to solve more complex problems.

A comparison between the composition and structure of the knowledge networks in these industries will enable us to assess eventual similarities and differences in terms of the type of organisations with whom RBSOs establish relationships (composition) and in terms of the structure of the networks, which give indications of the type of connections they may help to establish.

3. Methodology

3.1 Data sample: the Portuguese RBSOs

For this study RBSOs were defined as firms created by entrepreneurs who have some stable connection with a university or other research institution - such as faculty members, researchers and graduate students - and who are applying knowledge obtained or technology developed as part of their research activity; and firms created by external entrepreneurs based on the transfer of technology developed by a research organisation (Conceição, Faria and Fontes, 2017).

The empirical analysis is based on the set of RBSOs created in Portugal between 1979 and 2007 and surviving to this date, which corresponds to the known population created during this period. It should nevertheless be noted that although the first firm identified was established 1979, spin-offs creation only took-off in the 1990s, the majority of the firms included having been established already in the 2000s (Conceição, Faria and Fontes, 2017).

These RBSOs firms are active in a wide variety of industries. In what concerns industry distribution, information & communication technologies (ICT) represent 40.67% of the population with 133 RBSOs, followed by the Biotechnology with 64 firms (19.57%). The smaller proportion corresponds to Engineering with 19 RBSOs (5.81%) (Conceição, Faria and Fontes, 2017).

3.2 Collaborative RTD Projects: data and analysis

To identify the formal networks established by the RBSOs, the paper draws on data on collaborative projects established by Portuguese RBSOs, at national and European level, in the context of all public programmes.

Given RBSOs reliance on public funding for research and development activities (Wright et al, 2007), this data is expected to offer a good coverage of the formal technological relationships by established these firms in this domain.

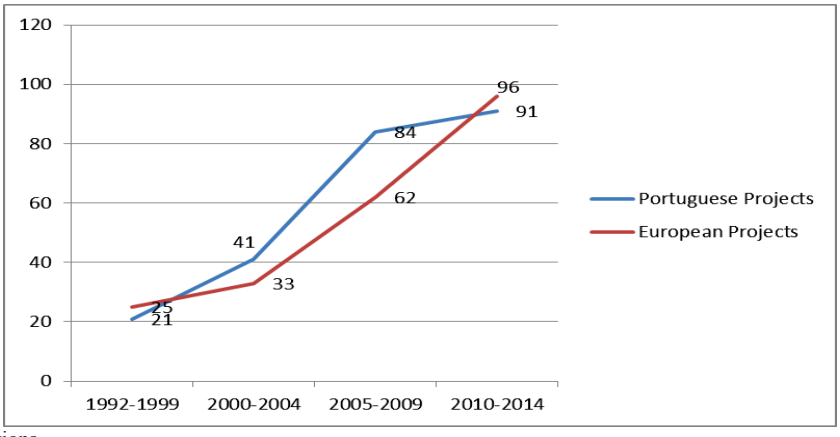
The Portuguese data, regarding the collaborative RTD projects funded by national support programmes, was obtained from the National Innovation Agency (AdI later ANI) database and covers the period 1992-2014. The European data, regarding the joint RTD projects conducted in the context European Framework Programmes, was obtained from the European Commission Community Research and Development Information Service (CORDIS) database and covers the same period. All National and European projects with Portuguese spin-off involvement were identified (table 1), totalling 453 projects (237 Portuguese projects and 216 European projects). Since not all RBSOs were involved in at least one type of project, the analysis ended-up including 112 RBSO, which totalled 510 project participations: 281 participations in Portuguese projects and 229

participations in European projects. Figure 1 presents the distribution of Portuguese and European projects over time.

Table 1: Descriptive of Portuguese and European projects.

	Number of projects	Number of RBSOs involved	Number of project participations of RBSOs
Portuguese funded projects	237	92	281
European funded projects	216	64	229
Total PT & EU	453	112*	510

Source: Own calculations.
* 44 spin-offs participated in both types of project



Source: Own calculations.

Figure 1: Distribution of Portuguese and European projects by start year (1992 – 2014)

Data was collected (in May 2016) on the characteristics of each project and on the partners. Then, both RBSOs and partner organisations were characterised by type and location. The RBSOs were also classified according to the industry where they conducted their principal activity: biotechnology, energy & environment, electronics, engineering and ICT. The "parent" research organisations of the RBSOs were identified and their presence in the same project of their spin-offs was signalled (table 2). As mentioned above, in this research only two industries are considered: biotechnology representing an analytichal knowledge base and energy & environment representing a systhetic knowedge base.

Table 2: Descriptive of Portuguese and European projects by Industry

Industry	Portuguese funded projects		European funded projects	
Biotechnology	47	20%	52	24%
Energy & Environment	14	6%	17	8%
Electronics	47	20%	56	26%
Engineering	9	4%	9	4%
ICT	109	46%	73	34%
Services	9	4%	9	4%
Total number of projects	237		216	

Source: Own calculations.

Collaborative projects constitute two-mode networks that link organisations to an event - the projects. From these we have extracted a one-mode network, considering inter-organisational networks, where a tie joins two organisations, if they collaborate in the same project. We have built symmetric adjacency matrices, valued by the number of common projects and conducted Social Network Analysis (SNA), using UCINET software. The diagrams were obtained with NetDraw software.

SNA provides information on the realtions and structure, as well as on the position of the actors in the network (Wasserman and Faust, 1994). From the vast set of SNA measure we will focus our attention on: i) the size of the network, in terms of number of actors and ties; ii) the network composition, in terms of the share of each type of partner, both considering a tipology of actors (spin-offs, other companies, reseach organizations, other

type of organizations; and their location); iii) the positioning of actors, assessing their centrality; iv) the structure of the networks, considering the measures of density, distance, centralization and cohesiveness.

4. RBSOs knowledge networks: Analytical KB (biotech) vs Synthetic (Energy & Environment)

The RBSOs knowledge networks are represented in Figures 2 and 3, where the colour of the nodes represents the type of actor (spin-offs in blue, other companies in red, research organizations in yellow and other type of actors, including public and non-profit organizations, in green), the shape represents the nationality of the organization (Portuguese in squares and foreign in clircles) and the size is proportional to degree centrality.

Figure 2: Knowledge network of Biotechnology RBSOs

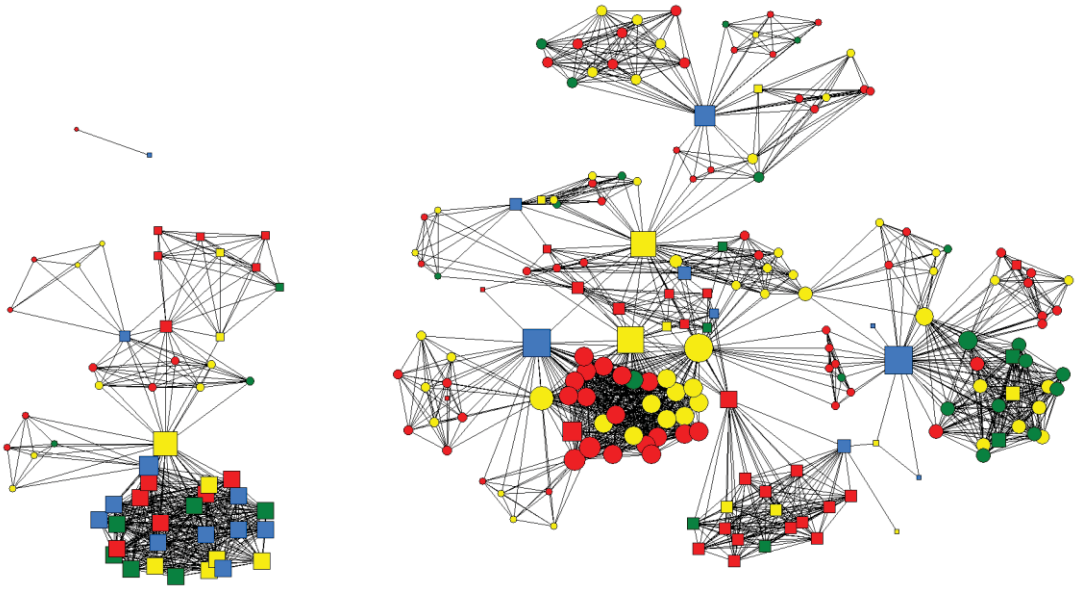


Figure 3: Kowledge network of Energy and Enviroment RBSOs

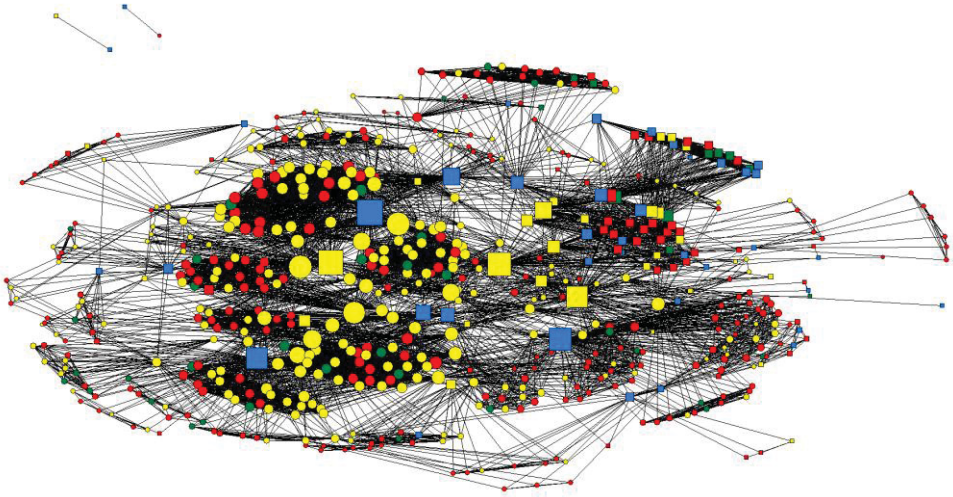


Table 3 presents the size and composition of the RBSOs knowledge networks in the two industries. It shows that the knowledge network of biotechnology is larger, notably in respect to the number of ties, stressing the importance of research collaborations in the industry. It also shows, that the frequency of interaction with research organizations is higher in biotechnology and that the frequency of interaction with other companies is higher in energy & environment, which in line with previous research, being consistent with the presence of an analytical knowledge base in the former and a synthetic knowledge base in the latter. Similarly, it also shows that national partners are more frequent in the industry with a synthetic knowledge base - energy & environment - while international partners are more frequent in the industry with an analytical knowledge base - biotechnology.

Table 3: Network size and composition

		Biotechnology	Energy & Environment
Size	Number of actors	612	240
	Number of ties	6785	1970
Composition	Spin-offs	6.2%	8.3%
	Other companies	43.9%	45.0%
	Research organizations	42.6%	31.7%
	Other organizations	7.2%	15.0%
	National organizations	19.9%	35.8%

Source: Own calculations.

Table 4 presents two centrality measures for the whole network and for the particular types of actors. Centrality measures enable to detect more favourable network positions, enabling access to new business opportunities access to the most relevant knowledge sources and access to better information about what is happening in the network, leading to a increase in innovative performance (Gilsing et al, 2008; Van Der Valk and Gijbers, 2010). In this paper two different centrality measures are used: degree centrality, enabling to capture those actors that are more active in the network and betweenness centrality, enabling to capture those actors that lie between the various other organisations, acting as knowledge brokers.

Table 4: Degree and Betweenness Centrality

		Biotechnology	Energy & Environment
Average Degree Centrality	Overall network	22.7	16.6
	Spin-offs	30.4	23.1
	Other companies	17.7	15.0
	Research organizations	26.9	7.2
	Other organizations	21.7	16.8
	Centralization Index	2.4%	7.7%
Average Normalised Betweenness centrality	Overall network	0.302	0.519
	Spin-offs	1.44	2
	Other companies	0.03	0.12
	Research organizations	0.46	0.89
	Other organizations	0.02	0.04
	Centralization Index	14.9%	26.1%

Source: Own calculations.

It is possible to observe differences across the two industries. Firstly, the biotechnology network exhibits a higher activity, refelected by the higher average degree centrality – each actor has in average 23 partners. Secondly, the distribution of the degree centrality across actor type shows that research organizations are the most relevant knowledge provider in biotechnology, while other organzations (followed closely by other companies) perform this role in the energy & environment network. Thirdly, in the energy & environment network, it is possible to observe a higher ability to broker between groups, expressed by a greater betweeness centrality. Fourthly, the energy & environment network shows a higher centralization index (both for degree and betweeness), indicating a higher variation in the centrality scores among the organizations and, therefore, reflecting a larger separation between the core and the periphery of the network. Since, more skewed distributions can give more benefits to central actors relatively to more peripherical ones, the most central actors in the energy & environment network can see their power reinforced by this structure. Table 4 also shows that, in both industries, research organzations are performing the role of brokers.

Table 5 presents a set of measures to characterize the structure of the networks. Knowledge circultes more easily when networks are connected and dense and have shot paths between the actors (Van Der Valk and Gijbers, 2010). In this case, althoug the networks have the same number of components - there is a path conecting all the organizations - in biotechnology the largest component includes a higher proportion of the total number of actors, and this is reflefted in a higher connectedness (proportion of the organizations that can be reached in the network. In the energy & environment industry we found a denser network, reflecting that the proportion of the relations that are possible, taking in to account organizations present in the network, were established by the RBSOs. Previous research has found that networks with a higher density favour the sharing and transfer of knowledge since they promote trust (Tortoriello et al, 2012), and provide better oportunites to asses the reliability of parters (Gilsing et al, 2008), to establish a share language (Obstfled, 2005) and to build absorptive capacity (Gilsing and Nooteboom, 2005), being very important to exploitation processes. On the other hand, less dense networks – case of biotechnology – facilitate the acquisition of

valuable non-redundant information contributiong to bring new ideas and to identify new opportunities (Burt, 2004; Zaheer and Bell, 2005; Zheng, 2010), being very important for exploration processes.

Table 5: Network structure measures

	Biotechnology	Energy and Environment
Number of components	3	3
Share of the largest component	99.3%	77.1%
Density	3.6%	6.9%
Connectedness	98.7%	64.2%
Average distance	2.9	2.9
Diameter	5	5
Clustering coefficient	0.496	0.974
Small-world index	21.6	9.6

Source: Own calculations.

No differences were found across the industries rearding the diameter and the average distance: in both cases the longest geodesic distance is 5 and the average geodesic distance is 3, meaning that to reach any other organization in the same component it will take 3 steps.

Efficiency in knowledge transfer is also related to the small-world characteristics of a network (Watts and Strogatz, 1998; Cowan and Jonard, 2004), i.e., the combination of many local ties and few more distant ties. Small-world networks tend to be formed by sub-groups, exhibiting a higher clustering coefficient (the density in the neighberhood of an actor) that is reflected in a fast diffusion of knowledge in the sub-group, and by the fact that most pairs of nodes will be connected by at least one short path, indicating that the knowledge can reach the whole network. This has important consequences for the easiness of information and knowledge flows and therefore for the innovation processes. Table 5 shows that the biotechnology industry exhibits a higher small-world index due to it more connected nature. This reflects a more descentralized search process (Easley and Kleinberg, 2010) that can be explained by the distributed nature of knowledge production in this industry (Whittington et al, 2009).

5. Conclusions

This paper proposed that, despite RBSOs common research-based origin, the composition and structure of their knowledge networks might vary between industries, being associated with the nature of the knowledge bases prevailing in the industry. This proposition was explored on the basis of a comparative analysis of the formal knowledge networks (national and international) formed by RBSOs in two industries - biotechnology and energy & environment - which exhibit characteristics that suggest the predominance of substantially different knowledge bases: analytical for biotechnology and synthetic for energy & environment.

The results show that there are indeed relevant differences in the composition and structure of the networks formed by RBSOs in these industries, which denote substantially different networking behaviours. In particular, the findings concerning the size (higher number of ties and greater component size) and the composition (greater weight of international partners) of the biotechnology network, as compared with the energy & environment, are in line with previous research on the characteristics of the networks in industries with the two types of knowledge bases (Martin, 2013). Similarly, concerning the structure, the finding that the biotechnology network exhibits a higher activity, reflected in the higher average degree centrality, is equally in line with previous reseach, which indicate that companies in analytical industries interact with a higher number of partners than those in synthetic industries (Martin, 2013).

The consistency of our results with features identified by previous research, involving a broader range of companies, supports our association of RBSOs active in these industries to the two generic knowledge bases, in particular our tentative association of the energy & environment industry to the synthetic knowledge base. More importantly, it suggests that despite RBSOs distinctive characteristics, their networking behaviour is strongly influenced by the dominant knowledge base in the industries where they operate. In addition, our research identified other differentiating features that reinforce the industry-specificity of the RBSOs knowledge networks studied. This variety is relevant since it has implications for the position and role of RBSOs in these networks. Thus, subsequent research will explore in greater detail the influence of these diverse network features in the RBSOs potential bridging role.

References

Aaboen, L., Laage-Hellman, J., Lind, F., Oberg, C., & Shih, T. (2016). Exploring the roles of university spin-offs in business networks. *Industrial Marketing Management*, 59, 157–166

Asheim, B.T., & Coenen, L., (2005). Knowledge bases and regional innovation systems: comparing Nordic clusters. *Research Policy*, 34, 1173-1190.

Asheim, B.T., & Gertler, M.S., (2005). The geography of innovation: regional innovation systems,In: Fagerberg, J., Mowery, D., & Nelson, R. (Eds), *The Oxford Handbook of Innovation*. Oxford University Press, Oxford: 291-317.

Autio, E. (1997). New technology-based firms in innovation networks symplectic and generative impacts. *Research Policy*, 26, 263-281.

Bathelt, H., Kogler, D., & Munro, A. (2010). A knowledge-basedt ypology of university spin-offs in the context of regional economic development, *Technovation*, 30, 519–532.

Benghozi, P., & Salvador, E. (2014). Are traditional industrial partnerships so strategic for research spin-off development? Some evidence from the Italian case. *Entrepreneurship & Regional Development*, 26(1-2), 47-79.

Bergek, A., & Jacobsson, S. (2003). The emergence of a growth industry: a comparative analysis of the German, Dutch and Swedish wind turbine industries. In Change, transformation and development (pp. 197-227). Physica-Verlag HD. doi:10.1007/978-3-7908-2720-0_12

Fontes, M., & Sousa, C. (2017). The entry strategies of research-based firms in the transition to a sustainable energy system. *International Journal of Technoentrepreneurship*, 3(4): 310-329.

Boschma, R. (2018). A concise history of the knowledge base literature: challenging questions for future research. In Isaksen, A., R. Martin, and M. Trippl (eds.) 2018. *New Avenues for Regional Innovation Systems - Theoretical Advances, Empirical Cases and Policy Lessons*. New York: Springer.

Broekel, T., & Boschma, R. (2011). Aviation, space or aerospace? Exploring the knowledge networks of two industries in the Netherlands. *European Planning Studies*, 19, 1205–27.

Coenen, L., Moodysson, J., Ryan, C., Asheim, B., & Phillips, P. (2006). Comparing a pharmaceutical and an agro-food bioregion: on the importance of knowledge bases for socio-spatial patterns of innovation. *Industry and Innovation,* 13(1), 393-414

Conceição, O., Fontes, M., & Calapez, T. (2012). The commercialisation decisions of research-based spin-off: targetting the market for technologies. *Technovation*, 32(1), 43-56.

Conceição, O., Faria A., & Fontes, M. (2017). Regional variation of academic spinoffs formation. *The Journal of Technology Transfer*, 42(3), 654-675.

Conceição, O., Sousa, C., & Fontes, M. (2017). The impact of research-based spin-offs as knowledge conveyers in innovation networks. In I. Bernhard (Ed.). *Innovation, Entrepreneurship and Industrial Dynamics in Internationalized Regional Economies*. Trollhättan: University West. p. 205-224. ISBN: 978-91-87531-61-3.

Conceição, O., Sousa, C., & Fontes, M. (2018). Research-based spin-offs as agents of knowledge dissemination: evidence from the analysis of innovation networks, in Therin, F., Appio, F.P. and Yoon, H. (Eds.). *Handbook of Research on Techno-Entrepreneurial Ecosystems*. - 3rd Edition, Edward Elgar Publishing (Forthcoming).

Cowan R., & Jonard N (2004) Network structure and the diffusion of knowledge. *Journal of Economic Dynamics and Control*, 28(8): 1557-1575.

Easley, D., & Kleinberg, J. (2010). *Networks, crowds, and markets: Reasoning about a highly connected world*. Cambridge University Press.

Djokovic, D., & Souitaris, V. (2008). Spinouts from academic institutions: a literature review with suggestions for futher research. Success of research-based spin-offs. State of the art and guidelines for futher research. *Journal of Technology Transfer*, 33(3), 225-247.

Fontes, M. (2005). The process of transformation of scientific and technological knowledge into economic value conducted by biotechnology spin-off. *Technovation*, 25, 339-347.

Fontes, M. , & Sousa, C. (2016). Types of proximity in knowledge access by science-based start-ups. *European Journal of Innovation Management*, 19(3), 298 – 316.

Gilsing, V. A., & Nooteboom, B. (2005). Density and strength of ties in innovation networks: An analysis of multi-media and biotechnology (Discussion Paper 2005-41). The Netherlands: Tilburg University, Center for Economic Research.

Gilsing, V., Nooteboom, B., Vanhaverbeke, W., Duysters, G., & van den Oord, A. (2008). Network embeddedness and the exploration of novel technologies: Technological distance, betweenness centrality and density. *Research Policy*, 37(10), 1717-1731.

Grillitsch, M., & Trippl, M. (2014). Combining Knowledge from Different Sources, Channels and Geographical Scales. *European Planning Studies*, 22, (11), 2305-2325.

Grimaldi, R., Kenney, M., Siegel, D., & Wright, M. (2011). 30 Years after Bayh-Dole: Reassessing academic entrepreneurship. *Research Policy*, 40(8), 1045–1057.

Hagedoorn, J., Lokshin, B., & Malo, S. (2018). Alliances and the innovation performance of corporate and public research spin-off firms. *Small Business Economics*, 50(4), 763–781.

Harrison, R., & Leitch, C. (2010). Voodoo Institution or Entrepreneurial University? Spin-off Companies, the Entrepreneurial System and Regional Development in the UK. *Regional Studies*, 44(9), 1241-1262.

Hayter, C. (2016).A trajectory of early-stage spinoff success: the role of knowledge intermediaries within an entrepreneurial university ecosystem. *Small Business Economics*, 47(3), 633–656.

Herstad, S. J., Aslesen, H.W., & Ebersberger, B. (2014). On industrial knowledge bases, commercial opportunities and global innovation network linkages. *Research Policy*, 43, 495–504.

Lubik, S., Garnsey, E., Minshall, T., & Platts, K. (2013). Value creation from the innovation environment: partnership strategies in university spin-outs. *R&D Management*, 43(2), 136-150.

Manniche, J. (2012). Combinatorial knowledge dynamics: on the usefulness of the differentiated knowledge bases model. *European Planning Studies*, 20, 1823-1841.

Martin, R. (2013). Differentiated Knowledge Bases and the Nature of Innovation Networks. *European Planning Studies*, 21(9), 1418-1436.

Martin, R., & Moodysson, J. (2013) Comparing Knowledge Bases: On the Geography and Organization of Knowledge Sourcing in the Regional Innovation System of Scania, Sweden. *European Urban and Regional Studies,* 20(2), 170-187.

Miranda, F.J., Chamorro, A., & Rubio, S. (2018) Re-thinking university spin-off: a critical literature review and a research agenda, *Journal of Technology Transfer* (in press), https://doi.org/10.1007/s10961-017-9647-z

Moodysson, J., Coenen, L., & Asheim, B.T. (2008). Explaining spatial patterns of innovation: Analytical and synthetic modes of knowledge creation in the Medicon Valley life-science cluster. *Environment and Planning* A, 40, 1040–1056.

Mustar, P., Renault, M., Colombo, M., Piva, E., Fontes, M., Lockett, A., Wright, M., Clarysse, B., & Moray, N. (2006). Conceptualising the heterogeneity of research-based spin-offs: A multi-dimensional taxonomy. *Research Policy*, 35, 289-308.

Mustar, P., Wright, M., & Clarysse, B. (2008). University spin-off firms: lessons from ten years of experience in Europe. *Science and Public Policy*, 35(2), 67–80.

Obstfeld, D. (2005). Social Networks, the tertius iungens orientation, and involvement in innovation. Administrative Science Quarterly, 50, 100-130

OECD (1996). *The Knowledge-Based Economy*. Paris: OECD.

OECD (2007) Revised Field of Science and Technology (FOS) Classification in the Frascati Manual, DSTI/EAS/STP/NESTI(2006)19/FINAL, Paris: OECD.

Pavitt, K. (1984). Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy*, 13, 343-373.

Perez, M., & Sanchez, A. (2003). The development of university spin-offs: early dynamics of technology transfer and networking. *Technovation*, 23, 823-831.

Pirnay, F., Surlemont, B., & Nlemvo, F. (2003). Toward a Typology of University Spin-offs. *Small Business Economics*, 21, 355 – 369.

Plum, O., & Hassink, R. (2011). Comparing knowledge networking in different knowledge bases in Germany. *Papers in Regional Science*, 90(2), 355-372.

Powell, W., Koput, K. & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology. *Administrative Science Quarterly*, 41(1), 116-145.

Rasmussen, E. (2018). *The regional impacts of university spin-offs: in what ways do spin-offs contribute to the region?* Handbook on Universities and Regional Development Edward Elgar Publishing (Forthcoming).

Salavisa, I., Sousa, C., & Fontes, M. (2012). Topologies of innovation networks in knowledge-intensive sectors: sectoral differences in the access to knowledge and complementary assets through formal and informal ties. *Technovation*, 32,(6), 380-399.

Scott, J. (2000) *Social Network Analysis – A Handbook*. 2nd Edition. London: Sage.

Tortoriello, M., Reagans, R., & McEvily, B. (2012). Bridging the knowledge gap: The impact of strong ties, network cohesion and network range. *Organization Science*, 23, 1024-1039.

Van Der Valk, T., & Gijsbers, G. (2010). The use of social network analysis in innovation studies: Mapping actors and technologies. *Innovation*, 12(1), 5-17.

Walter, A., Auer, M., & Ritter, T. (2006). The impact of network capabilities and entreprenueurial orientation on university spin-off performance. *Journal of Business Venturing*, 21, 541-567.

Wasserman, S., & Faust, K. (1994). *Social Network Analysis: methods and applications*, Cambridge: Cambridge University Press.

Watts D. J., & Strogatz S. H. (1998). Collective dynamics of small-world networks. *Nature*, 393(6684): 409-410.

Whittington, K., Owen-Smith, J. and Powell, W. (2009). Networks, propinquity and innovation in knowledge-intensive industries. Administrative Science Quarterly, 54(1): 90–122.

Wright, M. (2014). Academic entrepreneurship, technology transfer and society: where next. *The Journal of Technology Transfer*, 39(3), 322–334.

Wright, M., Clarysse, B., Mustar, P., & Lockett, A. (2007). *Academic Entrepreneurship in Europe*. Cheltenham: Edward Elgar.

Zheng, W. (2010). A social capital perspective of innovation from individuals to nations: Where is empirical literature directing us? *International Journal of Management Reviews*, 12, 151-183

Determinants of Research-Based Spin-Offs Survival

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Abstract: Existing literature has shown that research-based spin-offs firms usually exhibit lower death risks than other start-ups. However, few studies have focused on the survival determinants of these particular firms. From a matched employer-employee data set this paper fills this gap by providing evidence using a sample of RBSOs created in Portugal from 1979 until to 2007 and observed until 2012. Specifically, we investigate if firm characteristics and location characteristics play a role on their survival. Our results show a positive impact on the probability of survival of these firms (such factors as firm size and age) as well as the location of spin-offs in municipalities with high entry rates and low exit rates.

Keywords: academic spin-offs; firm survival; duration analysis.

1. Introduction

The entry of new firms in the market bringing in new knowledge, technologies or products is seen as an important driver of economic growth (e.g. Shane 2004; Vincett 2010). Spin-off firms are a particular case of new firm entry. Academic or research-based spin-off (RBSO) relates to a firm whose creation is based on the formal and informal transfer of technology or knowledge generated by public research organizations (Mustar et al. 2006; Djokovic and Souitaris 2008). The study of RBSO has assumed a growing importance in the literature reflecting the importance of these firms as a mechanism of exploitation and transfer of scientific knowledge produced in research institutions, serving also as measure of success of the parent organization (Wright et al. 2007).

An empirical regularity emerging from recent evidence is that these firms exhibit lower death risks than other entrants in the same industry (Mustar 1997; Callan 2001; Di Gregorio and Shane, 2003;Smith and Ho 2006; De Cleyn et al. 2015). Whereas, on average, 40% to 50% of the firms in a given market survive beyond the seventh year (Eurostat/OECD 2007), in the case of research-based spin-offs the survival rate can be as high as 90% (Smith and Ho 2006). A possible explanation could be that RBSOs benefit from numerous advantages, either in the set up phase or throughout the life of the firm such as the high number of employees with PhD degrees, greater experience in research, privileged access to financial funds and networks with the academic system (Lockett and Wright 2005; Walter et al. 2006; Jong 2006). However, these firms usually have on average less experience in industry, which could act as a disadvantage and offset those potential advantages (Colombo and Piva 2012).

Empirical evidence on the survival of RBSOs is still very limited. Whereas some studies have explored the topic using cross-section data or case studies, only Nerkar and Shane (2003) have so far investigated the topic using duration analysis. Their data included 128 spin-offs from the Massachusetts Institute of Technology (MIT) founded between 1980 and 1996. They found that having a radical technology and broad scope patents in a fragmented industry reduces the RBSO´s failure.

Using a unique dataset, this paper analyzes the survival of Portuguese RBSOs from 1986 to 2012. The study goes beyond prior research in using a larger and more comprehensive database than previous studies that corresponds to the population of Portuguese academic spin-offs. Moreover, this study provides an integrative view by simultaneously investigating the role that founding conditions, parent and location characteristics play on RBSOs´ survival.

2. Theoretical framework and hypotheses

2.1 Spin-off Firm´s characteristics

Regarding firm level attributes, the literature has pointed out firm age as a key variable in determining the firms´ survival. Audretsch and Mahmood (1994) considered that the likelihood of firms to survive tends to increase along with the age of the firm The positive relationship between firm age and survival probability is sustained in several studies (e.g. Dunne et al. 1989; Agarwal and Audretsch 2001; Agarwal and Gort 2002).

Regarding the impact of firm's conditions on firm's survival Geroski (1995) argues that the likelihood of survival is greater for larger firms than for small firms. Several studies have confirmed Geroski´s proposition in that the firm´s survival is positively related to firm size (e.g. Dunne et al. 1989; Geroski et al. 2010; Mata et al. 1995; Agarwal 1997; Agarwal and Audretsch 2001; Agarwal and Gort 2002).

Several empirical studies show that firm's human capital, in particular the level of qualifications of its founders, positively influences its survivability (Storey and Wynarczyk 1996; Gimmon and Levie 2010). Saridakis et al. (2008), using a sample of 622 UK small firms, concluded that firms whose founders had a higher level of qualifications (founder's education degree) have a higher probability of being competitive and thereby survive.

Comparing the RBSOs with other high-tech start-ups, Colombo and Piva (2012) consider that the main difference between them are the peculiar genetic characteristics of spin-off firms, in particular the high number of PhD degrees, the strong ties with academia and a greater experience in research but, on average, less experience in industry. Based on a sample of 64 Italian RBSOs and a matched control sample of non-academic high-tech start-ups the authors conclude that the initial competences of the entrepreneurial team are potentially a key source of competitive advantage and leave an enduring imprint on the firm's development.

2.2 Spin-off´s region characteristics

The geographical location of the firms seems to exert a positive effect on business rate of growth, where some regions that are characterized by high resources and wide market opportunities are more conducive to firm growth. As such, metropolitan areas hold strong attractions for small firms with high technological ability.

Indeed the spatial concentration of higher education institutions, technological research facilities, centers of knowledge, science parks and incubators in metropolitan areas increases information accessibility and has a positive influence on firms' innovative capacity (Frenkel 2001; Holl 2004; Salvador (2011); Smith and Bagchi-Sen 2006; Schwartz 2013).

Agglomeration externalities are frequently pointed out as an important determinant of firms´ geographical concentration. Audretsch et al. (2005) argue that knowledge spillovers represent a significant form of agglomeration externalities and that the location decision of new firms should be influenced significantly by access to the sources of such spillovers. The propensity to cluster geographically should be higher in industries where knowledge and innovation activities plays a more important role, namely for high technology and knowledge-based industries and services (Baptista and Mendonça 2010; Magrini and Galliano 2012). According to Woodward et al. (2006) the high-technology plant births are highly concentrated around some regions.

From an empirical study of high-technology location decisions in U.S. counties, the authors found evidence that agglomeration effects, the availability of qualified labor and natural amenities, as well as, university R&D expenditures exert a positive influence on the decision to locate high-technology firms in a county.

Regarding start-ups, the literature postulates a positive link between entrepreneurship and innovation performance (Baptista et al. 2008) where high start-up rates are associated with higher levels of technological innovation in the developed countries (Anokhin and Wincent 2012). Regarding the specific case of knowledge-based start-ups, the entry rate across regions measures the capacity of region on catching up start-up firms.

The regions with high entry rates are more attractive for knowledge-based firms (Baptista and Mendonça 2010).

3. Data and Methodology

3.1 Data collection

Our starting point for this study was the population of Portuguese RBSOs created since 1979 until 2007. In order to identify the population of Portuguese spin-off firms, a comprehensive list was made of spinout firms from Portuguese public research organizations. In this regard we started by collecting information from universities and other public research organizations in order to identify their spin-off firms.

We were able to identify 327 RBSOs created up until 2007. Based on these firms' fiscal number, which we have collected, we asked the Portuguese Ministry of Employment and Social Security for information regarding the identification codes of these RBSOs on Quadros de Pessoal, without the possibility of any matching, in order to preserve data confidentiality.

From the population of 327 RBSOs, the response from the Ministry of Employment and Social Security allowed us to get a sample of 234 firms on Quadros de Pessoal (public RBSOs, for instance, would not figure in Quadros de Pessoal due to the nature of the inquiry). After cleaning the dataset from some inconsistencies we ended up with data for 215 firms, the study sample.

We use data for the Portuguese economy from twenty-five waves of Quadros de Pessoal, a matched worker-firm longitudinal data set. Annually, the Portuguese Ministry of Labour and Social Solidarity gathers information on all firms, from the private sector, with wage-earners. Data collection is based on a mandatory response survey to firms.

Quadros de Pessoal includes information on two hundred thousand firms a year, on average, and their workers (over two million a year). Each firm and worker is uniquely identified in the data set and this allows researchers to follow them over time.

Firm level information includes the date of creation, number of establishments, number of workers, sales, industry, and region, among other. Workers' files present data such as age, gender, date of admission into the firm, date of latest promotion, education, hierarchical level, occupation and wages.

3.2 Method and empirical variables

In this paper the event is the failure of a research-based spin-off founded in Portugal from 1979 until 2007; the failure is define as a firm that ceases operations. For those firms that have not exited at the end of our period of analysis (2012), we do not have information on how long they survive (our empirical approach deals with this right censoring Table 1).

Table 1: Descriptive statistics of events

Spells	Frequency	Percent	Survival time		
			25%	50%	75%
Completed	59	3.17	4	6	11
Right-censored	1,800	96.83			
Total	1,859	100			

Source: Computations from the authors based on Quadros de Pessoal, 1986-2012.
Note: Survival time is measured in months.

Of the 215 spin-offs analyzed, only 59 firms closed their activity in the observed period (1986-2012). This reduced death risk is in accordance with previous empirical studies that mention the high levels of survival of the RBSOs vis-à-vis other start-up firms (Zhang 2009). Considering the survival levels by age of the spin-off firms, we observe that most of the failures occur in the early stages of the start-ups' life. About 8% of these firms fail in the second year of activity but failures increase substantially in the subsequent years, to a cumulative total of 34% by the fourth year and of 42% by the fifth year which is in line with the stylized fact that most of the unsuccessful start-ups fail in the early stages of their life. The probability of failure for the start-ups that survive the first years of activity declines steadily with the firm's age. This is consistent with evidence that older firms are more diversified and less risky than younger firms (Agarwal and Audretsch 2001).

Table 2 presents the descriptive statistics of the dependent variable and covariates and Table 3 the correlation matrix.

Table 2: Definition and summary statistics of variables

Variables	Definition	Mean (standard deviation)	Percent
Time to event (in years)	Survival time to death, in years	7.29 (4.19)	--
Died	=1 if firm died	--	3.17
Firm Characteristics			
Firm age	Age of the firm, in years	8.78 (6.05)	--
Firm size (log of number of employees)	Size of the firm, as the logarithm of the number of employees	2.00 (1.11)	--
Founder PhD	=1 if founder has a PhD	--	3.60
Region Characteristics			
Higher Education Institutions	Number of higher education institutions in the municipality	10.87 (13.70)	--
Entry rate	Ratio of the number of new firms entry to the total number of firms in the municipality	0.038 (0.03)	--
Exit rate	Ratio of the number of firms exits to the total number of firms in the municipality	0.11 (0.05)	--
Hight tech	Ratio of the number of firms on high technology industries to the total number of firms in the municipality	0.002 (0.001)	--

Source: Computations from the authors based on *Quadros de Pessoal*, 1986-2012.
Note: 1,859 observations (firm-year spells); N=215 firms.

Table 3: Definition and summary statistics of variables

1	2	3	4	5	6	7	8	
Died		1.0000						
Firm age		-0.0458	1.0000					
Firm size	-0.1216	0.3245	1.0000					
Founder PhD		-0.0326	0.0060	0.0087	1.0000			
HEI*		-0.0114	-0.0356	0.1653	-0.0393	1.0000		
Entry rate	-0.0422	-0.1861	-0.0855	-0.1323	-0.1500	1.0000		
Exit rate		0.1465	-0.0098	-0.0140	-0.0213	-0.0769	0.3275	1.0000
High-tech	-0.0690	-0.1261	0.0219	-0.1027	-0.0212	0.1327	-0.1770	1.0000

Note:*HEI: Higher Education Institutions.

4. Results

The non-parametric estimation of the survivor function plotted in Figure 1 shows a survival rate of 99.72% after the second year, 97.91% after six years and 93.29% after seventeen years. Our results reveal that Portuguese RBSOs survival rate is superior to other Portuguese start-ups (Mata el al. 1995; Nunes and Sarmento 2011).

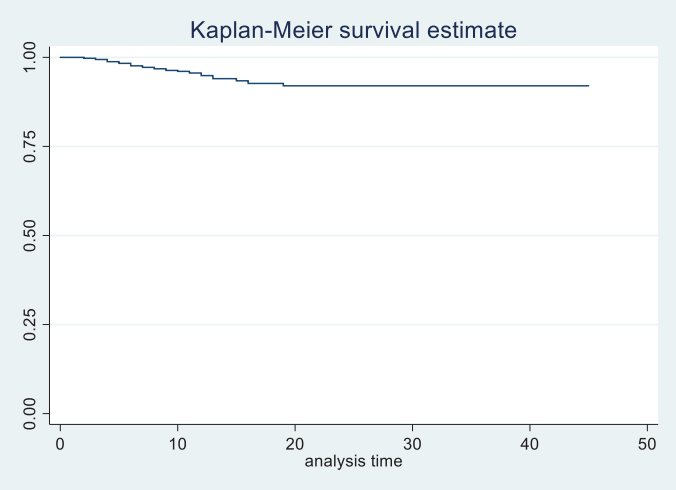

Figure 1: Kaplan- Meier Survival Function of Portuguese RBSOs

In order to analyze the determinants of RBSOs' survival and test our hypotheses, we estimated the parametric proportional hazards models (Exponential, Weibull, Gompertz) (Table 4). These models produce results that are directly comparable to those produced by Cox regression. In fact, in all PH models (semi-parametric or parametric), the exponential of estimated coefficient indicates the ratio of the hazard for a 1-unit change in the corresponding covariate, i.e., a positive coefficient reflects a higher hazard and a negative coefficient represents a smaller hazard.

Table 4: Proportional hazard models' coefficients

Variables	Exponential	Weibull
Firm age	-0.193***	-1.140***
	(0.03)	(0.14)
Firm size	-0.731***	-0.676***
	(0.15)	(0.14)
Founder PhD	-13.842	-13.772
	(591.09)	(610.33)
Higher education institutions	0.004	0.008
	(0.01)	(0.01)
Entry rate	-27.467***	-23.036***
	(6.01)	(5.84)
Exit rate	16.167***	14.962***
	(2.50)	(2.42)
High-tech	-43.490	-59.428
	(88.10)	(88.06)
Constant	-3.729***	-10.275***
	(0.51)	(1.08)
Log-likelihood	-212.387	-125.367
AIC	441	269

Source: Own computations based on *Quadros de Pessoal*, 1986-2012.
Notes: * p<0.05, ** p<0.01, *** p<0.001. Gompertz model is not concave. Number of observations: 1,859 observations. Number of failures: 59 failures

In order to select the parametric model that fits better our data we also estimated the Accelerate Failure-Time Parametric Models (Table 5). In AFT models the effect of covariates is multiplicative with respect to survival time, whereas for PH models the assumption is that the effect of covariates is multiplicative with respect to the hazard. In the case of AFT models, the parameters measure the effect of the correspondent covariate on the mean survival time. In assessing model fit, the Akaike Information Criterion (AIC) combines two criteria: parsimony and the log-likelihood. The smaller the AIC score, the more appropriate the model. [1]

[1] We have performed different model specifications which additionally included variables such as firm sales and/or the existence of science parks in the region or being in a metropolitan area. Nonetheless, due to the existence of high correlation levels between some of

Table 5: Accelerate Failure Time models' estimates

Variables	Weibull	Log-logistic	Lognormal
Firm age	0.142***	0.142***	0.145***
	(0.01)	(0.01)	(0.01)
Firm size	0.084***	0.084***	0.088***
	(0.02)	(0.02)	(0.02)
Founder PhD	1.710	4.457	1.223
	(75.76)	(8212129.92)	(72.61)
Higher education institutions	-0.001	-0.001	0.000
	(0.00)	(0.00)	(0.00)
Entry rate	2.859***	2.753***	2.728**
	(0.81)	(0.81)	(0.87)
Exit rate	-1.857***	-1.975***	-2.310***
	(0.37)	(0.39)	(0.43)
High-tech	7.377	8.513	6.837
	(10.96)	(11.43)	(12.39)
Constant	1.275***	1.265***	1.380***
	(0.08)	(0.08)	(0.09)
Log-likelihood	-125.367	-126.348	-130.412
AIC	269	271	279

Source: Own computations based on *Quadros de Pessoal*, 1986-2012.
Notes: * p<0.05, ** p<0.01, *** p<0.001. Generalized gamma model is not concave. Number of observations: 1,859 observations. Number of failures: 59 failures

Comparing all parametric models, we conclude that Weibull model fitted data better than other distributions in multivariate analysis. In fact this distribution presents the smallest AIC value and also the largest log-likelihood (see Table 3 and Table 4). Thus, we will comment on the Weibull estimates.

Regarding the firms characteristics, our results shows that *Firm Size* does seem to be key in explaining spin-off survival since results show that a one-employee increase on firm´s size decreases the hazard by 49.14%. This result is in line with previous evidence (e.g. Mata et al. 1995). Likewise, if we consider the firm´s age, the results are in agreement with previous empirical studies, where older firms have higher probability of survival (Agarwal and Audretsch 2001; Agarwal and Gort 2002). One-year increase on *Firm Age* decreases the hazard by 68.02%. Together, these results suggest that the key firm-level characteristics in determining RBSO spin-off survival are not different from those that are relevant to any other start-up.

Regarding region characteristics, results show that the being located in a metropolitan area, with spatial concentration of higher education institutions, science parks and incubators, is not important in determining RBSOs survival. However, when the firm is located in a municipality with higher capacity to capture start-up (Baptista and Mendonça 2010) the firms have higher probability of survival. Estimates show that a unit increase of the variable *Entry Rate* decreases the hazard by 100%. Complementarily estimates show that a unit increase of the variable *Exit Rate* increases the hazard by 3147124.3%. This result supports for the positive influence of agglomeration economies on innovation (Magrini and Galliano 2012).

5. Conclusions and policy implications

Previous studies have shown high levels of survival of RBSOs as soon as these exceed the so-called period of "infant mortality". Yet, few studies have focused on the determinants of these high survival rates. Using a matched employer-employee data set this paper fills this gap by providing evidence using a sample of RBSOs created in Portugal from 1979 until to 2007 and observed until 2012. Specifically, we investigate the role of two types of effects that have been put forward in literature as being relevant to understand the survival of

the variables, we did not include those variables in the final specification. Regarding firms characteristics the correlation analysis indicates high levels of correlations between Firm Size and Firm Sales (0.79). Regarding region characteristics variables the correlation analysis indicates high levels of correlations between Higher education institutions and Science Parks/Incubator (0.54) also between Higher education institutions and Metropolitan Area (0.47).

these particular firms, namely spin-offs characteristics and region characteristics where the spin-off firm is located.

Our results suggest that firm size and age is the spin-offs characteristics that matters most to determine RBSOs´ survival, where the larger size the lower the probability of exit by the firm and where older the spin-off is the lower the likelihood of exiting the market. The possession of a PhD degree by the team founders do not seem to be relevant in discriminating survival rates among spin-off firms. In this regard our results indicate that certain inherent characteristics common to RBSOs are less important to explain differences among survival rates than the well-known size and age effect that has been found in firm survival studies and is common across different types of firms.

Regarding the region characteristics, results show that being located in municipalities with high entry rates and low exit rates seems to be important factors influencing the survival of spin-offs corroborating the largely accepted view of the importance of local spillovers and agglomeration externalities in determining firms´ survival. As such, there seems to be no difference between RBSOs and other start-ups regarding the region´s role on their survival.

Our results provide several implications from a policy point of view. First, public policy and parent organizations should support RBSO firms by helping them to have more employees since their set-up. Second, local governments should implement policies that help the start-up of firms and contribute to the ease of doing business, so that they can attract new firms into the region, as agglomeration economies and spillovers effects are very important to spin-offs survival.

A limitation of our data is that it does not allow us to properly identify the industry in which the firm operates according to the economic classification. We are only able to identify the technology area. Thus, two important lines for further research would be to explore the role played by market characteristics, namely competition, and by individual characteristics of the founding team members.

References

Agarwal, R. (1997). Survival of Firms over the Product Life Cycle. Southern Economic Journal, 3: 571-584.

Agarwal, R. & Audretsch D. (2001). Does Entry Size Matter? The Impact of the Life Cycle and Thecnology on Firm Survival. The Journal of Industrial Economics, 49 (1). 21-43.

Agarwal, R. & Gort M. (2002). Firm and Product Life Cycles and Firm Survival. Technological Change, 92 (2): 184-190.

Andersson, M., Baltzopoulos A., & Loof H. (2012). R&D strategies and entrepreneurial spawning. Research Policy, 41: 54-68.

Anokhin, S. & Wincent J. (2012). Start-up rates and innovation: A cross-country examination. Journal of International Business Studies, 43: 41-60.

Audretsch, D., Lihmann E. & Warning S. (2005). University spillovers and new firm location. Research Policy, 34: 1113-1122.

Baptista, R., Escária V. & Madruga P. (2008). Entrepreneurship, regional development and job creation: The case of Portugal. Small Business Economics, 30(1): 49-58.

Baptista, R. & Mendonça J. (2010). Proximity to knowledge sources and the location of knowledge-based start-ups. Annals of Regional Science,45: 5-29.

Callan (2001). Generating spin-offs: evidences from across the OECD. In: OECD (eds) STI Review - Special Issue on Fostering High-tech Spin-offs: A Public Strategy for Innovation. Paris: OECD Publishing.

Cleves, M., Gould W., Guitierrez R. & Marchenko Y. (2010). An Introduction to Survival Analysis using STATA. Third Edition. Stata Press.

Colombo, M. & Piva E. (2012). Firms' genetic characteristics and competence-enlarging strategies: A comparison between academic and non-academic high-tech start-ups. Research Policy, 41: 79-92.

De Cleyn, S., Braet, J. and Klofsten, M. (2015). How human capital interacts with the early development of academic spin-offs. International Entrepreneurship and Management Journal, 11,(3), 599- 621.

Di Gregorio, D., & Shane, S. (2003).Why do some universities generate more start-ups than others ? Research Policy, 32(2), 209–227.

Djokovic, D. & Souitaris V. (2008). Spinouts from academic institutions: a literature review with suggestions for futher reserach. Journal of Technology Transfer, 33 (3): 225-247.

Dunne, T., M. Roberts and L. Samuelson (1989). The growth and failure of US manufacturing plants. Quarterly Journal of Economics, 104 (4) 671–698.

Eurostat/OECD (2007). Eurostat/OECD Manual on Business Demography Statistics. OECD: Paris.

Frenkel, A. (2001). Why High Technology Firms Choose to Locate in or near Metropolitan Areas. Urban Studies, 38 (7): 1083-1101.

Geroski, P. (1995). What do we know about entry?. International Journal of Industrial Organization, 13: 421-440.

Geroski, P., Mata J. & Portugal P. (2010). Founding Conditions and the Survival of New Firms. Strategic Management Journal, 31: 510–529.
Gimmon, E. and J. Levie (2010). Founder's human capital, external investment and the survival of new high-technology ventures. Research Policy, 39: 1214–1226.
Helm, R. & Mauroner O. (2007). Success of research-based spin-offs. State of the art and guidelines for futher reserach. Review of Managerial Science, 1(3): 237-270.
Helmers, C. & Rogers M. (2011). Does patenting help high-tech start-ups?. Research Policy, 40: 1016–1027.
Holl, A. (2004). Start-ups and relocations: Manufacturing plant location in Portugal. Regional Science, 83(4): 649–668.
Jong, S. (2006). How organizational structures in science shape spin-off firms: the biochemistry departments of Berkeley, Stanford, and UCSF and the birth of the biotech industry. Industrial and Corporate Change, 15: 251-283.
Lockett, A. & Wright M. (2005). Resources, capabilities, risk capital and the creation of university spin-out companies. Research Policy, 34: 1043-1057.
Magrini, M. & Galliano D. (2012). Agglomeration Economies, Firms' Spatial Organization and Innovation Performance: Some Evidence from the French Industry Industry and Innovation, 19 (7): 607-630.
Mata, J., Portugal P. & Guimarães P. (1995). The Survival of New Plants: Start-up conditions and post-entry evolution. International Journal of Industrial Organization, 13: 459-481.
Mustar, P. (1997). Spin-off enterprises. How French academics create high-tech companies: The conditions for sucess or failure. Science and Public Policy, 24 (1): 37-43.
Mustar, P., Renault M., Colombo M., Piva E., Fontes M., Lockett A., Wright M., Clarysse B. & Moray N. (2006). Conceptualising the heterogeneity of research-based spin-offs: A multi-dimensional taxonomy. Research Policy, 35, 289 – 308.
Nerkar, A. & Shane S. (2003). When do start-ups that exploit patented academic knowledge survive?. International Journal of Industrial Organization, 21: 1391-1410.
Nunes, A. & Sarmento E. (2011). A comprehensive survival analysis of business demography dynamics in Portugal. In: European Regional Science Conference, Barcelona. 2011
Salvador, E. (2011). Are science parks and incubators good "brand names" for spin-offs? The case study of Turin. Journal of Technology Transfer, 36: 203-232.
Saridakis, G., K. Mole and D. Storey (2008). New small firm survival in England. Empirica, 35: 25-39.
Schwartz, M. (2013). A control group study of incubators' impact to promote firm survival. Journal of Technology Transfer. 38 (3): 302–331.
Shane, S. (2004). Academic Entrepreneurship: University Spinoffs and Wealth Creation. Massachusetts: Edward Elgar Publishing.
Smith, H. & Ho K. (2006). Measuring the performance of Oxford University, Oxford Brookes University and the government laboratories' spin-off companies. Research Policy, 35: 1554-1568.
Smith, L. & Bagchi-Sen S. (2006).University-industry interactions: the case of the UK biotech industry. Industry and Innovation, 13: 371-392.
Storey D. and P. Wynarczyk (1996). The Survival and Non Survival of Micro Firms in the UK. Review of Industrial Organization, 11: 211-229.
Vincett, P. (2010). The economic impacts of academic spin-off companies and their implications for public policy. Research Policy, 39: 736-747.
Walter, A., Auer M. & Ritter T. (2006). The impact of network capabilities and entrepreneurial orientation on university spin-off performance. Journal of Business Venturing, 21: 541-567.
Woodward, D., Figueiredo O. & Guimarães P. (2006). Beyond the Silicon Valley: University R&D and high-technology. Journal of Urban Economics, 60: 15–32.
Wright, M., Clarysse, B., Mustar, P. & Lockett, A. (2007). Academic Entrepreneurship in Europe. Cheltenham: Edward Elgar.
Zhang, J. (2009). The performance of university spin-offs: an exploratory analysis using venture capital data. Journal of Technology Transfer, 34 (3): 255-285.

Life Sciences & Health: Open Access Open Innovation in South West Wales

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Abstract: This paper presents the case of two initiatives, AgorIP (IP Commercialisation) and Accelerate (Life Science & Health Innovation platform), devised to support the commercialisation of research in Life Sciences & Health. This activity is set in the region of south west Wales, UK, where comparatively low levels of Business Expenditure on R&D make the research output of Swansea University and local Health Boards particularly important to support knowledge-based enterprise. The research aim of the paper is to examine as to whether the initiatives' novel 'Open Access Open Innovation' philosophy represents a practical implementation of the non-linear Technology Transfer model proposed by Bradley et al. (2013). In this regard, the case explores novel components of the initiative including their 'zero-waste' approach whereby all opportunities are progressed along a pathway identified as most appropriate, using a proportionate investment of resources. Data drawn from the Pilot/Initiation period of the initiatives suggests that these principles are in action, with early insight having potential implication for further development, practice and wider policy. This includes recognition of the inherent complexities of such activity, and the need for further data to emerge in order to fully determine the impact of the approach.

Keywords: Technology Transfer, Regional Innovation Systems, Smart Specialisation, University-Industry Interaction; Life Sciences & Health

1. Introduction

This paper explores the commercialisation dynamics of opportunities progressing through two Technology Transfer initiatives, AgorIP/Accelerate, which use an 'Open Access Open Innovation' approach, as part of a wider effort to realise knowledge-based economic development in south west Wales. It examines the AgorIP Intellectual Property Commercialisation initiative which is currently being expanded through the Accelerate Technology and Health Innovation initiative, with the common aim of supporting wider Life Sciences & Health innovation. This paper builds upon the broader regional case and context described at the ECIE 2017 conference in Paris by Davies et al. (2017). Progressing the Open Access Open Innovation framework beyond the AgorIP *commercial* focus, into development of *technology*, *clinical* and *user* innovation perspectives through the Accelerate partner initiative aims to draw upon wider ecosystem resources to support innovation. (Gibson S, 2007)

AgorIP and Accelerate are embedded within the Swansea Bay City Region as a core component of its Internet Coast City Deal (SU, 2017) initiative for knowledge-based regional economic development. This initiative aims to further develop infrastructure (capital funding) to support innovation, though recognises the need to address the requirement for activity and dealflow in order to deliver benefits. This includes alignment with revenue activities including AgorIP and Accelerate (SU, 2016) which aim to deliver increased activity by creating greater quality and volume of commercialisation opportunities from publicly-funded research within the region.

Drawing upon theory from Regional Innovation Systems (Cooke 2004, Abbey et al. 2008), Technology Transfer (Tornatzky and Association, 2000) and wider University-Industry Interaction, the case study explores the interactions of these initiatives with the wider regional Life Sciences & Health ecosystem. This is alongside efforts to maximise their engagement with the 'Innovation Corridor' running through the Swansea Bay City Region, as part of the broader support environment.

2. Life Sciences & Health Innovation in South west Wales

South west Wales has a proud economic history at the centre of the industrial revolution (Mathias, 2013) though has since been struggling in its transition to a knowledge-led economy for reasons including

persistently low levels of Business Expenditure on Research & Development (Mom et al.) (Edmonds, 2000), along with weak endogenous entrepreneurship and business growth (Cooke and Clifton, 2005). A subsequent focus upon high Gross Value Add sectors, including the grand challenge areas of Life Sciences & Health became Welsh Government policy as it aimed to restructure the regional economy (WG, 2013).

In the broader context, the global life sciences and health sector is a major driver of UK productivity and export activity (Bell, 2017), and is characterised by the challenge and opportunity of disruptive forces including demographic change and pressures upon public health systems. In parallel, while the value of sales of pharmaceuticals and medical technology are projected to grow strongly the market structure is evolving with reduced role for blockbuster drugs, and new technological frontiers being crossed such as IoT and AI (Deloitte, 2018). In this respect the Internet of Health & Wellbeing is enlarging the region's capture of this growing global opportunity rather than competing within a zero-sum game. As effectively described by NESTA (Hutton and Schneider, 2008), the nature of innovation brings inherent uncertainty and with that imperfect allocation of resources into the unknown. This makes for challenging market conditions where information paucity and asymmetry and subsequent risk aversion leads to market failure as investment remains within sectors (or mature segments thereof) and regions providing historic returns.

UK Government identified a 'nascent' life sciences cluster of biotechnology companies in Cardiff and Swansea in 2001 (DTI, 2001) described by Cooke (2001) as 'mini-agglomerations'. These had a focus on medical devices, as subsequently presented in Davies et al. (2018a). This cluster sits within a broader Welsh life sciences sector employing roughly 10,000 people and contributing ~£2bn GVA to the economy. It is notable though that health service activity in south west Wales alone of Abertawe Bro Morgannwg (ABMUHB) and Hywel Dda University Health Boards (as part of the ARCH A Regional Collaboration for Health initiative) is itself greater in scale. Collectively, these two Boards present 30,000 employees across a range of roles (ARCH, 2017), contributing in part to a general regional imbalance towards public-sector employment. However, the nature of the activity and sectors involved does present specific innovation potential within the Regional Innovation System (RIS) as described by Cooke (2004a), (2004b), and Davies et al. (2015).

The major RIS actor of NHS Wales is an integrated health system which differs to the fragmented nature of the US system described by Herzlinger (2006) (or even by comparison NHS England). In terms of innovation and absorptive capacity it does though still involve barriers of; substantial regulation; a rigid business model (dominated by NHS) (Hwang and Christensen, 2008); public procurement constraints (Uyarra et al., 2014); and stringent regulation of patient information.

In this regard, the public health system certainly poses some tougher questions with regard to market orientation than those relating to other public services (Hodgkinson et al., 2012). The resultant reduced absorptive capacity and 'porousness' of open innovation walls is however noted, and policymakers are aiming to address these issues (WG, 2015), with initiatives such as AgorIP and Accelerate as part of the response.

3. Theoretical Context

Previous sections have presented the broad context and ambitions which surround the AgorIP and Accelerate initiatives, which relate to multiple theoretical contexts of RIS, Smart Specialisation, Open Innovation and University-Industry Interaction, though at its core is theory relating to Technology Transfer.

Technology transfer from academia, itself exists in the broader context of University-Industry Interaction as described by D'Este and Patel (2007), who also suggest that its associated mechanisms of patenting and venture spin-out may attract disproportionate levels of attention. However, it is also presented that there are linkages between mechanisms such as shown by Dechenaux et al. (2011), where one type of engagement relates to another. Technology transfer was historically considered as unidirectional and linear (D'Este and Patel, 2007), as presented in the model originally described by Siegel et al. (2004), in Figure 1 below.

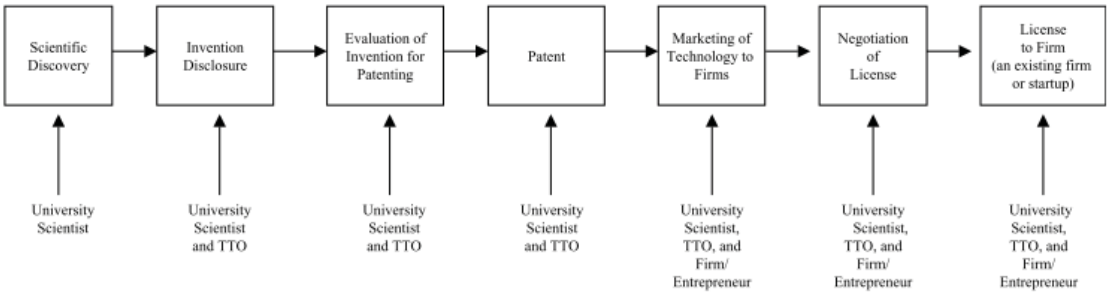

Figure 1: Linear Technology Transfer Process (Siegel et al., 2004)

However, greater complexity including multiple potential transfer pathways, including outside of formal channels are a limitation of the linear model. Observers such as Perkmann and Walsh (2007) suggested that University-Industry relationships were distinct from Technology Transfer, while others such as Dechenaux et al. (2011) emphasise their interconnection. However, both perspectives embrace Open Innovation (Chesbrough, 2003) recognising how organisations source opportunities through relationships. This has subsequently been reflected in Bradley's discussion of a proposed Alternative Technology Transfer Model (2013), within the construct of the 'entrepreneurial university' (Gibb and Hannon, 2006).

In this context, the role of the Technology Transfer Office is central to the process, with recognition of TTO experience being an important success factor (Hülsbeck et al., 2013). In this regard, a lack of TTO skills in the UK has long been noted as a key challenge (Siegel et al., 2003) (Decter et al., 2007), including specifically within Wales (WAG, 2004). Other factors relating to TTO operation have also received examination, including proximity and critical mass of activity. This has included the perspective offered by Macho-Stadler et al. (2007) of TTOs developing a reputation through scale of innovative activity, though conversely Siegel et al. (2003) suggest potential decreasing returns with increased scale. Further facets, including delivering efficiency in TTOs has been examined by Anderson et al. (2007), observing significant variation in performance, and suggesting a number of factors for consideration, including scale, variation in policies and incentive structures.

This broader debate sits alongside a view of a lack of viable TTO activity within Wales, as noted by WAG (2004) with suggestion for integrated or shared services to overcome the lack of sustainable scale within any one Welsh university.

In terms of TTO output, it is licensing or investment into spin-out ventures which are considered as principle results of the process, whether it is linear (Siegel et al., 2004) or otherwise (Bradley et al., 2013). Selection of paths, is in itself an area of ongoing discussion, including by Wright et al. (2006) having described the preference of venture capital to invest in university spin-outs once they have been developed (Ferguson and Olofsson, 2004), which is arguably picking winners when the race is already well underway and is consistent with Di Gregorio and Shane (2003) suggesting an importance of funding availability at spin-out early stages. It also echoes Ambos et al. (2008) describing the tensions of industry preferring later less risky endeavours than the earlier academic stages of discovery, with tighter control of intellectual assets that pulls against academics' eagerness to openly disseminate findings. Therefore, maximising the commercial readiness of opportunities represents an important factor in commercial attraction, investor readiness and successful innovation.

4. Approach

In the above context this study examines the emerging AgorIP project portfolio and proposed Accelerate activity for development of life sciences and health innovation along with its integration within its regional innovation system. Its central aim is to examine the pathways of the technology transfer process from source to output, and therein its claimed 'Open Access Open Innovation' philosophy.

Using the approach presented below (Fig.2), adapted from Stake (1995), and applied by Huxtable-Thomas et al. (2015) to examine an ESF-supported project the study provides an initial view of the initiatives and their contexts. This will support ongoing development of the study, including wider research of the region's *Internet Coast* City Deal initiative (SU, 2017). The study is undertaken through a bibliographic review examining how the initiatives compare to the theoretical technology transfer processes of (Siegel et al., 2004) and (Bradley et al., 2013), in the context of the sectors and their RIS.

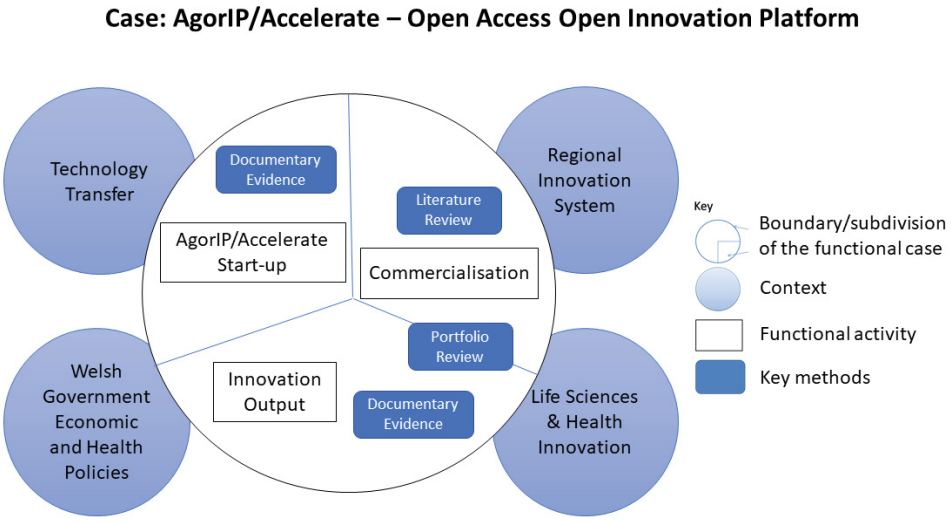

Figure 2: AgorIP/Accelerate Model and Review

The study examines the initiatives in the relevant contexts of Technology Transfer, Life Sciences & Health innovation, Regional Innovation Systems and Welsh Government Economic and Health Policies, applying mixed methods (Creswell and Clark, 2007) involving;

- Review of the original AgorIP and Accelerate project proposals/model in the context of Technology Transfer processes; and
- Review of current and emerging AgorIP project portfolio data and Accelerate partnership

The above framework also supports integration of further data and methods to build upon the study, including longitudinally, as well as providing a basis for planned examination of the cases of individual innovations emerging from the initiatives.

As European Regional Development Fund (ERDF)-supported projects (WEFO, 2013), AgorIP and Accelerate are required to maintain detailed project records, along with ongoing independent evaluation of their activities.

These records, together with the original project business cases and supporting documentation provide the basis of this study. Data made available and reviewed within the study relate to the origin, maturity (technology readiness level), sector, and output of opportunities progressing through the technology transfer process. Due to the early stage of the activity there were insufficient data for statistical analysis, though sufficient to identify commercialisation pathways involved in the process.

4.1 AgorIP and Accelerate

AgorIP (with Agor being Welsh language for 'Open') has been developed in partnership between Welsh Government, academia and industry to commercialise technology from universities and clinical research. In parallel, the forthcoming *Accelerate* initiative extends this philosophy to *technical*, *clinical* and *product* perspectives of innovation opportunities as presented in Figure 3 below.

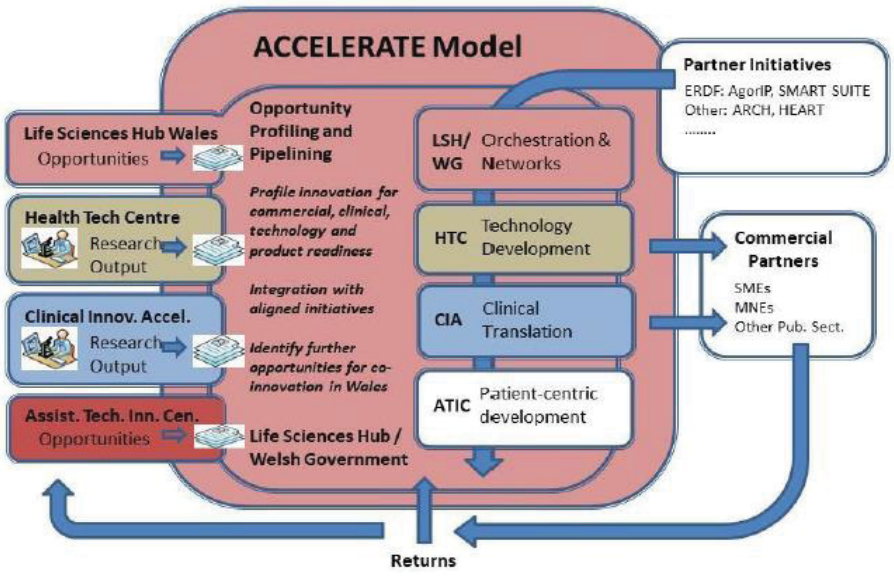

Figure 3: Accelerate Model

Both AgorIP and Accelerate present the same '*Open Access Open Innovation*' and '*zero-waste*' approaches (SU, 2016), with the former focused on achieving investment readiness and the latter focused on *unmet clinical need*, *technology*, *ecosystem engagement* and *user-centric* perspectives of opportunities. Each initiative draws opportunities from diverse sources including universities, health boards and industry (SU, 2016).

The initiatives aim to capture and develop intellectual property emerging from universities and health boards and wider sources which is subsequently developed with co-investment from the partners. This is planned to involve in-kind staff effort by specialists from the universities, and investment for services such as market research, regulatory advice and other services, as required to support commercialisation of an opportunity to a point of 'investor-readiness' (SU, 2016).

The *Open Access* element aims to disincentivise or at least accept the 'bypassing', or simply the non-use of the system by academic and clinicians who wish to otherwise develop their opportunities. This also relates to a claim of allowing the initiatives to focus efforts on those who wish to engage and avoid the role of 'policing' commercialisation activities.

The stated aim of the *zero-waste* principle involves progressing each opportunity onto the most appropriate pathway, with success defined by the relevant partners but underpinned by the broader regional economic development mission. This allows all disclosures to be supported, though with proportionate and appropriate use of resource, along the most advantageous pathway (e.g. licence or spin-out).

Over the planned 3 years of delivery the combined initiatives aim to develop 400 opportunities, register for over 100 patents and support creation of ~200 jobs (SU, 2016). This would represent a significant contribution to the sector, which for reference would represent adding to previous growth from initiatives such as the Institute of Life Sciences which created ~800 jobs in the period 2007-15 (Davies et al., 2018a).

5. Analysis

The AgorIP project, as of March 2018 had been underway for 27 months, including its initial 'mobilisation', while the Accelerate project was still approaching funding approval. At this point AgorIP had developed a portfolio of 261 opportunities across sectors including Life Sciences & Health, Information and Communications Technology and Renewable Energy generation and management.

Clearly, as opportunities take time to develop, this portfolio predominantly relates to the input rather than innovation success. At this stage, 27 opportunities had already progressed to become spin-out companies (with IP invested into the venture) attracting external investment, with a further 12 resulting in licensing arrangements. This mix of outputs demonstrates a diversity of transfer mechanisms and not a favouring either

of spin-out or licence as a form of output. From this portfolio, 107 opportunities (41%) related to Health & Life Sciences, compared to the 50% target for the sectors included in the project plan (SU, 2016). This mix of sectors also implies potential for Open Innovation (Chesbrough, 2003) with diverse sources, disciplines and potential destinations for technology transfer.

While the above is based on a relatively early and limited number of opportunities it gives an indication of overall input and output, and the nature of the pathways involved. The above figures present an emerging pipeline of individual projects including some contemporary forms of innovation (Davies et al., 2018b). Furthermore, the AgorIP project activity to date also involves some structural and operational changes to commercialisation activity amongst the partners including;

- Harmonisation of IP policies between Swansea University and University Health Boards of Abertawe Bro Morgannwg and Hywel Dda. This presents an alignment of organisations with common terms of engagement for industry and other partners. This suggests response to one of the more UK-specific challenges identified by Decter et al. (2007) where variation between organisations presents a challenge to industry engagement.
- Integration with delivery of knowledge transfer mechanisms such as consultancy arrangements (through Swansea Innovations), which aims to protect against potential overemphasis on patenting and spin-out described by (D'Este and Patel, 2007) avoiding internal competition to separately pursue knowledge transfer and commercialisation pathways.
- The use of intensive mentoring to the point of directing spin-outs, including surrogate entrepreneurs supported by strong networks across sector fora, as suggested by Wright et al. (2006) to negate weak entrepreneurial focus and skills amongst researchers.

In parallel, the emergence of the Accelerate initiative has moved emphasis from a purely commercial perspective for opportunities to also incorporate *technology*, *clinical* and *user* innovation perspectives. This has involved partnership with specialist facilities/expertise in the regional innovation centres of the Institute of Life Science; Welsh Wound Innovation Centre; Institute of Sustainable Design; Cardiff Medicentre; and the Life Sciences Hub Wales.

Accelerate also develops greater scale through wider geographical engagement, and broader partnership including the second mini-agglomeration (Cooke, 2001) around Cardiff. This responds to the 'Critical Mass' issue noted in the Smart Specialisation Self-Assessment from Welsh Government (WG, 2014), along with observations of key commentators (Gibson S, 2007) describing a need to focus on developing greater scale of commercialisation activity.

6. Conclusion

AgorIP is still at its early stages, particularly considering commercialisation timescales involved in Life Sciences & Health innovation, while Accelerate remains to become operational. Therefore, data emerging from the initiatives are limited. Realisation of the initiatives in themselves do however represent recognition of the need to create dealflow, described by commentators such as Gibson S (2007) in order to achieve the knowledge-based economic development presented in regional policy (WG, 2014, SU, 2017). The mixture of university and health board opportunity sources reflects the proposed 'Open Access' while the zero waste philosophy together with broader cluster engagement also acknowledges the important issue of recognising that awareness of TTO is a key determinant in levels of 'bypassing' them to pursue opportunities (Huyghe et al., 2016). Furthermore, the involvement of multiple organisations as both sources and destinations of opportunities suggests the more complex dynamics with multiple pathways of the model proposed by Bradley et al. (2013) presenting an advancement in practice compared to the earlier linear model from (Siegel et al., 2004).

The AgorIP and Accelerate approach presents a practical implementation of the non-linear Technology Transfer model proposed by Bradley et al. (2013), including importantly the Open Innovation paradigm. A key element of the case has been not decoupling the initiatives from their context or relevant timescales. In this respect, the regional history of prior initiatives and forthcoming endeavours such as the Internet Coast City Deal presents opportunity for further research into this technology transfer approach. This includes regard to

the specific context of Open Innovation across public and private sector partners, with potential relevance to other post-industrial regions.

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References

ABMUHB 2017. Changing for the Better: Destination: Digital - our digital strategy Abertawe Bro Morgannwg University Health Board.

AMBOS, T. C., MÄKELÄ, K., BIRKINSHAW, J. & D'ESTE, P. 2008. When Does University Research Get Commercialized? Creating Ambidexterity in Research Institutions. *Journal of Management Studies,* 45**,** 1424-1447.

ANDERSON, T. R., DAIM, T. U. & LAVOIE, F. F. 2007. Measuring the efficiency of university technology transfer. *Technovation,* 27**,** 306-318.

ARCH. 2017. *A Regional Collaboration for Health* [Online]. Online. [Accessed 10th April 2017].

BELL, J. 2017. Life Sciences Industrial Strategy - A report to the Government from the life sciences sector. *In:* BELL, P. S. J. (ed.). Life Science Industrial Strategy Board.

BRADLEY, S. R., HAYTER, C. S. & LINK, A. N. 2013. Models and methods of university technology transfer. *Foundations and Trends® in Entrepreneurship,* 9**,** 571-650.

CHESBROUGH, H. 2003. Open innovation. Boston: Harvard Business School Press.

COOKE, P. 2001. Biotechnology Clusters in the U.K.: Lessons from Localisation in the Commercialisation of Science. *Small Business Economics,* 17**,** 43-59.

COOKE, P. 2004a. Life sciences clusters and regional science policy. *Urban studies,* 41**,** 1113-1131.

COOKE, P. 2004b. The regional innovation system in Wales. *Regional Innovation Systems. The Role of Governances in a Globalized World*.

COOKE, P. & CLIFTON, N. 2005. Visionary, precautionary and constrained 'varieties of devolution'in the economic governance of the devolved UK territories. *Regional Studies,* 39**,** 437-451.

CRESWELL, J. W. & CLARK, V. L. P. 2007. Designing and conducting mixed methods research.

D'ESTE, P. & PATEL, P. 2007. University–industry linkages in the UK: What are the factors underlying the variety of interactions with industry? *Research policy,* 36**,** 1295-1313.

DAVIES ET AL., G. 2018a. Life Sciences & Health in south west Wales: A Sub-regional Innovation System *In:* JAMES, J., PREECE, J. & VALDES-COTERA, R. (eds.) *Entrepreneurial Learning City Regions.* Springer.

DAVIES, G., HUXTABLE-THOMAS, L., RODERICK, S. & MAIR, C. R. 2015 Models of Life Sciences Start-ups: Don't throw the incubator out with the bathwater. *University-Industry Interaction 2015.* Berlin.

DAVIES, G., RODERICK, S. & WILLIAMS, M. 2017. A Sub-Regional Innovation Ecosystem? Life Sciences & Health in the Swansea Bay City Region. *12th European Conference on Innovation and Entrpreneurship.* Paris.

DAVIES, G. H., RODERICK, S. & HUXTABLE-THOMAS, L. 2018b. Social commerce Open Innovation in healthcare management: an exploration from a novel technology transfer approach. *Journal of Strategic Marketing***,** 1-12.

DECHENAUX, E., THURSBY, J. & THURSBY, M. 2011. Inventor moral hazard in university licensing: The role of contracts. *Research Policy,* 40**,** 94-104.

DECTER, M., BENNETT, D. & LESEURE, M. 2007. University to business technology transfer—UK and USA comparisons. *Technovation,* 27**,** 145-155.

DELOITTE 2018. 2018 Global life sciences outlook.

DI GREGORIO, D. & SHANE, S. 2003. Why do some universities generate more start-ups than others? *Research Policy,* 32**,** 209-227.

DTI 2001. Business Clusters in the UK - a first assessment. *In:* INDUSTRY, D. F. T. A. (ed.).

EDMONDS, T. 2000. Regional Competitiveness & the Role of the Knowledge Economy. *In:* COMMONS, H. O. (ed.). Online.

FERGUSON, R. & OLOFSSON, C. 2004. Science Parks and the Development of NTBFs-- Location, Survival and Growth. *Journal of Technology Transfer,* 29**,** 5-17.

GIBB, A. & HANNON, P. 2006. Towards the entrepreneurial university. *International Journal of Entrepreneurship Education,* 4**,** 73-110.

GIBSON S 2007. Commercialisation in Wales - A Report by the Independent Task and Finish Group.

HERZLINGER, R. E. 2006. Why innovation in health care is so hard. *Harvard business review,* 84**,** 58.

HODGKINSON, I. R., HUGHES, P. & HUGHES, M. 2012. Absorptive capacity and market orientation in public service provision. *Journal of Strategic Marketing,* 20**,** 211-229.

HÜLSBECK, M., LEHMANN, E. E. & STARNECKER, A. 2013. Performance of technology transfer offices in Germany. *The Journal of Technology Transfer,* 38**,** 199-215.

HUTTON, W. & SCHNEIDER, P. 2008. The failure of market failure. NESTA.

HUXTABLE-THOMAS, L., HANNON, P. & THOMAS, S. 2015. Using a Mixed Method 'Petri-Dish' Diagram to Determine Complex Impacts of Leadership Development in Extant Entrepreneurs. *14th European Conference on Research Methodology for Business Management Studies.*

HUYGHE, A., KNOCKAERT, M., PIVA, E. & WRIGHT, M. 2016. Are researchers deliberately bypassing the technology transfer office? An analysis of TTO awareness. *Small Business Economics,* 47**,** 589-607.

HWANG, J. & CHRISTENSEN, C. M. 2008. Disruptive innovation in health care delivery: a framework for business-model innovation. *Health Affairs,* 27**,** 1329-1335.

MACHO-STADLER, I., PÉREZ-CASTRILLO, D. & VEUGELERS, R. 2007. Licensing of university inventions: The role of a technology transfer office. *International Journal of Industrial Organization,* 25**,** 483-510.

MATHIAS, P. 2013. *The first industrial nation: The economic history of Britain 1700–1914*, Routledge.

MOM, T. J. M., OSHRI, I. & VOLBERDA, H. W. 2012. The skills base of technology transfer professionals. *Technology Analysis & Strategic Management,* 24**,** 871-891.

PERKMANN, M. & WALSH, K. 2007. University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews,* 9**,** 259-280.

SIEGEL, D. S., WALDMAN, D. & LINK, A. 2003. Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study. *Research policy,* 32**,** 27-48.

SIEGEL, D. S., WALDMAN, D. A., ATWATER, L. E. & LINK, A. N. 2004. Toward a model of the effective transfer of scientific knowledge from academicians to practitioners: qualitative evidence from the commercialization of university technologies. *Journal of engineering and technology management,* 21**,** 115-142.

STAKE, R. E. 1995. *The art of case study research*, Sage.

SU 2016. AgorIP Business Plan. Swansea University.

SU 2017. Internet Coast: Phase 1: City Deal Proposal Impact Appraisal. *V1.26.* School of Management: Swansea University.

TORNATZKY, L. G. & ASSOCIATION, N. G. 2000. *Building state economies by promoting university-industry technology transfer*, National Governors' Association.

UYARRA, E., EDLER, J., GARCIA-ESTEVEZ, J., GEORGHIOU, L. & YEOW, J. 2014. Barriers to innovation through public procurement: A supplier perspective. *Technovation,* 34**,** 631-645.

WAG 2004. Knowledge Economy Nexus: Role of Higher Education in Wales. *In:* GOVERNMENT, W. A. (ed.).

WEFO 2013. European Structural Funds programmes 2014-2020, West Wales and the Valleys European Regional Development Fund Operational Programme. *In:* OFFICE, W. E. F. (ed.).

WG 2013. Sectors Delivery Plan. *In:* DEPARTMENT FOR BUSINESS, E. A. T. (ed.).

WG 2014. Innovation Wales. *In:* GOVERNMENT, W. (ed.).

WG 2015. Informed Health and Care: A Digital Health and Social Care Strategy for Wales. *In:* WALES, N. (ed.).

WRIGHT, M., LOCKETT, A., CLARYSSE, B. & BINKS, M. 2006. University spin-out companies and venture capital. *Research Policy,* 35**,** 481-501.

Is Portuguese Higher Education Developing Students Capacities for Innovation? The Truth behind Learning Outcomes

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Abstract: The political and social discourse about innovation becomes dominant in our economy and society, which impacts also on educational and labour market systems. Particularly for Higher Education, boosting knowledge and innovation appears as a strategic mission, calling for innovative research, innovative pedagogies, and innovative organizational structures. Similarly, fostering students' abilities to innovate appears as a vector of this strategic mission. Based on this framework, this study intends to explore if, effectively, innovation (or the capacity to innovate) appears as an expected learning outcome to the achieved by students at the end of their qualification. Using a qualitative approach, the contend of learning outcomes proposed in all programs submitted to quality accreditation in Portugal (since 2009) was analyzed. In general, results indicate that innovation is fairly mentioned (about 35,8% of the programs mentioned it at least once). From a total of 39742 segments coded, innovation is mentioned 1704 times, which correspond to 4,3%. A cross comparison between academic degrees revealed that innovation is particularly relevant for PhD degrees and integrated masters. Significant differences are found according to disciplinary areas. Environmental sciences, art and design programs, engineering and computer sciences clearly emphasize innovation as an expected skill to be achieved by their students. Some implications to practice need to be debated, confronting these results with literature insights.

Keywords: higher education, innovation, competences, learning outcomes.

1. Introduction

Fostering and cultivating innovation, or the ability to innovate and to create, appears as a central vector in Higher Education mission. This skill is particularly required on job market, desirable not only for technological development but also as a problem-solving facilitator. As future workers, university students are a main source to contribute for future innovations in their organizational settings. Thus, an education that promotes innovation and entrepreneurship is essential on the development of students' innovation spirit, entrepreneurial consciousness and innovation ability (Jing, Li, Zhang, & Li, 2016), supporting their transition from education to labor market.

In the literature, the ability to innovate appears closely connect to entrepreneurship skills regarded, also, as a personality trait. The willingness to change (Mueller & Thomas., 2010) or the tendency to think creatively (Martín, Potočnik, & Fras, 2017) are some personal facilitators of the ability to innovate. A set of skills is critical to an innovative performance. These skills for innovation may include technical skills (to know-what and to know-how), cognitive skills (critical thinking, imagination or creativity) and behavioural and social skills (persistence, conscientiousness, self-esteem, communication, collaboration), working as building blocks of students ability to innovate (Avvisati, Jacotin, & Vincent-Lancrin, 2013).

It is in the context of Higher education that students start to develop and achieve these skills for innovation. However, the acquisition of these outcomes and competences varies depending on university experiences, academic degrees and or the study program/disciplinary area students chose.

The differentiation of competences and expected outcomes across qualification degrees is well documented in the literature. According to the National and the European Qualification Framework (Bergan, 2007), each academic degree should be characterized by a set of LOs, ranging from discipline-specific knowledge to a set of wider generic skills and competences. Different qualifications are expected to have different LO and a variety of competency profiles. From a Bachelor to a PhD degree, LO becoming progressively more demanding, as the complexity of skills and competences rises (Werquin, 2012). Some guidelines – Dublin Descriptors - could be used to distinguish academic qualifications or degrees (Joint Quality Initiative informal group, 2004). For instance, communication skills become more demanding as the qualification level increases. In a bachelor degree, students are expected to have the ability to interpret relevant data to inform personal judgments. In turn, students who completed a master degree are expected to have the ability to integrate knowledge and reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.

Finally, in a PhD degree, learners are expected to be able to promote contexts, technological, social or cultural advancement in a knowledge-based society. Another important vector of differentiation between degrees is related to the learning skills domain. While a bachelor student is expected to have achieved the skills needed to study further with a high level of autonomy, a master student is already expected to be able to study in a self-directed and autonomous manner. A PhD student is expected to be able to promote technological, social or cultural advancement, using innovation as a tool to gather those achievements (Joint Quality Initiative informal group, 2004).

Disciplinary differences in teaching and learning leads also to an interdisciplinary variation in students competency-profiles (Sin & Soares, 2018). For instance, students from arts and design programs tend to have a higher score in critical thinking and interpersonal relationship skills, while engineering students scored highly in problem solving (Jessop & Maleckar, 2014). Using the classification developed by Biglan (1973) and reviewed by Neumann and colleagues (Neumann, 2001; Neumann, Parry, & Becher, 2002), disciplinary areas could be categorized as "hard pure," "soft pure," "hard applied," and "soft applied." Hard pure disciplines (e.g., physics) to be typified as having a cumulative, atomistic structure, concerned with universals, simplification and a quantitative emphasis. Soft pure disciplines (e.g., history) to be "reiterative, holistic, concerned with particulars and having a qualitative bias" (Neumann et al., 2002, p. 406). Hard applied disciplines (e.g., engineering) are characterized as "concerned with mastery of the physical environment and geared towards products and techniques," while soft applied disciplines e.g., education) care about "the enhancement of professional practice and aiming to yield protocols and procedures" (Neumann et al., 2002, p. 406). Focusing on innovation skills, results from Avvisati, Jacotin, & Vincent-Lancrin (2013) indicated that these skills are particularly required in some disciplinary areas. For instance, in manufacturing industries, over 50% of tertiary-educated employees involved in innovation have an engineering (42.9%) and a science degree (7.8%), suggesting the relevance of those skills in these specific study programs.

Based on this theoretical framework, this study intends to explore if and how Portuguese Higher Education Institutions transfer innovation into LO, defining this skill ("the ability to innovate") as an expected outcome to be achieved by their students. A comparison between academic degrees and disciplinary areas will be also analysed.

2. Methodology

2.1 Procedure

A content analysis of the LO identified in the proposals of new study programs submitted to accreditation by the Portuguese Agency for Higher Education Accreditation (A3ES) was carried out using the MAXQDA software (version 12). Six steps were taken to identify patterns (themes) within the data. This analysis followed a conceptual framework, in which 24 technical and generic skills were included, such as specific knowledge, critical thinking, ability to innovate, problem solving, autonomous work, team work, or This procedure uses a theoretical thematic analysis approach, instead of a data-driven option (Braun & Clarke, 2006).

2.2 Measures

At an initial stage of the accreditation process, HEI submit an accreditation proposal to A3ES: "Request for Accreditation of a Study Cycle". In the description of each study cycle that is submitted, institutions must describe what are the "intended learning outcomes" they expected students will achieve at the end of a specific period of learning. Data analysis focused on information included in this question, and which is limited to 1000 characters LOs included in all proposal of study programs submitted to accreditation in A3ES, from 2009 to 2014, were examined (n = 2890).

From those documents, 50,8% correspond to 2nd study cycle (master degree) proposals, while 34,8% refer to 1st study cycle (bachelor degree), and 14,4% to 3rd study cycle (PhD degree).

3. Results

From the content analysis of the LO emerged different outputs. Firstly, the frequency of each category coded informs about the relevance of "ability to innovate" in all 24 skills assessed. Secondly, a comparison across academic degrees and disciplinary areas is also performed, informing about what specific areas and qualifications emphasized more this skill.

Accordingly, as presented in Table 1, "critical thinking" and "discipline-specific knowledge" are the most mentioned skills in all documents analysed. In turn, "cultural awareness" and "communication in a foreign language" seems to be less relevant competences. Focusing in "ability to innovate" skill, results show that this skill is fairly mentioned. From a total of 39742 segments coded, innovation is mentioned 1704 times, which correspond to 4,3%.

Table 1: Percentages of each skill in all coded segments

Skills	**%**
Critical thinking	11,82
Discipline-specific/technical skills	9,71
a) Applied knowledge	8,98
b) Theoretical knowledge	4,89
Information management	6,97
Generic knowledge	4,49
Ability to innovate	*4,29*
Organizing and planning	4,13
Problem solving	3,88
Written communication	3,76
Information and communications technology	3,51
Oral communication	3,48
Team work	3,16
Autonomous work	2,76
Leadership	2,74
Creativity	2,68
Social, economic and environmental sustainability	2,65
Lifelong learning	2,51
Adaptability to new contexts	2,25
Personal and social responsibility	2,11
Ethical and professional regulation	1,98
Strive for excellence	1,45
Decision making	1,43
Entrepreneurship	1,42
Interpersonal relationship	0,93
Cultural awareness	0,42
Communication in a foreign language	0,32
Total	**100,00** (total of 39742 segments coded)

A cross comparison between academic degrees revealed that innovation is particularly relevant for PhD and integrated masters. As table 2 reveals, almost 8% of PhD programs and 6% of integrated master programs mentioned this skill.

Some differences are also found according to each disciplinary area. Results show that 10% of manufacturing industries programs emphasize innovation as an expected skill to be achieved by their students. Programs such as art and design, environmental sciences, agriculture, forestry and fisheries, engineering and computer sciences programs also stressed this skill. On the other hand, management sciences and transport services programs do not give any prominence to this skill.

Table 2: Percentages of "ability to innovate" skill in each academic degree and each disciplinary area

		Ability to innovate (%)
Academic degrees	Bachelor	2,84
	master	4,26
	Integrated master	*6,11*
	PhD	*7,76*
Disciplinary areas	Educational Sciences	2,95
	Arts and design	*8,96*
	Humanities	4,63
	Social sciences	3,47
	Information and journalism	4,66
	Management sciences	0,00
	Law	2,46
	Life sciences	2,82
	Physics	5,11
	Mathematics	4,84
	Computer sciences	*6,34*
	Engineering	*6,59*
	manufacturing industries	*10,42*
	Architecture and construction	5,17
	agriculture, forestry and fisheries	*7,47*
	Veterinary sciences	2,06
	Health sciences	1,47
	social services,	1,61
	Personal services	4,02
	transport services	0,00
	Environmental sciences	*8,51*
	Security services	3,91

4. Discussion

This study aims to explore the relevance of graduates "ability to innovate" on the context of Portuguese Higher Education. The content analysis of learning outcomes provides a comparison between specific and generic competences, as well as comparison across disciplinary areas and academic qualifications.

In general, results showed a clear trend towards the inclusion of innovation as an expected learning outcome, being one of the most quoted generic skill (after critical thinking and information management). Portuguese Higher Education Institution seems to be committed to the promotion of an education for innovation, in which the ability to innovate, critical thinking skills, specific and general knowledge appears as crucial dimension in graduates' competency-profiles. The combination of those skills is already discussed by Avvisati and colleagues (2013). Skill for innovation includes not only technical skills (represented in our study by specific and general knowledge), but also cognitive skills (such as critical thinking or information management). Accordingly, an interesting question need to be asked: could innovation be considered a single skill or a combination of skills?

The comparison across qualification degrees suggest that innovation is particularly relevant for PhD and Integrated Master programs. According to the Dublin descriptors, skills and competences required in each domain become more complex as the level of qualification increases (Joint Quality Initiative informal group, 2004). A PhD program, as the last stage of qualifications, is highly demanding for students, due to the innovation and for the expected quality required on a research and on an elaboration of a thesis). If a bachelor student is expected to be able to elaborate a portfolio, a PhD student is already expected to develop an innovative research in a high competitive field.

When contrasting disciplinary areas, a similar result from Avvisati et al. (2013) also is revealed. Innovation is clearly emphasized on programs related to manufacturing industries, closely connected to engineering and computer science areas. Art and design programs stress, also, innovation as an important learning outcome.

Here, virtual environment and these new design techniques and methodologies could be working as a reinforcement of innovative skills.

To conclude, some implications from our result should be discussed. Firstly, even though with different weights, the truth is that Portuguese Higher Education understand innovation as a core LO to be achieved by their students. Innovation seems to be particularly relevant for some specific programs (such as manufacturing, engineering, art and design) and for some academic degrees (PhD). Being the "ability to innovate" a required skill for labor market, institutions should try to foster these skills for innovation, regardless of the discipline or the academic degree. Several pedagogic practices, some of them already implemented worldwide, such as problem or project -based learning, design thinking, case studies, competitions or simulation seems to have a great impact on the development of students' skills for innovation.

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References

Avvisati, F., Jacotin, G., & Vincent-Lancrin, S. (2013). Educating higher education students for innovative economies: What international data tell us. Tuning Journal for Higher Education, 1(1), 223–240. http://doi.org/http://www.tuningjournal.org/public/site/01/11_Educating_Higher_Education_Students_for_Innovative_Economies.pdf

Bergan, S. (2007). Qualifications - Introduction to a concept. In Council of Europe higher education series No.6 (p. 80).

Biglan, A. (1973). The characteristics of subject matter in different academic areas. Journal of Applied Psychology, 57(3), 195–203. Retrieved from https://eric.ed.gov/?id=EJ080995

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. http://doi.org/10.1191/1478088706qp063oa

Jessop, T., & Maleckar, B. (2014). The influence of disciplinary assessment patterns on student learning: A comparative study. Studies in Higher Education, 5079(December 2014), 1–16. http://doi.org/10.1080/03075079.2014.943170

Jing, L., Li, J., Zhang, X., & Li, M. (2016). Research on the innovation and entrepreneurship of college students ' education: Evaluation based on analytic hierarchy process. International Journal of Hybrid Information Technology, 9(1), 291–300.

Joint Quality Initiative informal group. (2004). Shared "Dublin" descriptors for Short Cycle, First Cycle, Second Cycle and Third Cycle Awards. Dublin.

Martín, P., Potočnik, K., & Fras, A. B. (2017). Determinants of students' innovation in Higher Education. Studies in Higher Education, 42(7), 1229–1243. http://doi.org/10.1080/03075079.2015.1087993

Mueller, S. I. ., & Thomas., A. S. (2010). Culture and entrepreneurial potential: A nine country study of locus of control and innovativeness. Journal of Business Venturing, 16, 51–75.

Neumann, R. (2001). Disciplinary Differences and University Teaching. Studies in Higher Education, 26(2), 135–146. http://doi.org/10.1080/03075070120052071

Neumann, R., Parry, S., & Becher, T. (2002). Teaching and learning in their disciplinary contexts: A conceptual analysis. Studies in Higher Education, 27(4), 405–417. http://doi.org/10.1080/0307507022000011525

Sin, C., & Soares, D. (2018). Disciplinary differences in university teaching. In Encyclopedia of International Higher Education Systems and Institutions (pp. 1–5). Dordrecht: Springer Netherlands. http://doi.org/10.1007/978-94-017-9553-1_329-1

Werquin, P. (2012). The missing link to connect education and employment: recognition of non-formal and informal learning outcomes☆. Journal of Education and Work, 25(3), 259–278. http://doi.org/10.1080/13639080.2012.687574

The Role of Vocational Education in the Formation of Career Trajectories in Russia

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Abstract: The paper analyses the role of vocational education in formation of professional trajectories of Russian employed population during the period 2005-2015. Based on longitudinal data we explore the differences between career paths of workers that had the experience of vocational training and workers without such experience. We contribute the debate regarding vocational training and its role in innovation and economic development utilizing methodology of sequence analysis and Markov chains with long memory (mixture transition distribution models (MTD)). MTD models suggest the analysis of categorical data sequences instead of quantitative data that is standard for this kind of research. Such methodological approach allows not only estimating casual effects of participation in vocational education programs on the wage level, but exploring how vocational training influences the whole career path. Our findings suggest that those workers who participate in vocational training have lower probability of different negative events in their careers including job loss. Moreover, mixture transitions distribution models suggest that for such workers the current career status determined by longer history of previous career events than for those employees that had not any experience of participation in vocational education programs. These results give the evidence that vocational education is important factor of success on the labour market, providing greater flexibility of career paths that is crucial in innovation development of the labour market and economy as a whole. Findings of the study also have important policy implications. Importance of vocational training on individual level suggests that investment in vocational education on societal level will bring positive returns. This kind of education provides the flexibility of individuals on the labour market, through vocational training workers obtain new skills and knowledge that allows them utilizing new technologies and innovations. Development of vocational education may be considered as policy-making instrument that can generate positive economic outcomes.

Keywords: Labor market, career trajectories, vocational education, sequence analysis, MTD models

1. Introduction

Increasing rates of technological and innovation development determine the increase in requirements for the competence of employees. The structure of demand on the labor market is changing: workers that can be flexible and adapt to constantly changing technologies become more and more in demand. Increasing demand for such workers, undoubtedly, leads to the increase in their wages that makes investment in human capital profitable (Becker, 1964).

Human capital generally defined as the accumulated stock of knowledge, skills, competence. It is usually approximated by the level of education or average years of schooling without splitting it into levels. However, in conditions of innovative economy vocational education becomes one of the most important types. Surely, higher education, for instance, provides a set of fundamental knowledge that is crucial for the success on the labor market. Today the most important characteristics of the workers are flexibility, adaptability, ability to learn quickly, acquire new skills and change the career trajectories. Vocational training provides the conditions for the development of these mentioned characteristics. Particularly, vocational education increase mobility on the labor market through short courses that allow people obtaining new qualifications needed for profession change.

Most existing studies in this field look at the problem of vocational training from two general perspectives. The first one is exploring the relationship between participation in vocational education programs and wage level. The second one is probability estimation of vocational programs existence in some particular industries. The first type of research is on individual level, the second one is on institutional level. This study opens new vision of vocational training since it looks for influences of vocational education participation on the whole career paths using methodology for life course analysis.

2. Related literature

The theoretical framework of this study is human capital theory that was developed in (Becker, 1964); (Schultz, 1960). This theory suggests that education is an investment in human capital that bring positive returns in the future. There are a lot of empirical studies giving the evidence that development of education leads to positive

economic outcomes both on individual (Mincer, 1974);(Psacharopoulos, Partinos, 2002) and macro (Barro, 1996); (Mankiw et al., 1992); (Barro, Lee, 2010) levels.

Human capital is rather wide concept that includes not only formal education, but also a vocational one. After 1960's the separate flow of research regarding vocational training was formed. The general directions of the research in this field are the analysis of the vocational training on the labor markets with imperfect competition (Acemoglu, 1997); (Acemoglu, Pischke, 1998); (Acemoglu, Pischke, 1999); relationship between vocational training and labor productivity (Ballot et al., 2006); government support of vocational training programs (Berger, Walden, 2002). One of the most important empirical works in the field of vocational training is (Bassanini et al., 2005) where authors provide comprehensive analysis of the vocational workplace training in European countries.

There are much less empirical studies on vocational training for Russian labor market. There are two main kinds of research in this field for Russia. The first type is the research of relationship between participation in vocational training and the level of wage (so-called return to vocational education). For example, in (Berger et al., 2001) it is suggested to separate vocational training that leads to obtaining of new qualification and the vocational training the leads to the development of the existing competence. Without such separation authors failed to find statistically significant influence of vocational training on the wage level. After separation the results change and the influence of the vocational training leading to new qualification on wage level is observed. Another type of research in this field for Russian labor market analyses the probability of the presence of vocational education programs in different industries (Roshchin, Travkin, 2017).

In general there is a gap in the literature devoted to the Russian labor market that provides the analysis of vocational training participation on the professional trajectories. This study aims to fill this gap and provide an empirical evidence that vocational training helps to form such career paths that are needed for innovative development of the labor market and the economy as a whole.

3. Methodology and data selection

This study is based on the Russian longitudinal survey- Higher school of economics (RLMS-HSE)[1]. This survey started in 1994 and contains different questions regarding employment, education, health, income. For this study the period from 2005 to 2015 was chosen. This choice is determined by the tradeoff between number of years and number of individuals in the sample. During the time some individuals fall out of the sample, so when we take longer period, the number of individuals for which we have data available for each year in the period decreases. Ten years period covers significant part of the career paths and at the same time allows keeping in the sample number of individuals that is enough for estimation of the models. In total, our sample contains 2017 individuals, 536 out of 2017 individuals had an experience of vocational training within 10 years interval.

The idea behind methodology implemented in this study is to form two groups of workers and then compare them in terms of career paths. This first group includes people who had experience of participation in vocational training programs. The second one includes respondents without such experience. To compare these two groups directly would be incorrect since the different characteristics of individuals in two groups may differ significantly. For instance, we can expect that the share of respondents who are working in the fields of education, science, healthcare and culture in the sample containing people with vocational education experience will be higher since for such professions training is a crucial thing. In order to overcome this problem we have formed control group artificially using propensity score matching technique.

The idea behind propensity score matching methods (Rosenbaum, Rubin, 1983) is that we estimate logistic regression where dependent variable reflects the treatment (experience of participation in vocational training in our case). In other words, propensity score as defined as conditional probability of being treated given the set of covariates X (1).

$$(1)\ P(x) = Pr[T = 1|X = x]$$

[1] Russia Longitudinal Monitoring survey, RLMS-HSE», conducted by National Research University "Higher School of Economics" and OOO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the IInstitute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences. (RLMS-HSE web sites: http://www.cpc.unc.edu/projects/rlms-hse, http://www.hse.ru/org/hse/rlms)

Different characteristics of individuals are used as explanatory variables in this regression that are believed to important determinants of participation in vocational training. After propensity scores estimation, control group was formed based on nearest neighbor technique suggesting that for each individual from the treatment group (with experience of vocational education) we select one individual from those who had no such experience and who is most similar in terms of propensity scores. In other words, control group contains individuals who had probability of participation in vocational training very close to probabilities for the individuals from the treatment group at the begging of the period. Such technique allows balancing covariates in both groups and makes comparisons between groups appropriate.

Descriptive statistics (mean values) for some characteristics used for propensity score matching procedure are presented in the table 1. Mean values show that covariates in two groups are rather unbalanced. Particularly, individuals in the sample 2 are more educated, shares of respondents working in the fields of education, science, culture and healthcare are two times higher in this sample. It can be noted also that people that have experience of participation in vocational education programs usually live in a larger cities and work in a larger companies, the share of females is higher among them, have higher tenure.

Table 1: Mean values of the samples used

	Sample 1 – workers without experience of vocational training	**Sample 2 – workers with experience of vocational training**
Population of the city of residence, people	618010	854816
Marital status (share of married respondents), %	77,2	72,3
Gender (share of females), %	48,8	64,4
Age, years	35,2	32,8
Share of respondents with secondary education, %	41,6	28,7
Share of respondents with professional secondary education, %	27,2	27,8
Share of respondents with higher education, %	18,2	37,7
Share of respondents working in the fields of education, science, culture, %	10,9	20,9
Share of respondents working in healthcare, %	5,0	12,8
Company size (# of employees), people	649,2	682,9
Tenure, years	5,5	6,0
Experience, years	14,7	12,8
Average salary, roubles	6297,2	7799,4
Share of respondents working in hazardous industries, %	16,1	25,4
Share of respondents working in the state-owned companies, %	52,9	63,5
Share of respondents working in the foreign companies, %	3,3	5,1

After formation of the treatment and control groups it is necessary to compare the changes that happens to individuals from different groups in time. The usual approach to model such evolutions is a Markov chain model formulated as follows. We consider discrete random variable X_t that takes values on the finite set {1,…,m}. The aim of the modelling is to predict the value of X_t knowing the values of this random variable in the previous period. The simplest model of this type is a Markov chain that suggests that current value of X_t depends only on the value of this variable in the previous period (2).

$$(2)\ P(X_t = i_o | X_0 = i_t, \dots, X_{t-1} = i_1) =$$
$$= P(X_t = i_o | X_{t-1} = i_1) =$$
$$= q_{i_1 i_0}(t)$$

If we consider all possible combinations of i_0 and i_1 we will obtain the matrix that contains probabilities of moving from one state of the chain to another one. Markovian property suggesting that the present depends only on the previous period is not suitable for the socio-economic research. Particularly, in the context of this

study we can not assume that the present career position of the individual depends only on the position the she had in previous period. In order to relax this assumption we use modification of the Markov chain that is called mixture transitions distribution model (Raftery,1985). This model adds the so-called long memory to the standard Markov model meaning that presence depends not only on the one previous period, but depends on several previous period (3).

$$(3)\ P(X_t = i_o | X_0 = i_t, \dots, X_{t-1} = i_1) =$$
$$= P(X_t = i_o | X_{t-l} = i_{t-l}, \dots, X_{t-1} = i_1) =$$
$$= q_{i_l,\dots,i_0}(t)$$

In this case the matrix of transition probabilities becomes much more complicated and model becomes computationally difficult. In order to simplify calculations Raftery (1985) proposed to split MTD models into several Markovian models with different lags and than consider a linear combination of these simpler models (4).

$$(4)\ P(X_t = i_0 | X_{t-l} = i_l, \dots, X_{t-1} = i_1) = \sum_{i=1}^{l} \lambda_g\, q_{igi_0}$$

Where q_{igi_0} is a transition probabilities with dimension mxm (like in standard Markovian model), $\lambda_g$the weighting coefficient of the model g in the linear combination (mixture). Obviously, in such setting the model requires much less parameters to estimate.

Like standard Markov chains MTD models are estimated using maximum likelihood. Usually several models are estimated with different amounts of lags and then compared based on some information criterion. In this study Baysian information criterion is used in order to compare the models.

In the dataset for MTD models construction we have formulated 9 possible states that are “no changes”, “promotion”, “demotion”, “job loss”, “real wage increase”, “real wage decrease”, “workplace change”, “profession change”, “horizontal mobility inside the company”. Different combinations of these events are also possible, so in total out sample contains 23 different states.

4. Results and discussion

Results of the logistic regression estimation that is used for propensity scores calculation are presented in the table 2. Regression shows that the statistically significant determinants of the likelihood of experience in vocational training are the level of education. gender, employment in the fields of education and healthcare, company size, average salary, work in the hazardous industry. Particularly, more educated workers, workers with relatively high salary, people who work in a large companies and in the education and healthcare sectors tend to participate in vocational education programs more often. Experienced professional and individuals working in hazardous industries tend to participate in such education programs rarely.

Table 2: Results of the propensity score matching

Variables	**Estimated coefficients (logit)**
Marital status	-0.101
	(0.190)
Secondary education	0.861 *
	(0.410)
Secondary professional education	1.232 *
	(0.411)
Higher education	1.826 ***
	(0.414)
Gender	0.412 *
	(0.193)
Employment in the field of education	0.926 ***
	(0.248)

Variables	Estimated coefficients (logit)
Employment in the field of science and culture	-0.136
	0.373
Employment in the field of healthcare	0.927 **
	(0.292)
Tenure	0.007
	(0.444)
Tenure squared	0.001
	(0.194)
Company size (# of employees)	0.031 *
	(0.030)
Average salary	0.075 ***
	(0.017)
Hazardous industry	-0.729 ***
	(0.201)
State-owned company	0.280
	(0.193)
Foreign company	0.528
	(0.376)
Job change in previous period	0.071
	(0.107)
Experience	-0.029**
	(0.011)
Pseudo R2	0.150
Prob>chi2	0,000

In order to from control group based on the propensity score 1:1 nearest neighbor technique was used. Total amount of respondents in each group is equal to 536. Differences in covariates distribution before and after matching are presented on the figure 1. This figure shows that the matching technique was implemented successfully and the differences in covariates do not exceed 20% of the standard deviation. In order to obtain additional evidence that the control group was formed correctly we conducted t-tests in order to compare mean valued in treatment and control groups. All tests showed that differences in means are nor statistically significant that makes our comparisons correct.

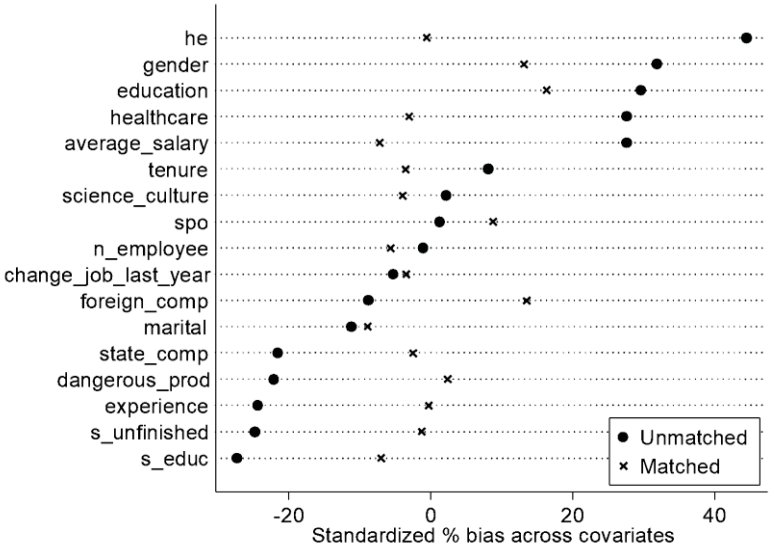

Figure 1: balance of covariates in treatment group and control group obtained using propensity score matching

Source: author's elaboration

For control and treatment samples, we have estimated MTD models separately. As was mentioned earlier, our dataset contains 23 different states. However, such amount of states make our model very complicated and computationally difficult. At this stage, it was decided to restrict the sample by 5 possible states by aggregating

initial ones. After such aggregation, we obtained 5 possible states that are “No changes”, “Positive changes”, “Negative changes”, “Unemployment”, “Neutral changes”.

The results of MTD models estimation presented in the table 3. We have considered 11 different models that are model of independence (assumes that presence does not depend on past), Markov chain and MTD models with number of lags from 2 to 10. In order to compare these models and to choose the best one Baysian information criterion values were calculated (the best model corresponds to the lowest BIC).

Table 3: Results of mixture transitions distribution models estimation

#	Model type	Sample 1 – workers with experience of vocational training (BIC)	Sample 2 – workers without experience of vocational training (BIC)
1	Model of independence	12943	14324
2	Markov chain (1 lag)	9343	12343
3	2 lags	7345	10322
4	3 lags	6356	8433
5	4 lags	6187	4323
6	5 lags	5639	3234
7	6 lags	5236	1498
8	7 lags	4865	**1843**
9	8 lags	3456	2439
10	9 lags	2734	4393
11	10 lags	**2130**	6434

Results resented in the table 3 shows that for the treatment group (with experience of vocational training) the best models is MTD with 10 lags. The best model for control group is MTD with 7 lags. In other words, current labor market status of the individual from the treatment group depends on the career paths in the previous 10 years or even more, since the sample period does not allow estimation models with higher amount of lags. For the individuals form the treatment group the length of the previous career paths that determine current position is equal to 7 years.

For the best models (according to BIC) we have calculated transition matrixes that are presented in the tables 4 and 5.

Table 4: Transition matrix for the sample of people with experience of vocational training

Without vocational training	No changes	Positive changes	Unemployment	Negative changes	Neutral changes
No changes	0.02	0.81	0.07	0.08	0.01
Positive changes	0.008	0.50	0.06	0.40	0.01
Unemployment	0.0005	0.24	0.73	0.025	0.0005
Negative changes	0.01	0.53	0.06	0.39	0.007
Neutral changes	0.02	0.45	0.05	0.39	0.09

Table 5: Transition matrix for the sample of people without experience of vocational training

With vocational training	No changes	Positive changes	Unemployment	Negative changes	Neutral changes
No changes	0.03	0.78	0.02	0.15	0.05
Positive changes	0.01	0.48	0.03	0.44	0.03
Unemployment	0.00	0.35	0.59	0.06	0.003
Negative changes	0.01	0.52	0.041	0.41	0.02
Neutral changes	0.04	0.59	0.01	0.27	0.09

Analysis of the transition matrixes shows that in general, probabilities of different negative career events are lower for the individuals from the treatment group. Particularly, if currently individuals are in the state “no changes”, for the treatment group probability of positive changes in the next period is 0.03 points higher, probability of unemployment is more than 3 times lower, probability of negative changes is almost 3 times higher. Moreover, respondents from the first group can leave the “unemployment” state with significantly higher probability.

5. Conclusion

This study is an attempt to analyze the impact of vocational training not only on separate characteristics such as level of wage or probability of unemployment but on the whole career paths. MTD models estimation results show that knowledge, skills and competence of workers that did not have any experience of vocational training obsolete at a faster rate. Current career position of this people depends only on their past from 7 years ago up to now. All career events that took place earlier do not have any influence on what is happening in period t. What is more important, individuals from the control group tend to have higher probability of different negative career events, including unemployment.

In overall, conducted analysis allows making four important conclusions. First of all workers that do not participate in vocational education programs have higher propensity to lose the job and to be unemployed. Secondly, career trajectories of individuals from the treatment group are more diverse, vertical as well as horizontal labor mobility occurs relatively more often. Thirdly, professional trajectories of the treatment group are more predictable. Finally, knowledge and skills are tend to obsolete at a higher rates in the sample that contains people without experience of vocational training.

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References

Acemoglu, D., (1997). Training and innovation in an imperfect labour market. The Review of Economic Studies, 64(3), pp.445-464.

Acemoglu, D. and Pischke, J.S., (1998). Why do firms train? Theory and evidence. The Quarterly Journal of Economics, 113(1), pp.79-119.

Acemoglu, D. and Pischke, J.S., (1999). Beyond Becker: training in imperfect labour markets. The Economic Journal, 109(453), pp.112-142.

Ballot, G., Fakhfakh, F. and Taymaz, E., (2006). Who benefits from training and R&D, the firm or the workers?. British journal of industrial relations, 44(3), pp.473-495.

Barro, R.J., (1996). Determinants of economic growth: A cross-country empirical study (No. w5698). National Bureau of Economic Research.

Barro, R.J. and Lee, J.W., 2013. A new data set of educational attainment in the world, 1950–2010. Journal of development economics, 104, pp.184-198.

Bassanini, A., Booth, A.L., Brunello, G., De Paola, M. and Leuven, E., 2005. Workplace training in Europe.

Becker, G. (1964). Human capital, New York.

Berger, M.C., Earle, J.S. and Sabirianova, K.Z., (2001). Worker training in a restructuring economy: Evidence from the Russian transition. In Worker wellbeing in a changing labor market (pp. 159-190). Emerald Group Publishing Limited.

Berger, K. and Walden, G., (2002). Trends in public funding for in-company training in Germany: From a dual to a plural system. Vocational training and lifelong learning in Australia and Germany, pp.135-49.

Mankiw, N.G., Romer, D. and Weil, D.N., (1992). A contribution to the empirics of economic growth. The quarterly journal of economics, 107(2), pp.407-437.

Mincer, J., (1974). Schooling. Experience and Earnings, New York.

Psacharopoulos, G. and Patrinos, H., (2002). Returns to investment in education: a further update World Bank Policy Research Working Paper 2881. World Bank: Washington.

Raftery, A.E., (1985). A model for high-order Markov chains. Journal of the Royal Statistical Society. Series B (Methodological), pp.528-539.

Roshchin, S. and Travkin, P., (2017). Determinants of on-the-job training in enterprises: the Russian case. European Journal of Training and Development, 41(9), pp.758-775.

Rosenbaum, P.R. and Rubin, D.B., (1983). The central role of the propensity score in observational studies for causal effects. Biometrika, 70(1), pp.41-55.

Schultz, T.W., (1960). Capital formation by education. Journal of political economy, 68(6), pp.571-583.

Social Innovation and Networks in Rural Territories: the case of EPAM

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Abstract: The paper presents a case study related to the production of medicinal and aromatic plants in rural territories within a conceptual and methodological framework focused on social innovation and networks. The case study presents specificities that allow the debate on methodologies and approaches aiming the promotion of rural development of territories with structural problems such as desertification. The concepts operationalized in order to understand these realities and problems offer interesting potentialities in the discussion of the challenges and design of solutions to overcome the main problems of rural territories.

Keywords: social innovation, networks, rural territories, ADCMoura, Baixo Alentejo

1. Introduction

The linkage between social innovation and territorial development has been established in the literature (Estensoro, 2015; 2016; Bellemare & Klein, 2010; MacCallum et al, 2009). But extant research focus mainly on urban territories and, therefore, there is a gap in the analysis of social innovation in rural territories, their specific problems and challenges (Ferreiro & Sousa, 2017).

This research applies the concept of social innovation and the methodology of social network analysis to the case study of EPAM project (Entrepreneurship in the value chain of medicinal and aromatic plants in Portugal), which started in 2011 and aimed the promotion of development of the medicinal and aromatic herbs sector.

The EPAM project is led by ADCMoura, a Portuguese Association of Local Development located in a very low-density region - Baixo Alentejo. EPAM is presented as a social innovation envisaging economic and rural development across several European countries. Networking, research, dissemination, and training, constitute the tasks of a 'collaborative methodology' and a 'strategic and innovative platform'. The project establishes a network of collaboration between different sectors and actors (public, private and non-profit) in the value-chain of aromatic and medicinal herbs. These networks convey and promote social capital.

The paper uses the case to critically discuss: i) the role of social innovation in the development of rural territories; ii) the network arising from the project and its importance to rural development.

2. Social innovation and rural development

Rural development corresponds to one central issue in political and scientific agendas within European Union. The importance of agriculture in the European project is expressed by the institutional and political centrality of Common Agriculture Policy (CAP), namely in budgetary terms. The sectorial bias has been gradually transformed in a more territorial view; the *rural* is no more synonymous of agriculture. Nevertheless, farmers continue to be key actors in rural territories in terms of control of natural resources (e.g. land) and other material and immaterial assets such as knowledge involved in food production, a strategic and central economic activity regarding food safety and sustainability. According to Dax & Fischer, "While many experts ask for sustainable urban development as priority action in the adaptation strategies, the contribution of rural regions to sustainable approaches should not to be underestimated. Rural regions have particular features in terms of innovation and have specific potential to kick off the discussion on the feasibility of post-growth trajectories" (Dax & Fischer, 2018, p.219).

The paradigm shift towards a territorial perspective in rural development research and public policy involves the consideration of local resources and skills and, therefore, the reflection on the way to take into account

local specificities and skills envisaging sustainable paths of territories. As point out by Dax & Fischer, "The concepts for rural development have, therefore, turned increasingly towards making use of the specific local assets and presenting diversity of regions as a valuable feature and not an obstacle that future regional activity should seek to overcome" (Dax & Fischer, 2018, p.219). The concept and the practices of social innovation, in its dimensions of mobilization of local resources and the empowerment of communities, constitute a fundamental tool within this political and analytical framework.

Research on social innovation can be considered as a tool of transformation of spatial relations (MacCallum et al, 2009, p.12) in the context of territorial development In fact, and territorially speaking, social innovation takes place also with the transformation of place-based social relations improving governance and decision-making forums, but also "the reproduction of place-bound and spatially exchanged identities and culture. […].

Social innovation is quite often either locally or regionally specific, or/and spatially negotiated between agents and institutions that have a strong territorial affiliation" (Idem, ibidem).

According to Bellemare & Klein (2010) the role of territory in the dynamics of innovation, as well as in regulation and governance of societies, remained unknown until recently. However, and according to the same authors, "after some years, we discover the territory, and this happens not only within the privileged scientific areas of, and for example, geography, spacial economics or urbanism […] but also in other areas such as sociology and economics […]" (Bellemare & Klein, 2010, p.2); and "the territory emerges as an important analytical dimension, in such a way that Pecqueur (2006) mention a territorial shift within a world economy" (Bellemare & Klein, 2010, p.2).

The evolution of the 'role of the territory in the analysis of societies' was developed within the planning and scientific realms and knows important milestones with the utopian socialists of the XIX century (e.g. Fourier, Owen and Kropotkine) as well as Marshall and 'industrial districts'. Thus, the territorial dimension was central in the proposals envisaging communitarian and solidarity values as well as in the analysis of socioeconomic dynamics and developments started with the industrial revolution (industrialization and urbanization). The funcionalist and territorialist paradigms represent completely different views on territory and its development.

The 1970', with the economic crisis, give rise to the valorization of local/endogenous resources and the respect for local and communitarian identities. Important steps toke place by the concept of social innovation in the approaches to these realities and new models of development, namely public policies and the 'new role' of the State. Therefore, current debates on social innovation represent new developments of a previous debate started in Europe some decades ago in the XX century.

The debate on social innovation within official institutions (OECD and EU) involve the presentation of definitions: there is social innovation "whenever new mechanisms and norms consolidate and improve the well-being of individuals, communities and territories in terms of social inclusion, creation of employment, and improved quality of life. Social innovation aims to respond to new needs that are not addressed by the market, and which may encompass conceptual and organisational aspects, and changes in the relationships between communities and respective territories." (OECD, 2010); 'social innovations' are social in both their ends and their means: "Specifically, we define social innovations as new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations. In other words they are innovations that are not only good for society but also enhance society's capacity to act" (European Commission, 2010, p.33).

Within academy we find different and several definitions for social innovation. According to Chambon, David and Devevey (1982), a milestone in this debate, "social innovation signifies satisfaction of specific needs thanks to collective initiative, which is not synonymous with state intervention" (in Moulaert, 2009, p.13), and "can occur in different communities and at various spatial scales, but is conditional on processes of consciousness raising, mobilization and learning" (Idem, ibidem, p.13).

Networks are vital to social innovation. Firstly, social innovation is often produced in collaboration processes with people and organisations from the civil society who are engaged in finding an answer to a social problem (Hulgård, 2010). Social innovation involves the interaction multiple stakeholders (Spear & Hulgård, 2007).

Moreover, networks provide resources for the social innovation process. Both organisations from the local community and from other geographies provide important tangible (e.g. financial resources) and intangible resources (e.g. trust and legitimacy), namely in rural areas (Muller & Korsgaard, 2018; Richter, 2018; Vestrum, 2014; Steinerowksi & Woolvin, 2012; Evans & Syrett, 2007). Networks with non-local actors can be very useful to gain and diffuse knowledge, to attract resources that are not available within the locality and to scale-up social innovations. Therefore, networks related to social innovation tend to gather different actors from different geographical scales.

The case under analysis (section 3) provides a good example of the potentialities and role of networks in the mobilization of local and non-local resources in order to develop entrepreneurial activities in a particular sector (medicinal and aromatic plants).

The revision of literature presented in this section allows the identification of the following analytical dimensions envisaging the case study related with networks of aromatic and medicinal herbs developed in different rural territories and presented as a social innovation initiative: 1. the importance of local resources in territorial development projects; 2. the role of networks in the promotion of social innovation; 3. the promotion of new relationships between communities and territories through social innovation.

3. Social innovation and networks in rural territories: the case of EPAM

ADCMoura is a non-governmental and non-profit organization founded in 1993, inspired by the principles of local development, social and solidarity economy and equal opportunities. Its main goals are: to contribute to the economic competitiveness and innovation in rural and vulnerable territories; to preserve and value natural and cultural assets; to raise environmental awareness through education; to defend the equal access of all citizens to social, educational, health and cultural services; to push for social cohesion and citizen's participation. It is settled in the county of Moura, in the Portuguese southern region of Baixo-Alentejo, very low-density region.

Over the 25 years of its existence, ADCMoura has acquired experience and competences in areas as diverse as community animation, intervention with disadvantaged social groups and ethnic minorities, environmental education, support to companies and entrepreneurship, training, network facilitation, among others. ADCMoura is a member of several national and international organisations and networks in social, entrepreneurial and rural development thematic areas, being the most relevant related to the economic value chain of Medicinal and Aromatic Plants (MAP).

EPAM - Entrepreneurship in the value chain of medicinal and aromatic plants in Portugal (https://epam.pt) - is the name of a project led by ADCMoura started in 2011 and supported by the National (Portuguese) Rural Network Program. The initiative continued after the project´s end in 2013, and was developed further through new partnerships and activities. It has enabled the development of a consolidated methodology and a set of tools to support the development of the MAP sector, acting at the levels of network animation, research and provision of information, training, promotion (both at national and international levels) and representation. It has been contributing to a strategic and innovative networking ecosystem, at the service of the stakeholders in the sector. Therefore, the EPAM case study, considered in this research, includes a permanent, strategic and widely-participated work for the sustainable development of the MAP sector in Portugal started, denominated by "EPAM process" (https://epam.pt/o-projecto-o-processo/) where several funded projects have been implemented, involving organisations from different countries:

- MEDISS - MEDiterranée Innovation Senteurs Saveurs (MED) | 2009-2012 (FR, IT, PT)
- ADLA - Actions for the Development of the Great Lake Alqueva, in which ADCMoura is a partner, with a cross border intervention linked to the promotion of the "Scents & Flavors" network of the Lands of the Great Lake Alqueva (POCTEP) | 2012-2015 (PT, SP)
- Training for the Production of Aromatic and Medicinal Plants (PRRN) | 2014-2015 (PT)
- Several funded (ESF) vocational training courses and courses for entrepreneurs (in partnership with MAP farmers) | since 2009
- Herbartis - Adult training on handicraft production of medicinal and aromatic plants (Erasmus +) | 2015-2017 (SP, PT, IT, FR)
- Inov@sfileiras (PDR2020) | 2017-2019 (PT)

More than a hundred activities on topics related to MAP were organized in the framework of these projects and other occasional opportunities, including Local and National Meetings of MAP Producers, Workshops, Seminars, Technical Visits, Shows, Working Groups, Promotion Activities in Portugal, France, Italy, Spain, England, Germany and Belgium, totalising more than 3 thousand participations of stakeholders of the sector.

Due to the success of these initiatives ADCMoura / EPAM was invited to join the Mediterranean network CEDDEM - Center d'Etude et de Développement Durable Euroméditerranéen (www.ceddem.org), the European association EUROPAM - European Herbs Growers Association (www.europam.net/) and the Portuguese network CCPAM – Centro de Competências das Plantas Aromáticas, Medicinais e Condimentares (Competence Centre on Aromatic, Medicinal and Condiment Plants), to which ADCMoura presides at the moment. Recently, in November 2017, the EPAM's animation methodology and tools integrated the list of good rural development practices presented in AGRI INNOVATION SUMMIT Lisbon.

Considering the above-mentioned projects, the EPAM's network was reconstructed (Figure 1). For each project the partners were identified and characterised according to two dimensions: the type of organisation (reflected in the colours of the modes) and the geographical scale (reflected in the shapes of the nodes). For the type of organisation, eight categories were considered: MAP producers belonging to the EPAM network (in pink); other MAP producers (in purple); other enterprises (in blue); organisations from the education, science and technology sectors (in yellow); public entities including local authorities (in red); associations for local development (dark green); and non-profit organisations (light green). For the geographical scale, three levels were considered: Portuguese organisations (circles); European organisations (squares), non-European organisations (triangles). The size of the node is proportional to the number of participation in EPAM projects.

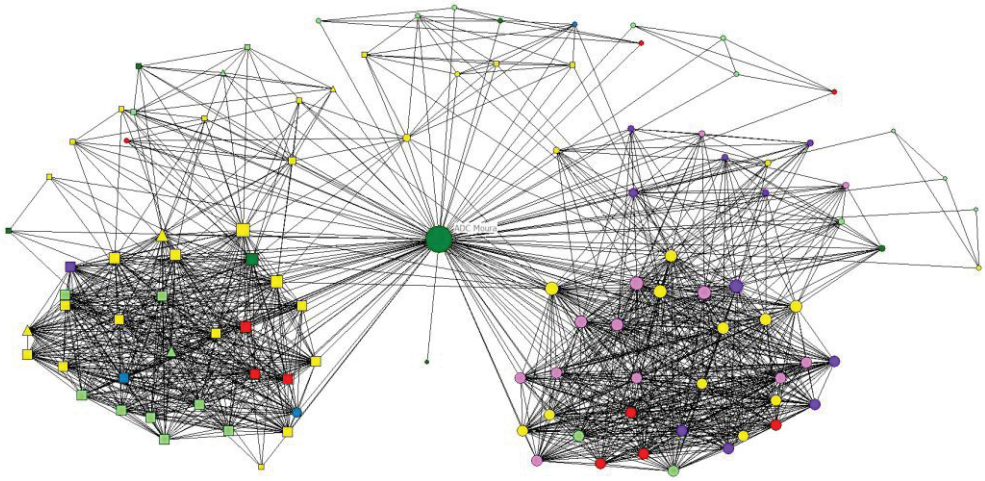

Figure 1: EPAM network

Figure 1 reveals the multi-actor, multi-scale nature of the network that supports this social innovation. MAP producers are embedded in an ecosystem that includes all sorts of stockholders, public and private, commercial and non-commercial, local and foreign. The network also reveals a certain divide between national and foreign organisations, due to the fact that, beyond ADCMoura, which is present in all projects, most projects only mobilise national or international organisations. This fact, gives ADCMoura, which is a local development association, the opportunity to transfer knowledge and best practices from and to different geographical scales, enabling to replicate and scale-up the EPAM's social innovation.

Other and important results are expressed by network analysis and complemented by other sources of information (e.g., site of ADCmoura). First, ADC Moura appears as the centre of the network establishing a clear division between national and international entities/partners. However, some national entities interact also with international players, namely in education, scientific and technology sector. In fact, these entities constitute an important player in this network, expressing the importance of interactions with universities and other scientific and technological actors within the development of the sector. European entities are central at this realm; secondly, EPAM is a network-based project, enabling the constitution of other networks through

the different, and diverse, activities developed through time (e.g., training, workshops, field visits); this aspect is visible in the networks established by different players in national and international context; it also worth to mention the fact that this network was promoted by other, national and public, network (Rede Rural Nacional, National Rural Network, an initiative of the Portuguese Government (Ministry of Agriculture).

Thus, network design corresponds to a central methodology in EPAM case from its start (Government initiative) and main steps of evolution, namely the recognition of EPAM as a best practice envisaging the promotion and development of other local products and their value-chain. The photos illustrate different dimensions and dynamics of the project EPAM (training, field trips, conferences/dissemination, exhibitions of the products of the value chain).





Source: https://epam.pt/o-projecto-o-processo/

4. Conclusions

The presentation of EPAM as a network-based approach to the development of local products corresponds to one of the dimensions that explain its reference as a social innovation project. Other important aspects involve the participation of diverse stakeholders (players of the sector, such as enterprises, universities and other education and scientific entities) and the development of different activities that contribute to the development of the sector. This case corresponds to an interesting case within the literature of rural development considering the mobilization of local resources, knowledge as well as different players through the value-chain. The integration of these diverse activities and players is made through a tissue of connections in national and international contexts. However, the bridging between national and international levels is not

clear. The network was designed with the collaboration of a governmental department of the Ministry of Agriculture and is polarized in ADCMoura, the most important actor and the main driver of the network. The case of EPAM offers interesting insights to the debate and reflection of rural development dynamics, namely the importance of central public players and funding and the role of local development associations in the promotion of innovation and exploration of local resources and knowledge (scientific and non-scientific-tacit) and practices. The constitution of EPAM as a best practices case is also pertinent and deserving further research.

References

Bellemare, G. & Klein, J.-L. (2010). Innovation Sociale et Territoriale, Convergences théoriques et pratiques, Presses de L' Université du Québec.

Dax, T. & Fischer, M. (2018). An Alternative policy approach to rural development in regions facing population decline. European Planning Studies, 26:2, 1469-5944.

Estensoro, M. (2015). How can social innovation be facilitated? Experiences from an action research process in a local network. Systemic Practice and Action Research, 28(6), 527-545.

Evans, M., & Syrett, S. (2007). Generating social capital? The social economy and local economic development. European Urban and Regional Studies, 14(1), 55-74.

Hulgård, L. (2010). Discourses of social entrepreneurship–Variations of the same theme. EMES European Research Network.

MacCallum, D., Moulaert, M., Hillier, J., Haddock, S. V., (ed) (2009). Social Innovation and Territorial Development, Ashgate e-Book.

Müller, S., & Korsgaard, S. (2018). Resources and bridging: the role of spatial context in rural entrepreneurship. Entrepreneurship & Regional Development, 30(1-2), 224-255.

Richter, R. (2018). Rural social enterprises as embedded intermediaries: The innovative power of connecting rural communities with supra-regional networks. Journal of rural studies (on-line).

Spear, R., & Hulgård, L. (2007). Social entrepreneurship and the mobilization of social capital in European social enterprises. In Social enterprise (pp. 101-124). Routledge.

Steinerowski, A., & Woolvin, M. (2012). Supporting older people in establishing social enterprises in rural Scotland through action research: reflections on challenges and opportunities. Families, relationships and societies, 1(2), 277.

Vestrum, I., & Rasmussen, E. (2013). How community ventures mobilise resources: Developing resource dependence and embeddedness. International Journal of Entrepreneurial Behavior & Research, 19(3), 283-302.

DIVE-IN: Problem First Team Formation in Entrepreneurship Education

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Abstract: Many startups teams are formed around ideas. This is most evident at the outset of entrepreneurship education programmes, at startup weekends, hackathons and founder formation events where people enthusiastically pitch ideas for others to gather around. Texts such as Business Model Generation, Crossing the Chasm amongst others often inform the completion of a Business Model Canvas ahead of pitching for investment. Recent developments have aimed to provide a step-by-step process that can test the commercial potential of an innovation, including the formidable Discipled Entrepreneurship. However, all of these texts and processes have a starting point of technology first or very well formed idea first. In contrast, this study explores the experience of 33 participants aiming to return to work after a period of unemployment that do not have a technology or a well-formed idea as they engage in a one year postgraduate diploma in technology innovation for entrepreneurship development. Inspired by social constructivist thinking, this study aims to establish the effectiveness of a designed problem pitching and collaborative validation process on team formation for sustainable innovation driven entrepreneurship. DIVE-IN (Define, Investigate, Verify, Empathise - Ideate & Narrate) asked programme participants to collaboratively negotiate their interpretation of a validated problem within a highly scaffolded learning environment. Qualitative data gathered suggests that while participants initially struggled to gather around a problem statement without a clear vision of a solution, the process of structured collaborative negotiation solidified their formation as a team and ensured that any solution to their identified problem had, at a high level a commercial viability. Participants viewed this process as a key informant of whether or not to proceed to solution ideation and as a critically important learning outcome for the development of a sustainable career as a serial entrepreneur. This paper will outline the conceptual framework supporting this process, detail the method of execution and present an analysis of the impact of the process on the participants. A model is presented for others to adopt and/or adapt in cognate settings.

Keywords: Entrepreneurship Education, Collaboration, Innovation, Higher Education

1. Introduction

The popular vision of an entrepreneur is one of a charismatic leader who has a clear vision, determination, the capacity for effective autonomous action, innovativeness, passion and flexibility (Rauch and Frese, 2007).

Indeed, for many years the characterisation of successful entrepreneurship focused on individuals and the identification of traits that might be recognised in similar individuals (McCelland,1961; Birley, 1985). Recent research has shifted focus to recognise that understanding the dynamic functions of founding teams is now of vital importance (Cooney, 2005; Vyakarnam and Handleberg, 2005; Kamm, et al., 1990). Much of this work has been carried out with high performance heterogeneous teams within established organisations or within heterogeneous founding teams who have demonstrated enhanced performance as consequence of their heterogenous composition (Bunderson and Sutcliffe, 2002). Recent thinking in the development startups has identified that individuals who seek co-founders should also seek heterogeneous candidates. Such individuals are often found at startup events where team formation centres around the pitching of an idea and the attraction of other individuals who may be able to make significant contributions to the development a fledgling venture. Venues such as hackathons and startup events are typical for such activity. A dearth of work exists that may serve to inform the formation of teams at shorter events particular here there is an absence of an advanced technology or well-formed idea to start from.

This study explores the experience of 33 participants aiming to return to work after a period of unemployment that do not have a technology or a well-formed idea as they engage in a one year postgraduate diploma in technology innovation for entrepreneurship development. Presented here is an overview of an innovative approach to team formation which explores the impact a problem first approach to team formation rather than the traditional idea first approach. A design research approach (Barab, 2004) was taken to the development of the programme which allowed the development of a conceptual framework to act as a lens in order to analyse the effectiveness of the designing methodology. This methodology, DIVE-IN (Define, Investigate, Verify, Empathise - Ideate & Narrate), reflective of a design-thinking (Brown and Wyatt, 2010; Scheer, Noweski, and Meinel, 2012.) paradigm facilitated:

1.

- The generation of a problem pool to DIVE-IN to.
- The refinement and definition of clear problem statements
- Problem selection through investigation
- Initial team formation based on negotiated verification
- Understanding with the validated problem though a scaffolded collaboration activity
- High-level response ideation
- Collaborative narration of the problem and the high-level response

This paper will outline the conceptual framework supporting this process, detail the method of execution and present an analysis of the impact of the designed process on the participating students and their associated teams. A model is presented for others to adopt and/or adapt in cognate settings.

2. Framework

Many start-ups teams are formed around ideas. This is most evident at the outset of entrepreneurship education programmes, at start-up weekends, hackathons and founder formation events where people enthusiastically pitch ideas for others to gather around. Texts such as Business Model Generation (Osterwalder and Pigneur, 2010), Crossing the Chasm (Moore, 2002) amongst others often inform the completion of a Business Model Canvas ahead of pitching for investment. Recent developments have aimed to provide a step-by-step process that can test the commercial potential of an innovation, including the formidable Discipled Entrepreneurship (Aulet, 2013). However, all of these texts and processes have a starting point of technology first or very well formed idea first. For those who wish to start a venture and do not have a technology or well-formed idea the prospect can be quite daunting. Increasingly the term innovation is being included in module descriptors within higher education institutions as they attempt to respond to the demands of industry (Finkle and Deeds, 2001). In the context of this study the term '*innovation*' is removed from the team formation process and replaced with the term '*problem identification*'. In order to facilitate this the study draws on a suite of design informants that are anchored in 6-step process of team formation - Define, Investigate, Verify, Empathise - Ideate & Narrate (DIVE-IN) - forming a conceptual framework.

For those who wish to create a new venture the journey to forming an idea that responds to a market need or pull can be long and frustrating. Often this this described as a spiralling process where iterative refinement reveals the appropriate path to take (Aulet, 2013; Petersen, 2015). This study posits that picking a problem or suite of problems to investigate the commercial viability of any potential solution may prove more advantageous for those who do not have a technology or well-formed idea from the outset. The initial step in this process is problem pool generation based on the use of Maslow's Hierarchy of Needs and in particular addressing the basic needs of security, safety, food, water, warmth and rest (Maslow, 1943). In the context of this study the hierarchy is used to help identify possible problems within chosen domains such as, but not limited to, agriculture, construction and health. Initially, this process asks participants to engage as individuals in the problem identification phase. Asking participants to work on their own to identify problems facilitates the expression of personal interest that may support the development of common frames of reference when presented with a challenge to overcome within a shared domain, thus helping to support the development of a collaborative response (Miyake, 1986; Rochelle, 1992; Barron, 2000). As noted by Barron (2000), "*for such forms of convergence to occur, students must organise themselves to engage in coordinated activity. Coordination is fundamental for the establishment of what has been called mutual knowledge or common ground.*" (p.404). It is intended that ultimately, the refinement and definition of multiple, clear problem statements with a view to confirming the commercial viability of any potential solution.

The formation of teams for problem solving is far from a new concept however, in contrast to Cox (1996) who advocates that the role of entrepreneurial education programmes is to develop the self-efficacy of the entrepreneur the purpose of this study was the formation of a heterogeneous team committed to solving a problem that all team members understand (Drayton, 2011). Team work is complex and requires pedagogical design particularly to support collaborative engagement (Stahl, 2002; Author, 2016). Scaffolding is required if all participants are to learn not only from each other and the lecturer (Vygotsky, 1978) but also within the designed learning environment (Goodyear, 2005). In the case of this study scaffolding or support for student engagement with content and each other is vital to support the development of Barron's (2002) concept of mutual undertaking and common ground within educational scenarios. The development of this shared understanding is considered fundamental to the solidification of the teams within this study particularly if they

are to have any chance of surviving beyond the educational programme within which they are enrolled. Consequently, in order to inform the methodological consideration of this study the following questions were formed:

- How can the use of Maslow's Hierarchy of Needs support the development of a problem first approach to entrepreneurial team formation?
- What are the supports that students require in order to define and select problems to solve?
- How does the development of common ground through structured investigation support the development of team formation?

3. Methodology

The participants in this study were a collection of individual that were aiming to return to work after a period of unemployment and were engaged in a one year, part-time postgraduate diploma in technology innovation for entrepreneurship development. The initial enrolment number for the programme was 38 however this reduced to 33 largely due to reasons of a personal nature. It is interesting to note, hover, that one of the participants who exited the programme did so due to the team working aspect of the programme and explicitly stated a need for individual engagement in entrepreneurial activity. Participants attended lectures on Thursday morning and engaged in workshops on Friday mornings as well as being supported by various course materials delivered online and through live feeds. For many participants it had been a considerable amount of time since their last engagement with formal education and for 31 of the participants it was their first time to engage with a postgraduate programme although all had completed an undergraduate degree programme at some stage in their educational history. The context of this study was a twelve week module focused on problem identification for entrepreneurial venture creation. Students had been given a 12 week module that had the MIT Disciplined Entrepreneurship (Aulet, 2013) as a core text. For this study a qualitative interpretive approach was employed and triangulated data was collected using the following techniques: ethnographic observation, students reflective submissions, face-2-face focus groups, digital questionnaire, student submitted artefacts and the observation of critical colleagues.

4. DIVE-IN

Generation of a problem pool to DIVE-IN to: Each week students received a lecture on a Thursday and a workshop on a Friday. The first step in this process was conducted within the first face-2-face workshop session of the 12 week module. The lecture the previous day had introduced Maslow's Hierarchy of Needs to the students and they were tasked with identifying at least two domains that they might be interested in, to list at least two problems that related to Maslow's basic needs and which they thought might be worth exploring related to personal interest. For many students this is a daunting task. Maslow's Heirachy allows them to make a personal connection, it acts as a touchstone for the students. Students were asked to post their domains on a board with post-its and the lecturer grouped the domains under common headings. It is important to note that no names were allowed to be placed on the domain titles. The domain groupings were then placed at intervals around the room. The problems identified by the students were collected by the lecturer on uniform coloured post-it notes and placed under each domain grouping. Again no names were permitted to be visible with the uniform colour minimising identification of the posting participant. Two teaching assistants condensed the problem lists by removing similar challenges. Subsequently participants were asked to place their name above a domain label and not beside a problem statement.

Refinement and definition of clear problem statements: The room had been pre-arranged so that to could facilitate groups of four working together. Each list of names beside each domain was split into four and assigned a table to work at. The entire problem list for that domain was provided to each group within the relevant domain. Participants were given exemplars of poorly and well defined problem statements as well as templates to support their refinement and definition of the information they were dealing with. When each group had formed a list of problem statements these were placed back on the wall and participants were given time to decide where they wanted to dedicate their efforts. Students were also permitted to change domain and encouraged to walk around the room and view the problem statements generated by other groups and to place their name under one domain topic.

Problem selection through investigation: Having selected their preferred domain each student was tasked with investigating the list of problems that had been refined and defined under each domain topic.The

participants were instructed to use steps 1-6 of the Disciplined Entrepreneurship (DE) process (Aulet, 2013) to investigate the early state commercial viability of a high-level solution and to rank the list by indicating which problem they considered emerged from the DE process most likely to succeed. This process was completed during a single week interval between workshops.

Initial team formation based on negotiated verification: During the next scheduled Friday workshop each domain grouping was asked to create a table outlining the problem statement list and their names. Students had been asked to rank the problems during the week and the scores were entered into the table by the students. At each domain grouping students were instructed to take the three highest scoring problem statements and to write them on post-it notes. The ranking served to validate the commercial potential or realistic nature of the problem however students were asked now decide on which problem they would like to address based on personal interest. Where a problem statement generated enough participants to form two teams this was facilitated and in turn where less than two participants has placed their name beside a problem, this problem statement was removed and the student was asked to join a team that was focused on their next highest ranking problem statement.

Understanding with the validated problem though a scaffolded collaboration activity: All of the students who selected a problem statement would have carried out the same DE process analysis. Using a generic template the students were tasked with completing a team charter in order to communicate their individual understanding of the problem statement and to come to a shared or mutual understanding, not only of the problem statement, but also of their raison d'être. An important component of this stage is the articulation of intent by each member, specifically in relation to whether they consider their participation in the programme as purely an academic exercise or if they have ambitions to continue the project beyond the programme should the opportunity present.

High-level response ideation: In order to test the mutual understanding of the problem being addressed by each team the individuals in the team were tasked with, over the course of the following weeks, ideating some high-level solutions to the problem they were attempting to address. During the next scheduled workshop students presented their favoured idea and invited questions from their fellow team members. The individual contributions reveal misunderstandings and/or disconnection from the problem being addressed by the group.

Post individual contributions the group votes on the high-level idea that they wish to progress through the remainder of the DE process for the remainder of the semester and possibly beyond.

Collaborative narration of the problem and the high-level response: Finally, in the next scheduled workshop the team are asked to present, to the rest of the cohort, their agreed problem statement, the rationale for picking it and their next steps. The construction of this collaborative narrative further serves to cement the shared understanding of the problem being solved and the team's agreed response going forward.

The DIVE-IN process takes three weeks to complete within a part-time programme. It is dependent on students having face-2-face engagement and having been provided with a structured process of market/customer discovery and validation such as the Disciplined Entrepreneurship process, specifically steps 1-6.

5. Findings

RQ1: How can the use of Maslow's Hierarchy of Needs support the development of a problem first approach to entrepreneurial team formation?

Findings show that participants found that this approach to problem identification had a positive impact on the formation of their entrepreneurial teams. In general the cohort viewed this as a refreshing approach to team formation and was a significant change from their previous experiences at events such as hackathons. As one participant noted:

> *"For some reason, after events or courses that I have attended in the past when I leave I don't really have anything to fall back on. It was great to see some sort of process, or way, to find a problem to*

solve. While [Maslow's Hierarchy] doesn't get you to a specific question or statement it made the challenge less daunting - repeatable even."

The development of Maslow's Hierarch of Needs as a framework within which to approach large, 'umbrella style' problems was well received by the majority (94%) of the participants. However, two participants felt that it was still too vague and did not paint a clear enough picture of challenges that could be a addressed. In terms of the value of the process to the development of teams focused around a problem, 100% of the participants indicated that they chose a problem to address based purely on a personal interest that was explicitly linked to Maslow's list of basic needs:

"It's like this; you can use each of the basic needs as a window to look through, at your domain. Straight away you can start listing problems and who those problems might affect. Boom, you are straight into [DE] steps 1-6"

The triangulated findings associated with this research question indicate that the use of Maslow's Hierarchy of Needs did support the development of a problem first approach to entrepreneurial team formation. In addition, the process was viewed as something that participants felt they could repeat beyond the programme.

RQ2: What are the supports that students require in order to define and select problems to solve?

Within previously delivered programmes students were observed as becoming frustrated when they did not have any guidance on where to look for a problem. In this programme exemplars of high-level problems were provided by the lecturer in order to scaffold their engagement. However, it would be useful to provide a start-to-finish example of the problem selection process with a strong narrative on how decisions were made along the way. As one student commented:

"The supports are great. We have worksheets, we have some worked examples. Everything runs pretty smoothly but I want to know what makes a person decide to look at something in a certain way. Is there a way to capture that way of thinking because it would give me some confidence around my own thoughts."

This was an interesting insight into the difficulty that students face when making decisions and their entrepreneurial self-efficacy. While the detail in this comment is revealing it was not replicated by others within the data set. However, the wider literature does indicate that novice entrepreneurs often exhibit low levels of entrepreneurial self-efficacy and in particular in relation to gender within cohorts (Markman, Balkin, and Baron, 2002; Wilson, Kickul, and Marlino, 2007). It is reasonable to conclude that a narrated process of problem selection for students to refer to, may prove to be valuable.

RQ3: How does the development of common ground through structured investigation support the development of team formation?

The participants (85%0 placed a high value on the development of common ground during the team formation process. In particular, students felt that they began to get to know each other. This was something that felt was lacking in other team formation situations where they indicated it took longer for this to happen. Two members of the same team commented:

"I had no idea that [x] thought about this problem in the same way as I did and it wasn't just that we agreed on the day. The work that we did during the week lined up. It could have been a photocopy. It made it much easier to talk about the problem and make decisions together after that"

"The work that we carried out was done on our own. I thought that this was a little strange given that we were in the process of forming teams but, when we came back, it seemed to make it easier to talk to

each other. Our research had given us a language that we both knew about - even if we didn't fully understand it yet."

While it is clear from this exemplar of the wider data set that the structured process of investigation allowed students to develop common ground for discussion it also encouraged the participants to engage with each other in a way that felt unstructured and informal:

"When we started talking about the problems we had investigated it didn't feel like we were reporting. It felt like we were chatting because we all knew at least something about the problem we were discussing. It made it easier to see the person we might be on a team with rather than just the problem."

Another participant commented:

"Even when we started to disagree about which problem to choose you knew it was because people cared about what they were disagreeing about. That's okay in my book. I can be on a team with somebody who cares but I don't always agree with."

6. Challenges

The most significant challenge face by the participant teams and the facilitating lecturer was the issue of academic engagement versus intention to create an entrepreneurial venture. While every attempt to mitigate this was made (as noted within the team charter formation description) this issue became problematic for two of the teams engaged with the programme. Despite the instruction to reveal intent from the outset it appears that this requires additional consideration for future iterations of the DIVE-IN process. As one participant commented:

"For me this was an academic exercise. I want to learn and I have no intention of going into business for myself or as part of a new company after this programme. For me this was a way becoming more attractive to a potential employer. It was fun for a while but it got way too serious and they became frustrated with me."

However, for another participant in a different team the revelation by a team member that their commitment to the team was purely academic was seen in a different light:

"[X] said that he had no intention of staying with the team beyond the programme but would do everything he could to work with us on the project - and he did - and more! It was a pleasure! Now we are in a funding pipeline and he has moved on to other things. [The] Team Charter sorted all that stuff out at the beginning - we all knew where we stood from the get-go."

7. Discussion and Conclusions

This study aimed to evaluated the effectiveness of a designed problem pitching and collaborative validation process, DIVE-IN, on team formation for sustainable innovation driven entrepreneurship. DIVE-IN (Define, Investigate, Verify, Empathise - Ideate & Narrate) asked team members to collaboratively negotiate their response to a validated problem within a highly scaffolded learning environment. The triangulated findings, within this purposive sample, imply that a structured process of problem first team formation did support the development of teams.

It is important to note that there are some limitations associated with this study. The study was carried out in a mandated academic setting over a 12 week semester. A condensed and accelerated design of the process for execution at a two-day or three-day event would reveal the adaptability of the process for startup events and/or hackathons.

The data collected and analysed in this study indicates that the use of Maslow's Hierarchy of Needs did support the development of a problem first approach to entrepreneurial team formation and was viewed as a

process that could be replicated by participants bond engagement with the programme. The DIVE-IN process also revealed a need for deeper understanding of the micro-decision making associated with entrepreneurial pathways. It can also be concluded that the development of common ground through structured investigation did support the development of team formation by breaking down interpersonal barriers and accommodating a collaborative negotiation of the team formation.

Possible directions for future research include the development of a deeper understanding of how entrepreneurial self-efficacy is developed within entrepreneurial education programme and specifically in relation to entrepreneurial micro-decision making.

References

Aulet, B., 2013. Disciplined entrepreneurship: 24 steps to a successful startup. John Wiley & Sons.

Author. 2016.

Barab, S., 2006. Design-Based Research: A Methodological Toolkit for the Learning Scientist. Cambridge University Press.

Barron, B., 2000. Achieving coordination in collaborative problem-solving groups. *The journal of the learning sciences*, *9*(4), pp.403-436.

Birley, S., 1985. The role of networks in the entrepreneurial process. *Journal of business venturing*, *1*(1), pp.107-117.

Brown, T. and Wyatt, J., 2010. Design thinking for social innovation. *Development Outreach*, *12*(1), pp.29-43.

Bunderson, J.S. and Sutcliffe, K.M., 2002. Why some teams emphasize learning more than others: Evidence from business unit management teams. In *Toward phenomenology of groups and group membership* (pp. 49-84). Emerald Group Publishing Limited.

Cooney, T.M., 2005. What is an entrepreneurial team?.

Drayton, B., 2011. Collaborative entrepreneurship: how social entrepreneurs can tip the world by working in global teams. *Innovations: Technology, Governance, Globalization*, *6*(2), pp.35-38.Vancouver

Finkle, T.A. and Deeds, D., 2001. Trends in the market for entrepreneurship faculty, 1989–1998. *Journal of Business Venturing*, *16*(6), pp.613-630.

Goodyear, P., 2005. Educational design and networked learning: Patterns, pattern languages and design practice. *Australasian Journal of Educational Technology*, *21*(1).

Kamm, J.B., Shuman, J.C., Seeger, J.A. and Nurick, A.J., 1990. Entrepreneurial teams in new venture creation: A research agenda. *Entrepreneurship Theory and Practice*, *14*(4), pp.7-17.

Petersen, S., 2015. Design Driven Startups. In International Conference on Engineering Design 2015 Conference, Milano, July.

Markman, G.D., Balkin, D.B. and Baron, R.A., 2002. Inventors and new venture formation: the effects of general self-efficacy and regretful thinking. *Entrepreneurship theory and practice*, *27*(2), pp.149-165.

McClelland, D.C., 1961. The achievement society. *Princenton, NJ: Von Nostrand*.

Miyake, N., 1986. Constructive interaction and the iterative process of understanding. *Cognitive science*, *10*(2), pp.151-177.

Moore, G.A., 2002. Crossing the chasm.

Osterwalder, A. and Pigneur, Y., 2010. Business model generation: a handbook for visionaries, game changers, and challengers. John Wiley & Sons.

Petersen, S., 2015. Design Driven Startups. In International Conference on Engineering Design 2015 Conference, Milano, July.

Rauch, A. and Frese, M., 2007. Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of work and organizational psychology*, *16*(4), pp.353-385.

Roschelle, J., 1992. Learning by collaborating: Convergent conceptual change. *The journal of the learning sciences*, *2*(3), pp.235-276.

Scheer, A., Noweski, C. and Meinel, C., 2012. Transforming constructivist learning into action: Design thinking in education. *Design and Technology Education: An International Journal*, *17*(3).

Stahl, G., 2002, October. The complexity of a collaborative interaction. In International Conference of the Learning Sciences (ICLS'02), Seattle, WA. Retrieved from http://www. cis. drexel. edu/faculty/gerry/cscl/papers/ch02. pdf.

Vyakarnam, S. and Handelberg, J., 2005. Four themes of the impact of management teams on organizational performance: Implications for future research of entrepreneurial teams. *International Small Business Journal*, *23*(3), pp.236-256.

Vygotsky, L., 1978. Interaction between learning and development. *Readings on the development of children*, *23*(3), pp.34-41.

Wilson, F., Kickul, J. and Marlino, D., 2007. Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: implications for entrepreneurship education. *Entrepreneurship theory and practice*, *31*(3), pp.387-406.

Resilience in Sudden Changes and Crises Related to Micro-Entrepreneurship

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Abstract: The paper examines micro-entrepreneurs' resilience to significant changes in a company. The focus of this research is on uncovering the kinds of changes and crises entrepreneurs met and on how to classify these changes and crises? The unexpected changes that entrepreneurs may face can have a significant impact on both their current and future activities and can be directed either at the individual or the business level. In micro-entrepreneurship, entrepreneurs typically have to address changes and crises alone. To a micro-entrepreneur, a sudden change can be challenging because he/she does not necessarily have a support network to provide useful or sufficient help (Alonso et al., 2015). Managing such situations requires resilience and flexibility from entrepreneurs and companies alike. This empirical research was qualitative by nature and the research method was a retrospective multiple case study. The data collection method was based on semi-structured thematic interviews with 12 entrepreneurs and managers from the social and health care sector in Northern Finland. All interviews were audio-recorded and transcribed. The transcriptions were analysed by content analysis with an interpretative approach, each on a case-by-case basis. The data were processed using qualitative data analysis software. Preliminary results suggested that the challenges that micro-entrepreneurs considered the most serious related to internal and external interventions, such as problems with staff, management, management models, authorities, institutions and bureaucracy. In addition, emotional interventions like one's own wellbeing and a lack of guidance and support related to real crises is a reality of a micro-entrepreneur's life.

Keywords: micro-entrepreneur, entrepreneurship, resilience, change, case study, Finland

1. Introduction

According to the European Union (EU) definition, a micro-enterprise is as an enterprise which employs fewer than 10 persons and has annual turnover and/or an annual balance sheet total that does not exceed 2 million euros (European Commission, 2003). Micro-enterprises represent more than 95% of European enterprises (Muller et al., 2016) and are considered a driver of the EU economy. There is a lack of academic research on micro-enterprises (Kelliher and Reinl, 2009), and thus a considerable gap in the literature regarding the reality of running a micro-business (Samujh, 2011).

In Finland, nearly 95% of companies are micro-enterprises (Statistics Finland, 2018). It is widely acknowledged that micro-enterprises experience resource scarcity, which forces them to operate under financial and expertise constraints (Kelliher and Reinl, 2009). Micro-enterprises are largely influenced by their owner-managers (Burns, 2010), who play a pivotal role in an organisation's focus and success (Kelliher and Reinl, 2009; Burns, 2010), which often makes micro-enterprise culture an extension of the owner's personality. In general, when a micro-entrepreneur faces unexpected changes or crises, he/she has to resolve them alone.

Even though it plays a significant role in entrepreneurship, this phenomenon is little-studied. Studies by Bruderl et al. (1992), which take as a theoretical framework the fields of organizational ecology and human capital theory, suggest that human capital may be a company's most important resource, because it affects both performance and development. Further, Ayala and Manzano (2010) argue that an entrepreneur's resilience—the tool they use survive crises—is one of the key factors to entrepreneurial success. Thus, resilience—the human system's ability to cope with significant change and survive—can be considered a meta-competence (Cheetham and Chivers, 1998). A resilient system is able to adapt to changing conditions and to develop new ways to succeed.

In psychology, resilience is defined as an individual's ability to tolerate difficult conditions and stressors without experiencing psychological distress. Severe conditions cause emotional reactions; but a resilient individual has a kind of mental elasticity and the capability to transform situations, which allows him or her to successfully negotiate stress. Bernard and Barbosa (2016, p. 89) have stated that "entrepreneurial resilience is as a form of emotional and cognitive ability that is useful for the entrepreneur, particularly when bouncing

back after failures connected to their entrepreneurial initiative." At an individual level, resilience is seen as a function of personal ability in the face of crisis and as an ability to adapt to new situations (Sawalha, 2015).

Thus, resilience is individual's invisible meta-competence, which is a driver for behaviour and entrepreneurial intention and an underlying factor in various situations. According to Coutu (2002), the characteristics of the resilient individual are an ability to accept reality, a belief in there being a meaning to existence and improvisation skills. Therefore, the identification and development of resilience is necessary for an entrepreneur to maintain their business and keep it within their control, and to ensure its independence and ability to cope with crises. All of these definitions are consistent with the studies that find micro-enterprises to be flexible, agile and adaptable actors. This study seeks to find out whether an entrepreneur's resilience is related to these characteristics attributed to micro-enterprises. In order to study micro-entrepreneurs' experiences and resilience related to significant company changes or crises, this research posed two primary questions: What kind of unexpected event, change or crisis occurred in our case companies? (RQ1); and how can these unexpected events, changes or crises be categorised? (RQ2).

The empirical case study was qualitative by nature and was conducted in social and health care micro-companies in Northern Finland. The data collection method was based on semi-structured thematic interviews with 12 entrepreneurs and managers. All interviews were audio-recorded and transcribed. The transcriptions were analysed using an interpretative approach and the analysis method was a content analysis. The transcriptions were analysed case by case. The data were processed using NVivo 11 data analysis software.

This research provides perspectives on what kind of situations or enterprise crises micro-entrepreneurs may have to experience and how the possible phenomena can be categorized? The results of the qualitative case study include the micro-entrepreneurs' descriptions of unexpected events related to their business, as well as the ways in which these events or crises might be categorized by using the framework of Conner (1993) and Hoopes & Mark (2004).

The paper first presents a theoretical discussion of the concept of resilience in general and how it relates to entrepreneurs' businesses. It then presents the empirical approach of this study, including how the study was structured and the reference framework for methods and findings. Finally, it includes a discussion related to the study's findings and implications.

2. Theoretical framework

Over the past 10 years, resilience has become a fashionable concept in business, used to explain adaptability in the face of sudden changes or crises. As a theoretical concept, resilience can be located in two quite different scientific traditions: psychology and ecological systems theory. In psychology, resilience can be defined based on an individual's ability to cope with trauma and as well as on factors affecting traumatic survival (Bonanno, 2004; Bonanno and Mancini, 2008). Resilience in ecological systems theory refers to the nonlinear recovery and adaptive dynamics of ecosystems. In ecology, resilience is generally defined as the capacity of a system to absorb disturbances and to reorganize in the midst of changes, allowing the system to maintain its function, structure and identity (Folke, 2006; Zolli and Healy, 2012).

Resilience is often talked about in conjunction with flexibility, agility and elasticity in work context. Because of the nestedness of systems, the resilience of an entire ecosystem depends on the agility and adaptability of its smaller parts. Mutually dependent and free systems are the most flexible and most capable of transformation, provided they are local and multifaceted. This reflects the central role that biodiversity plays in creating resilience and self-adaptability (Folke, 2006; Zolli and Healy, 2011). In psychology, resilience is usually defined as "a dynamic process that generates positive adaptation in a situation where significant adversity is experienced" (Luthar et al., 2000; Bonanno, 2004). An individual indicates resilience, when he/she maintains his/her ability to take action in and adapt to a crisis situation despite being vulnerable during that situation.

Resilience, however, cannot be considered in isolation from an individual's socioeconomic background. The psychological concept of resilience differs from the ecological one in that it is more sensitive to understanding intentionality. The relationship between resilience and personal, demographic or socioeconomic factors is a central question. Empirical studies indicate, for example, that work situations and wider social resources are resilience-enhancing factors. In addition, studies related to cognitive resources also correlate with individual-

level resilience (Luthar et al., 2000). However, the comparatively significant psychological resilience of certain individuals does not mean that those individuals would experience crisis situations as positive events. Rather, it is about recovery and maintaining functional capacity. In addition, the same factors affecting resilience depend on context and may lead to very different reactions. Resilience that expresses itself as mental stamina is a recognized phenomenon, for example, but psychological research focuses on the factors that influence its evaluation (Bonanno and Mancini, 2008).

For a couple of decades, the organization's research has looked for features related to resilience that are suitable for changing working life and which resilient individuals and organizations use for coping with change. Conner (1993) and Hoopes and Mark (2004) have noticed the following counterparts, which affect from the surprising changes to a stabilization of the situation (Table 1).

Table 1: The counterparts modified from Conner (1993) and Hoopes and Mark (2004)

Counterparts	Definitions
Optimism - pessimism	**Optimism:** The ability to look at a situation realistically and in a positive light and to see opportunities rather than threats. **Pessimism**: Will not take any action, because they know that it will not work. Believes that the failures of the past will be repeated in the future, but even worse.
Strong self-esteem - a weak sense of self-efficacy	**Strong self-esteem:** Has a strong sense of basic trust in themselves and their environment. There is also a strong belief in their own ability to influence a situation. **A weak sense of self-efficacy**: Underestimates their own talents, cannot recognize their own achievements or development.
Strong focusing - poor orientation of consciousness	**Strong focusing:** Always aware of priorities and how to proceed. This can also be called impulse control. The ability to focus on a specific issue and close the mind from irrelevant and disturbances. **Poor orientation of consciousness:** Loss of focus in critical situations.
Flexible thinking – inflexible thinking	**Flexible thinking:** The ability to consider alternatives, understand cause-and-effect relationships and examine situations from multiple perspectives. **In-flexible thinking:** Drawing conclusions too quickly and not reconsidering these conclusions even if they prove incorrect. Always consider themselves right.
Social flexibility - coping alone	**Social flexibility:** Understanding how to utilize others' competencies and having the courage to ask for and accept help. **Coping alone:** Showing mistrust towards others, dealing with problems in isolation
Systematic - unsystematic	**Systematic:** Taking systematic, structured, and disciplined action, and sharing plans with others so that they can participate. **Unsystematic:** Offering a one-point solution to problems that, from the outside, seems like an improvisation.
Risk-taking ability - safety-conscious	**Risk-taking ability:** Dares to take action to try one direction, correcting direction later if necessary. **Safety-conscious:** Is risk-averse and waits for clarification in all situations. Proceeds only in safe situations and environments, seems uncertain or procrastinates.

3. Methodology

The qualitative approach of this empirical study aims to provide an understanding and analysis of micro-entrepreneurial resilience. Qualitative research (Bryman, 1988; Merriam, 2009) explores the ways in which people understand and interpret the significance of their reflections and experiences, in other words, their social reality. The case study strategy used in this study is often selected for research focusing on a particular real-life phenomenon (Ghauri and Grønhaug, 2005). This retrospective multiple case study uses a well-founded research methodology which allows the study to describe actual phenomena in their own context, answering the question "how" without the use of investigators who are the subject of their own research (Yin, 1994).

Compared to single case studies, multiple case studies yield more reliable results (Miles and Huberman, 1994; Baxter and Jack, 2008) and allow for the examination of an issue from multiple perspectives. Multiple case studies are considered more robust and helpful in terms of both generating and testing explanations (Herriot and Firestone, 1983) and they provide a stronger basis for theory building than single case studies (Yin, 1994).

The objectives of this study and the evidence presented are based on interviews with 12 social and health care micro-entrepreneurs in Northern Finland. In these interviews, the subjects reflected on and assessed situations in which they encountered difficulties or crises related to their business. In-depth interviews are usually conducted with a limited number of participants, allowing them to provide much deeper insight than the standardized and structured interview format (Legard, Keegan and Ward, 2003). This method is particularly

effective for small-scale research studies or studies where a lot of research is required before general patterns can start to be observed (Johnson, 2002).

The analysis of the interview data used open coding to identify the main topics of discussion (Strauss and Corbin, 1990). The analysis process started with repeated readings of the transcribed text in order to gain an in-depth knowledge of the research subject. Then, open coding was introduced in order to create links and comparisons between topics. This analytical review was associated with continuous comparison of the codes, which helped to explain overlays and contrast in data, which in turn facilitated building new sub-themes. These sub-themes were evaluated, limited, and categorised with each other by interrogating them further on the codes. By combining relevant sub-themes into separate groups at a higher level, the abstraction level offered emerging thematic groups that secured the theoretical saturation. Table 2 lists the codes, sub-themes, and thematic categories produced by a complete data analysis.

4. Findings

This section provides analysis of the unexpected events, changes or crises occurring in micro-entrepreneurs' case companies and how to categorise those events. The findings are presented in four subsections, each focusing on one of four key thematic categories that emerged from the data: 1) internal intervention, 2) external intervention, 3) wellbeing intervention and 4) tangible intervention (see table 2). These four terms categorise the resilience of micro-enterprises and increase the knowledge related to micro-entrepreneurship.

Table 2: Codes, sub-themes, and thematic categories describing entrepreneurs' resilience

OPEN CODES	SUB-THEMES	THEMATIC CATEGORIES
Change of owners, departure, change of focus in business, core business, change in all, lack of control, change of stakeholder groups, threat, interruption, fear, misjudgement, wrong target group, wrong recruitment, correct management, all knowledge only in one person, too fast growth, uncontrollability, dismissal of a worker	The firm's internal affairs; the functional identity of entrepreneurship and ownership; factors related to the business' concept and pressure to change; competence and knowledge about the workforce and its resources; lack of organizational expertise	**Internal intervention**
Political decision-making, feminine industry, maternity leave, problems of cooperation, bureaucracy, competitive bidding, limitations, increased control, authorities, regulatory requirements	Challenges of securing independence in the face of bureaucracy; the specificities of the various sectors and, in particular, the feminine sectors; cooperation and the development of competencies with the various authorities; institutional control over the business	**External intervention**
Uncertainty, justification of existence, vulnerability, identity, inadequacy, lack of fluency, frustration, lack of competence, relocation, loneliness, heavy time	The entrepreneur's physical and mental wellbeing; the entrepreneur's wellbeing at work; need for peer support for entrepreneurs and the possibility of discussion and disengagement	**Wellbeing intervention**
Fire, having to move unwillingly, indoor air problems, ventilation, monetary crisis, foreign currency loans, debt	Expert assistance, counselling and guidance in difficult situations and crises	**Crisis intervention**

Internal intervention includes changes to the company's internal dynamics. These can include changes in ownership, management models or personnel. In this study, changes in ownership elicited strong reactions from both stakeholders and staff and required a great deal of time and a lot of mental resources. Such changes may also come from outside the company, for example, a blurring of the core business idea due to a dwindling number of customers or ineffective market behaviour. However, the root causes of these problems are within the company.

> *[…] we had to start [to] quickly clarify and reflect on what the purpose of this company is … why this company exists. (Firm 1, owner)*

> *[…] the workers felt sorrow and disappointment and such a feeling of being betrayed [because] they did not know and they were not told that the other owner would leave and replace the new owner. The*

company was a very close, small work community, and for the first time I realised that this is also a company. (Firm 3, owner)

External intervention comes from outside the company. It is often a macro level change related to legislation or regulations. Although information and guidance about such changes is often available for business owners, it may be difficult for entrepreneurs to understand how to apply this information to their specific working environment. The slow pace of legislative changes may come as a surprise and there may be uncertainty or additional work involved due to authorities' varied interpretations of new legislation. The social and health sector is currently turbulent, and entrepreneurs feel that they have been part of the so-called "game blocks." Forecasting and planning for a company's future development has become more difficult.

[…] social decision-makers woke up to the need for effectiveness and cost-effectiveness, and then began to drive down such activities as this company produces. We have not succeeded enough to bring enough evidence that we are genuinely an alternative to the forms of service provided by the authorities and decision-makers […] (Firm 5, owner)

[…] in proportion to the number of staff in recent years has been the most maternity leave in this company's history. In four years, we have had 13 maternity leave, if I'm not terribly lying. It's a huge amount ... the kids are wonderful, of course, and maternity leave is wonderful, yeah, but if you're thinking of euros and the subordinate arrangements we have to be a substitute and the cost, they are really huge […] (Firm 2, owner)

Wellbeing intervention is related to the entrepreneur's own experiences and feelings. Entrepreneurs did not talk about wellbeing at work, but instead about how they coped with difficulties, maintained motivation, or, sometimes, felt inadequate. A lack of delegation or the unwillingness to delegate added to entrepreneurs' sense of inadequacy, as did the feeling that their competence in some areas was insufficient. A sense of loneliness at work was the result of frustration or underestimating their own competence. These issues meant that even a little adversity could temporarily seem more significant. The lack of peer support increased feelings of frustration and inadequacy.

[…] our organizational structure is too vulnerable, because I'm … the only one who knows these things […] (Firm 4, owner)

[…] now there are a lot of balls in the air and there is such inadequate feeling that everything should be done and the employees are out of focus ... Part of my feelings is that the staff feel that the owner does not appear and does not belong and maybe she not even have interest what we are doing here. Do they think that I'm lazy and they just make money for me and the company? (Firm 11, owner)

Crisis intervention refers to a sudden crisis, independent of all the previous categories, which could not be resolved, for example, a fire or an abrupt change in office space due to an existing office being sold. The lack of expert advisers increased resilience, because the entrepreneur felt he would often stay alone.

[…] we can probably set up some moving company, we have been moved so many times during these years. … There was the situation that in those premises where we were, there was a problem with ventilation. They had rental facilities. (Firm 7, owner)

[…] that was such a very foggy time for me, there were really heavy years. ... We had a foreign currency loan and I called my colleague, another owner, for the loans to be terminated because I had the feeling that something was happening. The prime minister had argued that Finland did not devalue, and therefore the partner said it was not worth terminating because he trusted the prime minister. In the morning when I woke I heard that at night there was a mark floating or devalued. I called again to a partner if it is time to terminate now? It is no longer worth it, he said […]. (Firm 9, owner)

5. Discussion

This study aimed to research events, crisis and events faced by micro-entrepreneurs and determine how to classify them. Although there is research on resilience in business, this topic has not been studied at all in the

context of micro-entrepreneurship, which is now a socially significant phenomenon. There is thus a natural connection between the existing literature and this study.

The analysis produced four distinct categories of intervention. This categorization can show signs of both ecological and psychological resilience (Bonanno, 2004; Bonanno and Mancini, 2008; Folke, 2006; Zolli and Healy, 2011). Internal and wellbeing interventions are the result of a company's internal affairs or the entrepreneurs themselves. External and crisis interventions originate outside the company and are, in some cases, difficult to foresee. This indicates that resilience is not only a matter of personal psychology and behaviour, since environmental factors can play a major role.

When under pressure, performance is emphasized and the ability to adapt to high pressure situations can be a virtue. Fatigue is avoided because it is easily linked to the idea of inferiority. This study also showed that a sense of underachievement can also be linked to negative experiences in one's personal life or a lack of physical fitness and the idea that "I'm not getting better, so I have to do more" can form a dangerous circle.

Curiosity, the desire to learn from experience, and determination were engines of change and action. If a person is motivated to persevere in spite of difficulties but they were not determined enough, then nothing happened. In addition, a sense of proportionality is important, that is, the ability to recognise the importance of things in a larger context (Hoopes and Mark, 2004).

Both anticipated and unexpected changes can disrupt a business. But a strong sense of resilience allows individuals and groups to cope with these changes appropriately. As Cheetham and Chivers (1998) argue, self-reflection and resilience are meta competences that are related to learning. Resilience is indispensable and enables better self-assessment. It also augments practical business skillsets.

Entrepreneurs did not interpret their interactions with unexpected or difficult situations as resilience, but rather as the ability to adapt or change—adopting a positive attitude, for example, could create enough confidence to survive a crisis. Several of the entrepreneurs' stories included a very realistic and structured analysis of events. As Coutu (2002) has argued, a realistic approach to handling business problems may lead to such an accurate description of those problems. Compared to Conner's (1993) and Hoopes and Mark's (2004), this is an optimistic viewpoint: entrepreneurs who can analyse a situation realistically and in a positive light see opportunities rather than threats.

6. Implications

6.1 Practical implications

According to Alonso, et al. (2015), micro-entrepreneurs often have to address changes and resolve crises alone. To a micro-entrepreneur, a sudden change can be challenging because he/she does not necessarily have a support network to provide useful or sufficient help. This analysis of the kinds of resilience entrepreneur's show in their careers and how we might categorise these types of resilience creates a greater understanding of the bigger phenomenon of micro-entrepreneurship and how micro-entrepreneurs describe the kinds of resilience they showed. The main finding of this study is that the nature and source of resilience differs on a case-by-case basis and is affected by a larger framework, whether that is the company's internal functions or its macro environment. This study also provides important information for facilitators, business advisers, and institutions working with micro-entrepreneurs.

6.2 Research implications

In general, there is too little research on micro-entrepreneurs, even though they play a significant role in Finnish business. This study offers a new approach to both entrepreneurship and resilience research and provides a starting-point for further research in this area.

7. Conclusions

This study was the first step in researching the resilience of micro-enterprises. The research identified and categorised the factors that contribute to micro-enterprise resilience. The next step is to examine micro-entrepreneurs' experiences of difficult situations or crises, how these situations affected their actions and decisions, and how they resolved these situations. In addition, the relationship between resilience and a firm's growth and success warrants further study.

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References

Alonso, A.D., Bressan, A., O'Shea, M. and Kraisic, V. (2015). Perceived Benefits and Challenges to Wine Tourism Involvement: An International Perspective. *International Journal of Tourism Research*, 17(1), 66–81.

Ayala, J.C. and Manzano, G. (2010). Established business owners' success: influencing factors. *Journal of Developmental Entrepreneurship*, 15(3), 263–286.

Baxter, P., and Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, 13(4), 544–559.

Bernard, M-J. and Barbosa, S.D. (2016). Resilience and entrepreneurship: A dynamic and biographical approach to the entrepreneurial act. *M@n@gement*, 19(2), 89–123.

Bonanno, G.A. (2004). Resilience in the Face of Potential Trauma. *Current Directions in Psychological Science*, 14(3), 135–138.

Bonanno, G.A. and Mancini, A.D. (2008). The Human Capacity to Thrive in the Face of Potential Trauma. *Pediatrics*, 121(2), 396–375.

Brüderl, J., Preisendörfe, P. and Ziegler, R. (1992). Survival Chances of Newly Founded Business Organizations. *American Sociological Review*, 57(2), 227–242.

Bryman, A. (1988). *Quantity and Quality in Social Research*. London: Umvin Hyman.

Burns, P. (2010). *Entrepreneurship and Small Business: Start-up, Growth and Maturity*. 3rd ed. Basingstoke: Palgrave Macmillan.

Cheetham, G. and Chivers, G. (1998). The reflective (and competent) practitioner: A model of professional competence which seeks to harmonize the reflective practitioner and competency-based approaches. *Journal of European Industrial Training*, 22(7), 267–276.

Commission of the European Communities. (2003). *Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (2003/361/EC)*. Official Journal of the European Union, (L124, 20 May), 36–41.

Conner, D. (1993). *Managing at the Speed of Change*. New York: Random House.

Coutu, D.L. (2002). How Resilience Works. *Harvard Business Review*, May, 80(5), 46–50.

Folke, C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change*, 16, 253–267.

Ghauri, P.N. and Grønhaug, K. (2005). *Research Methods in Business Studies: A Practical Guide*. Essex: Pearson Education Ltd.

Herriot, R., and Firestone, W. (1983). Multisite qualitative policy research: Optimizing description and generalizability. *Educational Researcher*, 12, 14–19.

Hoopes, L. and Mark, K. (2004). *Managing Change with Personal Resilience*. MK Books.

Johnson, J. M. (2002). In-depth interviewing. In J. F. Gubrium and J. A. Holstein, eds., *Handbook of Interview Research: Context and Method*. Thousand Oaks, CA: Sage. (103–119).

Kelliher, F., and Reinl, L. (2009). A resource-based view of micro-firm management practice. *Journal of Small Business and Enterprise Development*, 16(3), 521–532.

Legard, R., Keegan, J., and Ward, K. (2003). In-depth interviews. In J. Ritchie and J. Lewis, eds., *Qualitative Research Practice: A Guide for Social Research Students and Researchers.* Thousand Oaks, CA: Sage. (138–169).

Luthar, S. S., Cicchetti, D. and Becke, B. (2000). The Construct of Resilience: A Critical Evaluation and Guidelines for Future Work. *Child Development*, 71(3), 543–562.

Merriam, S.B. (2009). *Qualitative Research: A Guide to Design and Interpretation*. San Francisco: Jossey-Bass.

Miles, M.B., and Huberman, A.M. (1994). *Qualitative Data Analysis*. 2nd ed. Thousand Oaks, CA: Sage.

Muller, P., Devnani, S., Julius, J., Gagliardi, D., and Marzocchi, C. (2016). *Annual Report on European SMEs 2015/2016–SME recovery continues*. Contract number: EASME/COSME/2015/012. European Union.

Samujh, H. R. (2011). Micro-businesses need support: Survival precedes sustainability, corporate governance. *The International Journal of Business in Society*, 11(1), 15–28.

Sawalha, I.H.S. (2015). Managing adversity: understanding some dimensions of organizational resilience. *Management Research Review*, 38(4), 346–366.

Strauss, A.L. and Corbin, J. (1990). *Basics of Qualitative Research*. London: Sage.

Yin, R.K. (1994). *Case Study Research: Design and Methods*. CA, Thousand Oaks: Sage Publishing,

Zolli, A. and Healy, A. (2012). *Resilience: Why Things Bounce Back*. New York: Simon & Schuster.

The Entrepreneurial Dream: Happiness, Depression and Freedom

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Abstract: Entrepreneurs have very high rates of depression. Some academic research suggests that adverse circumstances force people into entrepreneurship through lack of opportunity: entrepreneurship is less a choice than a symptom of lack of choice. While some entrepreneurs are indeed forced by circumstance, more react to opportunity. Several studies confirm that most Western entrepreneurs are attracted by the promise of freedom and autonomy, but many discover that, in reality, they have lost control of their personal, social and professional lives. 90% of startups will disappoint their founders and, in consequence, threaten their physical and mental health. Half of entrepreneurs say they have mental health issues and a third are depressed. The decision to become an entrepreneur increases these risks. Some researchers suggest that entrepreneurial personality types correlate with a higher incidence of general mental health issues, ADHD, depression and suicide. This paper uses research in entrepreneurship, psychology, philosophy and neuroscience to show that, contrary to current belief, entrepreneurs are not unusually prone to depression. They are in fact extraordinarily resilient, but their entrepreneurial projects often create high levels of risk, uncertainty, loss of control, fractured relationships and damaged identity. These, coupled with extreme lifestyles, lack of sleep and exercise and poor diet, combine to create exceptional physiological and psychological stress. These conditions, and not predisposition, lead to entrepreneurial depression. Entrepreneurial traits are a shield and protection, not a cause of distress. The conclusion suggests a range of mitigating philosophical, strategic and personal approaches to improve wellbeing and social and economic outcomes. In summary, entrepreneurs should keep themselves fit to lead, share the burden with a team and keep the project lean.

Keywords: Entrepreneuship, Happiness, Depression, Freedom

1. Why be an entrepreneur?

The Approved Index (2015) map of entrepreneurial countries identifies Uganda as the most entrepreneurial country in the world, with Sweden and Finland listed as among the ten least entrepreneurial. If this seems surprising it is worth noting their definition of entrepreneurship as "the percentage of an adult population who own (or co-own) a new business and has paid salaries or wages for at least 3 months". This measures not creative entrepreneurship but economic desperation. There is no developed country in the Approved Index top 25.

A more comprehensive and systematic view is taken by the GEM report (Global Entrepreneurship Monitor, 2018), which finds that most entrepreneurs are driven by opportunity rather than by necessity, and this is even more marked in developed nations. In North America 82.6% cited opportunity as their motivation. Segal et al. (2005) make explicit reference to Vroom's Expectancy Theory and conclude with an analogous suggestion that "self-employment intentions" are a function of self-efficacy, risk tolerance and perceived net desirability. This last factor contrasts the psychological benefits of self-employment with the more certain value or distress of regular employment: push and pull. While there is no doubt that some kind of inner calculus is involved in the moment of commitment to an entrepreneurial course of action, the generic motivations towards entrepreneurship are more likely to be found in Abraham Maslow's (1943) hierarchy of needs. The hierarchy shows physiological needs at the bottom and suggests that no higher needs can be addressed until these are satisfied. Maslow is much criticised for his research base, nevertheless, his model remains popular and is a simple, useful and memorable presentation of motivational factors. The adjusted version (Maslow, 1971) includes a sixth, "transcendent" tier, that of higher purpose beyond the individual.

Maslow's self-actualisation and self-transcendent levels are only open to the fortunate few who have satisfied and moved beyond the lower levels, "the awakened, the illuminated, the 'high plateau' People" (Maslow, 1979). The top two levels can never be fully satisfied but represent the unachievable drive towards betterment and the service of a higher purpose. This is explicitly spiritual or mystical, but while Maslow mentions religious calling he is careful not to limit himself to religion (Koltko-Rivera, 2006). His Transcendence is imbued with a Romantic sense of the sublime, and embraces humanistic, ecological, social or societal service: anything beyond the individual.

The entrepreneurial need to "make a difference" addresses the levels of self-actualisation and higher calling.

The constituents of the highest strata of the hierarchy predict the stated motivations of many entrepreneurs, for example the need for status and identity, progress and learning, challenge and achievement.

2. So Who Are the Entrepreneurs?

William Gartner (1988) warns against a trait-based definition of entrepreneurship, saying that we cannot identify the characteristics of dancers and use what they do to define the dance. While this is a compelling metaphor, we accept that there is a dance, and consequently we are justified in asking who is dancing, and why. As Carland et al. (1988) put it '"Who is an entrepreneur?" is a question worth asking'.

The answers come from a range of empirical research. Lüthje and Franke (2003) studied 512 engineering students at MIT and found that Entrepreneurial Intent is more influenced by personality factors (propensity for risk-taking, internal locus of control) than by environmental factors. A study of South African tertiary education students (Louw et al., 2003) identified "Competing against self-imposed standards", "Self-confidence" and "Dealing with Failure" as more apparent in students with entrepreneurial intent. Entrepreneurial Turkish students evidenced more of every entrepreneurial trait than their non-entrepreneurial peers, although their confidence is only marginally higher (Gürol and Atsan, 2006). If we accept Gürol and Atsan's list of traits, we have (i) locus of control, (ii) need for achievement and (iii) tolerance of ambiguity (Entrialgo et al., 2000); and (iv) risk taking propensity, and (v) innovativeness (Stewart Jr et al., 1999); along with (vi) self-confidence (Robinson et al., 1991).

There is an established link between low self-confidence and depression. Al-Asadi et al. (2014) confirm the correlation and suggest a causal spiral where low confidence leaves patients more prone to depression, and the increasing signs of depression undermine confidence. Entrepreneurs must be confident enough to commit to their risky ventures, and so should be less susceptible.

Locus of Control (LoC) was a concept introduced by Julian Rotter and his team in the 1950s and 60s to describe an individual's perceptions of his ability to influence his own life and specific outcomes. An external LoC suggests a belief that the circumstances and outcomes are driven by external factors. Krause and Stryker (1984) report that "*moderate externals are the most vulnerable to the effects of job and economic stress".* DuCette and Wolk (1972) find respondents with external LoC were characterised by "*a preference for extreme risks, low persistence, and atypical shifts in level of aspiration; they were more extreme in their estimation of success when responding to items related to academic, occupational, and cognitive activities".*

By contrast "e*xtremely internal types may be so overcome with a sense of personal responsibility for the occurrence of the stressful event that they may suffer from anxiety and depressive reactions"* (Krause and Stryker, 1984) and this evidences an inability to cope with life's ups and downs when they are genuinely beyond our control. Entrepreneurs, who characteristically have a marked but mild internal locus, should be more resilient to setbacks. Chen and Silverthorne (2008) report that "*Respondents who had an internal LOC perceived lower levels of job stress, and reported higher levels of job satisfaction and job performance"* while Krause and Stryker (1984) confirm that "*moderate internals are able to cope most effectively with stress".*

Entrepreneurs have a higher than average Need for Achievement or nAch (Begley and Boyd, 1987, Collins et al., 2004, Wu et al., 2007). This is associated with people who never switch off. In a study measuring a physiological hypothalamic–pituitary–adrenal (HPA) response and cortisol release, individuals with a high nAch were found to be more habitually stressed than their peers but coped better with challenging tasks and negative feedback (Yang et al., 2015). They fared particularly well where they had articulated both challenge and feedback as opportunities to learn and improve. Entrepreneurial activity involves very high levels of uncertainty. For many, particularly those with a need for control, this presents a problem and a source of stress. Entrepreneurs' tolerance of ambiguity serves as a buffer and allows them to continue even when the fundamentals of the nascent business are still open to question.

Uncertainty is risky, and entrepreneurs necessarily have a higher propensity for risk-taking. Risk-taking is a complex psychological trait. It includes elements of sensation and novelty seeking and impulsiveness. Zuckerman and Kuhlman (2000) confirm that these are personality traits rather than responses to opportunity, so all risks are more acceptable to the risk-taker. The gambler is more likely to take drugs, and the lothario

who takes sexual risks is more likely to crash a car. Nicholson et al. (2005) point out that typical risk-takers show high extraversion and low conscientiousness. This is the opposite of typical entrepreneurs, but lest this seems like a contradiction, they identify three different, but not exclusive, categories of risk-taker: the Sensation-Seeker, the Goal Achiever and the Risk Adapter. Of these, the Sensation-Seeker manifests a general predisposition towards risk and is unlikely to become a successful entrepreneur. The Goal Achiever accepts entrepreneurial risk as a condition of expected reward. The Risk Adaptor exercises increasing mastery of a skill or profession where risk is endemic (as is the case with many forms of finance or speculative trading).

Hvide and Panos (2014) observe "*More risk tolerant [stock market investors] are more inclined to start up a firm but of poorer expected quality than less risk tolerant individuals*". There has been some argument over the characteristic nature of entrepreneurial risk-taking since Brockhaus (1980). Astebro et al. (2014) suggest that entrepreneurs are not so much seeking risks as dazzled by opportunities. They habitually under-estimate the challenge and over-estimate their own abilities, with the consequence that they embrace risks that other would find unappealing.

Families, peer groups and role models all have a profound impact on intending entrepreneurs, and it seems that they also specifically affect risk-taking. Smith et al. (2014) identify the influence of peers on adolescent risk-taking while Kish-Gephart and Campbell (2015) noted the importance of social class for CEOs, where more affluent backgrounds led to the acceptance of greater risk, mitigated by the safety nets of social networks, family means and elite education.

Innovativeness is central to contemporary theories of Bricolage (Baker and Nelson, 2005) and Effectuation (Sarasvathy, 2009). Even Schumpeter's (1942) creative destruction calls for "the qualities of boldness, self-confidence, creativity and innovative ability" (Kirzner, 1999). Hmieleski and Corbett (2006) measure entrepreneurial activity and creativity, and find a clear link, supported by Rauch and Frese (2007). There have also been a large number of studies suggesting a link between creativity and mental health issues such as bipolar disorder and depression (Power et al., 2015). Silvia and Kimbrel (2010) acknowledge the potential link between mental illness and "divergent thinking, creative self-concepts, everyday creative behaviors, and creative accomplishments", support the correlation but find the impact is smaller than generally assumed.

We have examined the entrepreneurial personality and discovered that the characteristic traits are more likely to constitute a shield and a defence against the psychological risks of entrepreneurship. These traits not only characterise entrepreneurs, they are directly responsible for a secondary characteristic, resilience. Every worthwhile project has setbacks and we all fall down from time to time. Some projects fail because they could not have succeeded, some because they are badly managed and some because their sponsors are unable or unwilling to continue to the point of success. The resilient entrepreneur increases his likelihood of success in a project with potential, but also increases the cost of failure in hopeless projects, by carrying on. The essential commitment and faith in the project all too easily become delusion. Resilience is a buffer against short-term failures but an amplification of the cost of final failure.

3. The Call and Cost of Freedom

Entrepreneurship is hard to define, but "happiness" is even more problematic. Aristotle (c340 BCE) saw happiness as virtue, fulfilment, balance and engagement. Fulfilment requires excellence and the realisation of potential, which is judged in the context of purpose. The entrepreneur commits to a project with an investment of time, money, emotions and identity. Entrepreneurs become voluntarily blind to alternative courses and opportunity costs. They create their own purpose and commit to it wholeheartedly, taking them to the higher reaches of Maslow's hierarchy. Daniel Pink (2011) identifies three powerful human motivators: autonomy, mastery and purpose. These are also the key pillars of job satisfaction and overall happiness, and they lie at the heart of the entrepreneurial dream.

Entrepreneurs are drawn to "being independent and one's own boss" (Blanchflower and Oswald, 1998). Not only are they attracted by independence but "the self-employed report higher levels of job and life satisfaction than employees" (ibid), a finding echoed by Andersson (2008) and Hessels et al. (2018) . The freedom to make decisions, to develop specialist expertise and to pursue a worthwhile goal means that a commitment to an entrepreneurial project creates a sound basis for happiness: autonomy, mastery and purpose. Many entrepreneurs cannot imagine a life as an employee.

While the rewards are immediately psychological (and provisionally financial), there is a cost to embarking on a new venture. The lone wolf entrepreneur commits himself to isolation and a greater risk of failure, and this is possibly the reason that investors dislike single-founder ventures, although they may also be looking for the increased guarantee of continuity should the founder be unable to continue, as well as a range of core skills and experience. Nevertheless, singleton or team, new ventures rarely succeed. The Enterprise Research Centre (reported in Financial Times, 2017) finds that half of new businesses in the UK fail within three years, and Shikhar Ghosh's research at Harvard Business School (Blank, 2013) suggests 75% are investment failures while 95% disappoint their founders. Entrepreneurial freedom comes at a cost.

4. When the Dream becomes a Nightmare

For the majority of entrepreneurs, their current project will bring failure, not freedom. Failure leads to feelings of bereavement (Shepherd, 2003) which shares the symptoms of depression (although psychiatrists treat them differently). Michael Freeman who has researched the links extensively (Johnson et al., 2015, Freeman et al., 2015), tells us that entrepreneurs are by their nature more prone to depression, ADHD, substance abuse and suicide. It is true that there are links between creativity and bipolar disorder (Baas et al., 2016); goal-seeking and mania (Johnson, 2005); action-orientation and openness, and the same dopamine reward circuitry that leads to impulsivity, risk-taking and addiction. The links are, however, only apparent when the personality trait is extreme. We can all think of examples of the troubled genius, the manic inventor and the tragic business founder. These are memorable but heuristically biased (Kahneman, 2011) and not statistically representative. We can just as easily find stories of heavy smokers who live to 100, but this does not mean cigarettes hold the secret to longevity.

Many entrepreneurs succeed after a string of failures. This is of course the rationale behind the Martingale betting strategy where, after every loss at Head or Tails, the gambler doubles the stake. Eventually, so the dangerous reasoning goes, they must be lucky. Entrepreneurs often persevere when a more balanced individual might have accepted defeat. The iconic story of Rovio is testament to the single-mindedness of the founders. Three graduates of Helsinki's Aalto University started to develop games for mobile phones. They prevailed on friends and family and raised over €1m, but development took longer than anticipated, family members fell out and Mikael Hed, the CEO, left the company in 2005. Reality, of a sort, encouraged them to take on contract work in 2006 but that was insufficient and they started to cut their workforce. By 2009 they were down from 50 to just 12 staff, and close to bankruptcy (Cheshire, 2011). Realising that they had not taken themselves and their product sufficiently seriously they re-recruited Mikael Hed, raised more money and tried again. The founders had started saying "just one more try" after the third release. They were still saying it after fifty. What reasonable person would want to continue after fifty successive disappointments? Rovio, to the despair of their families and friends, were still insisting on "one more try" for their fifty-first title (which failed), and then for the fifty-second, which they called Angry Birds and which became the most downloaded iPhone game ever (Robertson, 2015). Somehow, the Rovio founding team had remained committed while their environment had become increasingly hostile and stressful. Many "normal" people would have succumbed to depression.

Not all entrepreneurs have such seemingly inexhaustible resilience. Eventually reality bites and this is apparent in the statistics. 49% of Freeman's (2015) research cohort of entrepreneurs reported depression and other mental health issues and there is a widely reported epidemic of founder suicides in Silicon Valley. Some authors ask what it is about entrepreneurs that makes them depressed. The better question is how so many entrepreneurs cope so well with failure when they are in a toxic environment that threatens nearly everything we accept as essential to happiness. Perhaps an entrepreneurial mindset helps us to happier, more meaningful lives. The Team Academy movement (Fowle and Jussila, 2016) uses entrepreneurial practice as a vehicle for developing self-efficacy, teamwork, resilience and business experience, and Tingey et al. (2016) report on entrepreneurship education as a means of encouraging attachment, confidence and mastery, self-control and optimism in American Indians. These traits are all significant in building defences against depression, but the circumstances of a fully commercial entrepreneurial project put them to the test.

Shneidman (1998) lists five psychological frustrations that lead to suicide, including (i) fractured control, (ii) assaulted self-image and (iii) ruptured key relationships. Founders pursue achievement and autonomy, but most find that a failing business, financial constraints and the demands of stakeholders lead to frustration and a loss of control. Entrepreneurship is attractive and founders build and promote an image of excitement,

competence and success to influence their backers, partners, staff and potential customers. For most, as disaster looms, the gulf between spin and reality becomes wider and increases the shame, humiliation and disgrace of failure and the collapse of self-image. The damage is particularly severe where the founder has relationships built on leadership and trust. Nobody loves a loser, and sometimes being honest about the challenges will be enough to destroy the company. As the position becomes more precarious, the dishonesty escalates. In order to save the company and those who depend on it, the founder betrays the trust of those same people and sets up an inevitable rift, akin to bereavement.

There is no doubt that commitment to an entrepreneurial venture triggers the probability of suffering all three of Shneidman's psychological assaults. Additionally there is the physiological impact of the entrepreneurial lifestyle. This becomes exaggerated in strongly entrepreneurial communities where there is a culture of extreme living. Silicon Valley is a unique and specific sub-culture but it influences attitudes to, and expectations of, all entrepreneurs. Douglas Coupland's Microserfs have eating, sleeping and psychological disorders. Wired (2007), Forbes (2014) and Entrepreneur.com (2014), offer entrepreneurs recipes based on ramen noodles, while Forbes (2011) and the Huffington Post (2014) claim that there is more to entrepreneurship than noodles, ironically reinforcing the association. The assumption is that diet, along with sleep, exercise and personal relationships have all been sacrificed to the greater cause. Doree Shafrir's "Startup" (2017) fictionalises the dysfunctional lives and lifestyles of startup entrepreneurs based on her journalistic observations. The ultimate expression of the entrepreneurial extreme is Belfort's drug-crazed and sex-addicted, semi-autobiographical Wolf of Wall Street (2013). The founder's self-image is a public relations pyramid scheme where the stakes (and the main characters) get higher, and the cost of failure escalates past the point of no return.

Social media has given us the blight of competitive happiness, and in entrepreneurial circles there is the analogous obligation to manifest success. Admissions of weakness are a personal failure and may well trigger business failure. Social pressure creates a spiral of adrenaline-based, high-energy activity. Failure is acknowledged, but only as a stepping stone to even greater success.

The outcome is that half of the entrepreneurs questioned by Michael Freeman report depression or other mental health issues. Depression rates are four times as high as they are amongst the general population. Freeman suggests that the entrepreneurial personality, and not the entrepreneurial decision, is the trigger.

However, we have shown that entrepreneurship is not a stage in the declining health of characteristically depressed people; it is a gamble with very high psychological stakes taken by naturally resilient people.

5. Guidance for Travellers

Why be an entrepreneur? The answer, as we have seen, is the building of identity, the autonomy, the excitement and the well-being that comes from wholehearted dedication to a purpose. Even unsuccessful entrepreneurs often speak nostalgically of their failed ventures and many look for another opportunity to start a business (Yamakawa et al., 2015, Hayward et al., 2010).

The appeal is seemingly irresistible, the rewards are high, but the penalty can be fatal. Is there a way that nascent entrepreneurs can navigate their paths without exposing themselves to psychological risk? Depression is a cycle fuelled by lack of sleep, lack of exercise and poor diet. Entrepreneurs should make a point of enforcing basic disciplines in each of these areas. It is plainly hopeless to expect to solve the problem simply by asking individual entrepreneurs to espouse a healthy work/life balance. However, as with risk-taking and the influence of role models, entrepreneurs are susceptible to the expectations of their cultural milieu. So many entrepreneurs now start in universities, accelerators or incubators that these organisations should consider themselves responsible in helping their alumni to healthier outcomes.

Where a self-imposed health regime may be an unlikely fantasy, competitive (or at least monitored) health is more likely to succeed. Fitbits and other health devices have a profound effect on some people's health (Mercer et al., 2016, Cadmus-Bertram et al., 2015, Lyons et al., 2014), and an even greater effect when their wearer is driven by performance metrics and goals (Michie et al., 2011). This gamification of health holds great hope for us all as we have the means and incentive to regulate our own lives. Even better is when we can create communities of health (Payne et al., 2015)ay. This explains the success of Weight Watchers (Ahern

et al., 2011) and the attempts of exercise apps like Runkeeper to move from self-monitoring to social, competitive and peer-regulated goals. The social environment helps, the smaller social group of fellow entrepreneurs allows the sharing of experience and the pooling of knowledge, and the founding team create a sense of camaraderie and shared purpose that strengthens resolve, mitigates the risks of loneliness and distributes the burden. New ventures founded by teams are more successful, at least in attracting funding, and failure is less painful.

Any venture, or any project will have challenges. Having a clear purpose, and specifically a purpose that is nobler or wider than simple profit helps founders to carry on when times are dark. When funds are running low, investor support is uncertain and progress seems interminably slow, then it is easier to carry on if the pain is matched by a belief that the venture is worthwhile: the new cancer drug will save lives; the educational product will transform the prospects for children; and the new building will allow thousands to enjoy healthy sports in all weathers. When Frankl was able to help others, even the horror of Auschwitz could not eradicate his satisfaction.

The final element is the enormous risk of the entrepreneurial venture. The sheer scale and potentially terminal consequences of failure still threaten the wellbeing of anyone supporting a new venture. But is the risk always unavoidable? In the last few years many venture creation courses have adopted the Lean Startup approach (Blank, 2012, Osterwalder and Pigneur, 2010, Ries, 2011). This encourages iteration and discourages a planned (and therefore prescriptive) route to a predefined but speculative objective or product. Instead there is a focus on experiment, engagement with customers, and learning. We have seen already that treating setbacks as learning experiences encourages resilience, but the Lean approach also reduces risk by embracing it early. Traditional planned business projects attempted to put the plan into action. Lean Startup tries to put the action into the heart of the plan. Risks are identified and tested as soon as possible in order to minimise commitment to untested courses of action. If product/market match is tested and proved or disproved then there is a rationale for continued investment. Founders have a sound basis for increasing the exposure of friends, family, other investors and staff and partners. Short-term failure becomes cheaper and more likely – as does long-term success. Both the scale and probability of failure dwindle, as does the personal and inter-personal liability of the founder.

Many entrepreneurs succeed on the second or subsequent attempts, but some are so damaged by an initial failure that they cannot carry on. The keys to psychological prosperity are (i) physical health and lifestyle, (ii) human relationships with family, friends, co-founders and other stakeholders, (iii) minimising risks through an accelerated lean approach, (iv) commitment to a greater purpose and (v) a sense of progress. Different industries have different cultures and attract different personalities, but the five keys are common to us all.

We can take positive steps to replace the culture of heroic all-nighters with competitive sleep monitoring, diet and exercise. We can use each other as regulatory mechanisms. We can reduce business risks by addressing them early and iterating with customer help. We can treat stakeholders as collaborators and recruit their expertise and networks. We can state and restate the purpose so that the team is inspired and aligned, and we can celebrate landmarks and turning points.

Driving, skiing and sky-diving all involve a level of risk, but it is the rewards and not the risks that attract us. In fact we train, prepare and adopt specific disciplines to minimise the risks of each. Similarly, entrepreneurs who can manage themselves as well as their ventures will reduce their exposure to physical, financial and psychological damage.

References

AHERN, A. L., OLSON, A. D., ASTON, L. M. & JEBB, S. A. 2011. Weight Watchers on prescription: an observational study of weight change among adults referred to Weight Watchers by the NHS. *BMC Public Health,* 11**,** 434.

AL-ASADI, A. M., KLEIN, B. & MEYER, D. 2014. Comorbidity structure of psychological disorders in the online e-PASS data as predictors of psychosocial adjustment measures: psychological distress, adequate social support, self-confidence, quality of life, and suicidal ideation. *Journal of medical Internet research,* 16.

ANDERSSON, P. 2008. Happiness and health: Well-being among the self-employed. *The Journal of Socio-Economics,* 37**,** 213-236.

APPROVED INDEX. 2015. *Entrepreneurship Around the World* [Online]. Available: http://blog.approvedindex.co.uk/2015/06/25/map-entrepreneurship-around-the-world/ [Accessed 18/04/2018.

ARISTOTLE c340 BCE. *The Nicomachean Ethics*, Penguin.
ASTEBRO, T., HERZ, H., NANDA, R. & WEBER, R. A. 2014. Seeking the roots of entrepreneurship: Insights from behavioral economics. *Journal of Economic Perspectives,* 28**,** 49-70.
BAAS, M., NIJSTAD, B. A., BOOT, N. C. & DE DREU, C. K. 2016. Mad genius revisited: Vulnerability to psychopathology, biobehavioral approach-avoidance, and creativity. *Psychological bulletin,* 142**,** 668.
BAKER, T. & NELSON, R. E. 2005. Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative science quarterly,* 50**,** 329-366.
BEGLEY, T. M. & BOYD, D. P. 1987. Psychological characteristics associated with performence in entrepreneurial firms and smaller businesses. *Journal of business venturing,* 2**,** 79-93.
BLANCHFLOWER, D. G. & OSWALD, A. J. 1998. What makes an entrepreneur? *Journal of labor Economics,* 16**,** 26-60.
BLANK, S. 2012. *The startup owner's manual: The step-by-step guide for building a great company*, BookBaby.
BLANK, S. 2013. Why the lean start-up changes everything. *Harvard business review,* 91**,** 63-72.
BROCKHAUS, R. H. 1980. Risk taking propensity of entrepreneurs. *Academy of management Journal,* 23**,** 509-520.
CADMUS-BERTRAM, L. A., MARCUS, B. H., PATTERSON, R. E., PARKER, B. A. & MOREY, B. L. 2015. Randomized trial of a Fitbit-based physical activity intervention for women. *American journal of preventive medicine,* 49**,** 414-418.
CARLAND, J. W., HOY, F. & CARLAND, J. A. C. 1988. "Who is an entrepreneur?" is a question worth asking. *American journal of small business,* 12**,** 33-39.
CHEN, J.-C. & SILVERTHORNE, C. 2008. The impact of locus of control on job stress, job performance and job satisfaction in Taiwan. *Leadership & Organization Development Journal,* 29**,** 572-582.
CHESHIRE, T. 2011. In depth: How Rovio made Angry Birds a winner (and what's next). *Wired Magazine, March,* 7.
COLLINS, C. J., HANGES, P. J. & LOCKE, E. A. 2004. The relationship of achievement motivation to entrepreneurial behavior: A meta-analysis. *Human performance,* 17**,** 95-117.
DUCETTE, J. & WOLK, S. 1972. Locus of control and extreme behavior. *Journal of Consulting and Clinical Psychology,* 39**,** 253.
ENTRIALGO, M., FERNÁNDEZ, E. & VÁZQUEZ, C. J. 2000. Characteristics of managers as determinants of entrepreneurial orientation: some Spanish evidence. *Enterprise and innovation management studies,* 1**,** 187-205.
FINANCIAL TIMES. 2017. *London* [Online]. Financial Times. Available: https://www.ft.com/content/e3c745c4-88d8-11e7-afd2-74b8ecd34d3b [Accessed 11 March 2018.
FOWLE, M. & JUSSILA, N. The Adoption of a Finnish Learning Model in the UK. European Conference on Innovation and Entrepreneurship, 2016. Academic Conferences International Limited, 194.
FREEMAN, M., JOHNSON, S., STAUDENMAIER, P. & ZISSER, M. 2015. Are entrepreneurs "touched with fire.". *Unpublished manuscript. San Francisco, CA: University of California San Francisco. Retrieved from http://www. michaelafreemanmd. com/Research_files/Are% 20Entrepreneurs% 20Touched% 20with% 20Fire,* 20**,** 204-17.
GARTNER, W. B. 1988. "Who is an entrepreneur?" is the wrong question. *American journal of small business,* 12**,** 11-32.
GLOBAL ENTREPRENEURSHIP MONITOR. 2018. *GEM Global Report 2017/8* [Online]. Available: http://www.gemconsortium.org/report [Accessed 2018/4/18.
GÜROL, Y. & ATSAN, N. 2006. Entrepreneurial characteristics amongst university students: Some insights for entrepreneurship education and training in Turkey. *Education+ Training,* 48**,** 25-38.
HAYWARD, M. L., FORSTER, W. R., SARASVATHY, S. D. & FREDRICKSON, B. L. 2010. Beyond hubris: How highly confident entrepreneurs rebound to venture again. *Journal of Business Venturing,* 25**,** 569-578.
HESSELS, J., ARAMPATZI, E., VAN DER ZWAN, P. & BURGER, M. 2018. Life satisfaction and self-employment in different types of occupations. *Applied Economics Letters,* 25**,** 734-740.
HMIELESKI, K. M. & CORBETT, A. C. 2006. Proclivity for improvisation as a predictor of entrepreneurial intentions. *Journal of Small Business Management,* 44**,** 45-63.
HVIDE, H. K. & PANOS, G. A. 2014. Risk tolerance and entrepreneurship. *Journal of Financial Economics,* 111**,** 200-223.
JOHNSON, S. L. 2005. Mania and dysregulation in goal pursuit: A review. *Clinical psychology review,* 25**,** 241-262.
JOHNSON, S. L., FREEMAN, M. A. & STAUDENMAIER, P. J. 2015. Manic tendencies are not related to being an entrepreneur, intending to become an entrepreneur, or succeeding as an entrepreneur. *Journal of affective disorders,* 173**,** 154-158.
KAHNEMAN, D. 2011. *Thinking, fast and slow*, Macmillan.
KIRZNER, I. M. 1999. Creativity and/or alertness: A reconsideration of the Schumpeterian entrepreneur. *The Review of Austrian Economics,* 11**,** 5-17.
KISH-GEPHART, J. J. & CAMPBELL, J. T. 2015. You don't forget your roots: The influence of CEO social class background on strategic risk taking. *Academy of Management Journal,* 58**,** 1614-1636.
KOLTKO-RIVERA, M. E. 2006. Rediscovering the later version of Maslow's hierarchy of needs: Self-transcendence and opportunities for theory, research, and unification. *Review of general psychology,* 10**,** 302.
KRAUSE, N. & STRYKER, S. 1984. Stress and well-being: The buffering role of locus of control beliefs. *Social Science & Medicine,* 18**,** 783-790.
LOUW, L., VAN EEDEN, S., BOSCH, J. & VENTER, D. 2003. Entrepreneurial traits of undergraduate students at selected South African tertiary institutions. *International Journal of Entrepreneurial Behavior & Research,* 9**,** 5-26.
LÜTHJE, C. & FRANKE, N. 2003. The 'making'of an entrepreneur: testing a model of entrepreneurial intent among engineering students at MIT. *R&d Management,* 33**,** 135-147.
LYONS, E. J., LEWIS, Z. H., MAYRSOHN, B. G. & ROWLAND, J. L. 2014. Behavior change techniques implemented in electronic lifestyle activity monitors: a systematic content analysis. *Journal of medical Internet research,* 16.

MASLOW, A. H. 1943. A theory of human motivation. *Psychological review,* 50**,** 370.
MASLOW, A. H. 1971. *The farther reaches of human nature*, Arkana/Penguin Books.
MASLOW, A. H. 1979. *The Journals of AH Maslow*, Brooks Cole Publishing Co.
MERCER, K., LI, M., GIANGREGORIO, L., BURNS, C. & GRINDROD, K. 2016. Behavior change techniques present in wearable activity trackers: a critical analysis. *JMIR mHealth and uHealth,* 4.
MICHIE, S., ASHFORD, S., SNIEHOTTA, F. F., DOMBROWSKI, S. U., BISHOP, A. & FRENCH, D. P. 2011. A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: the CALO-RE taxonomy. *Psychology & health,* 26**,** 1479-1498.
NICHOLSON, N., SOANE, E., FENTON-O'CREEVY, M. & WILLMAN, P. 2005. Personality and domain-specific risk taking. *Journal of Risk Research,* 8**,** 157-176.
OSTERWALDER, A. & PIGNEUR, Y. 2010. *Business model generation: a handbook for visionaries, game changers, and challengers*, John Wiley & Sons.
PAYNE, H. E., LISTER, C., WEST, J. H. & BERNHARDT, J. M. 2015. Behavioral functionality of mobile apps in health interventions: a systematic review of the literature. *JMIR mHealth and uHealth,* 3.
PINK, D. H. 2011. *Drive: The surprising truth about what motivates us*, Penguin.
POWER, R. A., STEINBERG, S., BJORNSDOTTIR, G., RIETVELD, C. A., ABDELLAOUI, A., NIVARD, M. M., JOHANNESSON, M., GALESLOOT, T. E., HOTTENGA, J. J. & WILLEMSEN, G. 2015. Polygenic risk scores for schizophrenia and bipolar disorder predict creativity. *Nature neuroscience,* 18**,** 953-955.
RAUCH, A. & FRESE, M. 2007. Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of work and organizational psychology,* 16**,** 353-385.
RIES, E. 2011. *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*, Crown Business.
ROBERTSON, A. 2015. 'Angry Birds 2'Arrives 6 Years And 3 Billion Downloads After First Game. Forbes.
ROBINSON, P. B., STIMPSON, D. V., HUEFNER, J. C. & HUNT, H. K. 1991. An attitude approach to the prediction of entrepreneurship. *Entrepreneurship theory and practice,* 15**,** 13-32.
SARASVATHY, S. D. 2009. *Effectuation: Elements of entrepreneurial expertise*, Edward Elgar Publishing.
SCHUMPETER, J. 1942. Creative destruction. *Capitalism, socialism and democracy,* 825.
SEGAL, G., BORGIA, D. & SCHOENFELD, J. 2005. The motivation to become an entrepreneur. *International journal of Entrepreneurial Behavior & research,* 11**,** 42-57.
SHEPHERD, D. A. 2003. Learning from business failure: Propositions of grief recovery for the self-employed. *Academy of management Review,* 28**,** 318-328.
SHNEIDMAN, E. S. 1998. *The suicidal mind*, Oxford University Press, USA.
SILVIA, P. J. & KIMBREL, N. A. 2010. A dimensional analysis of creativity and mental illness: Do anxiety and depression symptoms predict creative cognition, creative accomplishments, and creative self-concepts? *Psychology of aesthetics, creativity, and the arts,* 4**,** 2.
SMITH, A. R., CHEIN, J. & STEINBERG, L. 2014. Peers increase adolescent risk taking even when the probabilities of negative outcomes are known. *Developmental psychology,* 50**,** 1564.
STEWART JR, W. H., WATSON, W. E., CARLAND, J. C. & CARLAND, J. W. 1999. A proclivity for entrepreneurship: A comparison of entrepreneurs, small business owners, and corporate managers. *Journal of Business venturing,* 14**,** 189-214.
TINGEY, L., LARZELERE-HINTON, F., GOKLISH, N., INGALLS, A., CRAFT, T., SPRENGELER, F. & MCGUIRE, C. 2016. Entrepreneurship education: a strength-based approach to substance use and suicide prevention for American Indian adolescents. *American Indian and Alaska native mental health research (Online),* 23**,** 248.
WU, S., MATTHEWS & DAGHER, G. K. 2007. Need for achievement, business goals, and entrepreneurial persistence. *Management Research News,* 30**,** 928-941.
YAMAKAWA, Y., PENG, M. W. & DEEDS, D. L. 2015. Rising from the ashes: Cognitive determinants of venture growth after entrepreneurial failure. *Entrepreneurship Theory and Practice,* 39**,** 209-236.
YANG, F., RAMSAY, J. E., SCHULTHEISS, O. C. & PANG, J. S. 2015. Need for achievement moderates the effect of motive-relevant challenge on salivary cortisol changes. *Motivation and emotion,* 39**,** 321-334.
ZUCKERMAN, M. & KUHLMAN, D. M. 2000. Personality and risk-taking: common biosocial factors. *Journal of personality,* 68**,** 999-1029.

A Path to Leadership of Innovation for a Developing Country

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Abstract: A path to leadership of innovation can be divided into two stages: the investment or catching up one and the stage driven by ingenious innovation. The development of national innovation system is providing the fundamental basis for a country to pass these stages and win a leadership on each of these stages. According the methodology of the study a national innovation system is represented as three interconnected macroblocks that interact with each other at the horizontal level: the business environment and the market; the environment generating new knowledge; and mechanisms for transferring knowledge. The content of the policy areas and actors' activity comply with the country's stages of development, including the resource stage, investment stage, and the stage grounded in the country's own innovations. NIS subprocesses are identified in this macrostructure as a result of decomposition of just mentioned blocks. In this study the block of mechanisms of knowledge transfer is disaggregated as three interacting channels of knowledge transfer. The block of business environment and market is decomposed to in accordance with the hierarchy of value-added chains. The paper is taking into account three such channels: open information channels, those of a transformation of open knowledge into pre-competitive and competitive one, and channels of commercial knowledge transfer. The study investigates in details the following tasks of public policy: how to shape and advance innovation modes on investment (catch-up) stage. The main futures of technology catch-up processes are considered. The crucial problems of successful entering the world market on the investment (catch-up) stage are associated hindrances on the external markets. Opportunities of integration in global value-added chains (GVC) are bearing in mind as a means of overcoming these hindrances. These opportunities are determined by the results of technology and organization revolutions of the last 15-20 years. The step to the next level of innovation leadership is transition from the investment stage to the one driven by ingenious innovation. However, the transition generates serious problems. Their solution requires particular post-catching up reforms.

Keywords: stages of development, innovation modes, competition, value-added chains, innovation shifts

1. Introduction

For a developing country, the paradigm of the actors' behaviour in its national innovation system, i.e. the widespread model or mode of this behaviour, plays a significant role in gaining the leadership of innovation. It includes a strategic choice at different levels of the hierarchy. The tasks of the strategy of top-level actors (including government) comprise the setting up framework conditions for shaping factors of technological competitiveness. At the level of enterprises and organisations, it is, first of all, a strategy of choosing models or modes of behaviour in carrying out their activities (Golichenko and Balycheva, 2016).

In the innovation system, building these strategies and construction of behaviour depends considerably on how and to what extent the following problems are solved.

How are the patterns or modes of actor's behaviour shaping and advancing at different stages of the country's development?

How can domestic enterprises succeed in the global market?

How to proceed with diffusion and incremental improvements of innovations to the creation of disruptive and ingenious innovations?

Below we are going to reply the questions raised. However, before answering these questions, let us turn to the methodology of the study.

2. Methodologies and literature review

As is known, in studies of innovation systems, it is assumed that the actors of these systems do not do optimal solutions to emerging problems and usually satisfy below optimal level of efficiency (Niosi, 2002). Under these conditions of bounded rationality, it is difficult to expect that a national innovation system (NIS) as a whole and its actors optimally perform their functions and missions. Consequently, it is necessary to focus not on the

optimal, but on the existing best practices. In the case that interests us, the use of best practices gives an opportunity to destroy dependence on the former path of development, unblock innovative activity, and introduce new rules (institutions) that offers a chance to move towards innovation leadership. In this study, these practices are sought among the newly industrialised countries of South East Asia.

A significant amount of literature has been devoted to the descriptions of the practices formed in this area over the past 20-30 years (see, for example, OECD, 2016, 2015, 2014, 2011). These descriptions can serve as an empirical basis for looking for the core rules that can enable to reach the innovation leadership.

The approaches of NIS are taken to achieve the stated goals. Unfortunately, these approaches are not sufficient to ensure a full-fledged method for studying a system (Golichenko, 2016). Such a method must be based on the transition from the micro to macro level (Lundvall, 2007, p. 102). The existing approaches are more focused on macro-level institutions and to a lesser extent on entrepreneurs operating at the micro level (Hekkert et al., 2007,p. 414). To addition, according to Edquist, when moving to a macro level, the innovation system is regarded as a single entity without breaking out the subprocesses and their actors (Edquist, 2006, p. 186).

In 2016, I proposed a methodology for studying the NIS that, on the one hand, takes into account the valuable results of the previous studies (Golichenko, 2016), and on the other, reduces the conceptual vagueness of the concept of the NIS and makes it possible to apply it to practical research on innovation systems. This methodology uses structural-objective and functional research methods. The first is used to solve the problem of the decomposition of NIS objects, and the second is applied to analyse the x-effectiveness of the NIS and its factors. It should be noted that the proposed methods develop the ideas of the structural and functional approach (Edquist, 2006; Hekkert et al., 2007; Johnson, 2001; Lundvall, 1992; Nelson, 1993).

Following the proposed methodology, the national innovation system is represented as three interconnected macroblocks that interact with each other at the horizontal level: the business environment and the market; the environment generating new knowledge; and mechanisms for transferring knowledge. NIS subprocesses must be identified in this macrostructure as a result of decomposition to reveal the main problems of the functioning of these macroblocks at the mesolevel. In this study, the block of mechanisms of knowledge transfer is disaggregated as three interacting channels of knowledge transfer. The block of the business environment and the market can be decomposed to meso units and meso populations (Dopfer, 2004) in accordance with the hierarchy of value-added chains. For this purpose, two types of the decomposition of hierarchical mesosystems are considered: vertically integrated and fragmented supply chains

The content of the policy areas and actors' activity must comply with the country’s stages of development, including the resource stage, investment stage, and the stage grounded in the country’s innovations (Porter, 1990). The stage-based approach to determining policy directions and measures for carrying out these policies allows the state to promote the process of the coevolution of the absorption capacities and increase the innovative capacity of enterprises in the national innovation system (Castellacci and Natera, 2013).

Let us now consider in more detail the methods of decomposition of these blocks and the main components of the stages of NIS development.

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2.1 Knowledge transfer channels

The mechanisms of knowledge transfer are primarily determined by nature of knowledge, namely, whether the knowledge is based on R&D or has one of the following alternative properties. It is public or private; codified or implicit; special or generic. In accordance with the listed properties of knowledge, three types of knowledge transfer can be presented (Golichenko, 2016):

- open information channels for pre-competitive knowledge transfer;
- channels for a transformation of open (public) knowledge into pre-competitive and competitive one;
- channels for commercial knowledge transfer, including embodied and disembodied technology diffusion.

It is worth noting that the system of interactive learning, embedded in NIS theory by Lundvall (1992), can be implemented in many respects through new knowledge transfer mechanisms.

The open channel as a mechanism of knowledge dissemination is exceptionally crucial when interaction is addressing to research and development (R&D) as well as the generic and pre-competitive phase of technology development. The critical characteristic of this channel is accessibility and opportunity that knowledge can be transferred without direct contact with a primary source of information. Such knowledge does not constitute a commercial secret since it is of public nature.

The second channel should be divided into two parts. The performance of the first is carried out by cooperation and partnership institutions. The usage of this part of the channel by enterprises through cooperation in the R&D area at the pre-competitive phase helps origination and evolution of some generic and pre-competitive knowledge, which, upon successful completion of the phase, may become private (as some intellectual property). The main components of the second part of the channel are institutions fostering new technology-based firms. They determine country’s ability to generate future radical technological changes.

The further transfer of knowledge obtained in the second channel can be carried out in frames of the third channel. The action of the channel includes adaptation and imitation known products and technologies, organisational and marketing innovations developed by other firms and companies. Diffusion of "external" foreign innovations can occur in the embodied and disembodied shapes in the channel.

The use of the channels depends heavily on the models of innovative activity firms. Below we are going to consider two basic models of actors' behaviour. The first type of the models corresponds to the investment stage of country’s development. The main driver of the stage is the technology catch-up. The second type is associated with the development driven by ingenious or radical innovations.

2.2 Global value chains

On the turn of the century, organisational innovations in value-added chains changed the concept of their actions and created new opportunities for developing countries' companies. Modern paradigms of interaction in global value chains are determined mainly by the degree of its fragmentation, more precisely, by the degree of rigidity of multifunctional relationships in production networks. Two extreme cases of global value-added chains (GACs) organisation could be distinguished. The first one relates to the organisation of the GACs functioning within the framework of traditionally rigid integrated production networks, and the second one is associated with flexible fragmented networks emerging in some knowledge-intensive economic activities.

Traditional paradigms of production organisation in the value chains. The vertical integration of traditional production networks introduces a hierarchy of subordination of production units (Gereffi et al., 2005). Consequently, there are no free market relations on the intermediate levels of the hierarchy. Two types of

such structures can be distinguished: vertical and quasi-vertical integrations. Both types of structures are related to closed product architecture; a hybrid combination is also possible.

Vertically-integrated structures are strictly hierarchical production systems in which the linkages are based on the bonds of ownership. The headquarters of a flagship firm takes full responsibility for governing the hierarchy. The dominant form of management is business governance directed from the top down. Quasi-vertical hierarchical structure arises if the firm's dominance in the value-added chain is not based on its ownership of business assets but rather on intellectual property including the brand, patents, technologies, and standards (Golichenko, 2011). The flagship firm checks suppliers and often assists them in creating and applying necessary rules.

The captive value-added chains look similar this kind of structure. Here, the hierarchy of subordination is built upon the technological complexity of the product (Gereffi et al., 2005). The complexity "tames" the participants of the production network by the performance of operations within the network of necessary functional components.

New paradigms of the production organization in production organization in value added chains. Last decades even powerful multinational companies were striving to connect their sub-divisions with external networks including firms, universities and institutes involved in the generation, storage, usage and absorption of knowledge (Castellani and Zanfei, 2007).

Standardisation causes the development of fragmentation processes and segmentation of many integrated companies. It is worth noting that fragmentation processes comprise the following vital phenomena:

- The unbundling of the product.
- The disappearance of "focal corporations" and expansion of factoryless producing firms (Bernard and Fort, 2015).
- The separation of different parts of production processes (Arndt and Kierzkowski, 2001).
- The acceleration of product and new technology development.

The non-linear innovation models in open networks replaced the linear models of in-house innovation (Chesbrough, 2003). The extension of open networks had caused technology modularity that means that some technological knowledge acquired the characteristics of standard commodity and production networks had been widely dispersed across firms and national borders. As a result, there was an integration of production, promotion of specialisation within open architecture structures, diminution of companies' core of competence, repudiation of the idea of vertical integration for some value-added chains (Amador and Gabral, 2016).

2.3 Stages of development

Policy areas in the NIS are usually formulated to solve the following tasks: increasing the innovation activity of businesses, expanding the processes of cooperation and knowledge diffusion and, and developing science. The stage-based approach to determining policy directions and measures for carrying out these policies allows the state to promote the process of the co-evolution of the absorption capacities and increase the innovative capacity of enterprises in the national innovation system (Castellacci and Natera, 2013).

At the investment stage, government policy promotes a shift from the mobilisation of primary factors at the preceding, resource stage to a technological leap forward due to a sharp increase in the use and updating of imported technologies as well as the incremental improvement of manufactured products. An essential part of this policy involves implementing economic incentives to improve the absorptive capacity of domestic enterprises by integrating them into the world economy and diffusing global knowledge. High-quality secondary and higher as well as vocational education makes it possible to launch the necessary technological absorption processes. A technological push policy should be generated, particularly, from the outside world.

There is a danger that the country, having coped successfully with the passage of many phases during the investment stage, will become “stuck” on it and will not be able to move to the stage of the country’s innovations. It is therefore essential to create the necessary institutional conditions and resource support during the investment stage for the transition to the next stage, it means that mixed public policy should be

designed and implemented during the investment stage that is aimed not only at completing the phases of the investment stage but also at creating institutions and resources that it can use to complete future stages.

The policy should be aimed at generating a post-imitation model of the NIS that is capable of creating radically new products and processes during the stage that is based on the country's innovations. At this stage, support for private and public investment in human resources in science and technology, as well as the development of a flexible labour market of highly qualified professionals, are the most critical objectives. At this stage, the policy of the technological push that is aimed at the creation of soft technologies and dual-use technologies is continued. The government should design a strategy to support market forces, including incentive schemes that are focused on the end of the innovation cycle. Significant efforts are required to strengthen the cooperative relations of the business and public sectors in R&D and the nonlinear interaction of these sectors, including the development of public-private partnership schemes.

Considerable public and private actions build conditions and provide incentives for joint orientation of government R&D sector and industry. At the stage, the lack of business motivation to search new knowledge sources can be a major obstacle to the cooperation of R&D and business organisation. The individual programs to accelerate technology diffusion in areas of nascent demand could assist in solving problems of increasing technological and organisational capabilities.

3. Main findings

In this part we are going to answer the questions that was put in the introduction

3.1 How to shape and advance innovation modes at investment (catching-up) stage

At the investment stage of development, catching-up countries mainly seek to increase performance and welfare as a result of absorption of technological imported knowledge. At this stage, the participation in the diffusion of innovations guides firms' behaviour. Assimilation and adaptation of these innovations require the actualisation of different types of organisations. The optimal organisation is vertically integrated enterprises for imported technologies diffusion and the introduction of incremental product innovations of foreign technology-based products (Golichenko, 2011).

Also, it must be borne in mind that success of this innovation model in many respects stems from the stable cycle of the interaction between external and domestic markets and incremental innovation improvements of imported technologies. The factors determining the effect of this cycle are the high elasticity of demand and fairly low production cost. They provide effective feedbacks, i.e. the growing demand gives producers incentives to strive for the further reduction of production costs and diminish prices, the latter, in turn, stimulates consumers to increase demand.

It is possible to reduce the production cost at the expense of involving the qualitative but relatively cheap labour. However, the opportunities of involving this domestic resource should be decreasing because of improving economic well-being. At the same time, employing cheaper labour abroad did not always give necessary effect. In these circumstances, the decrease of production costs could be only achieved thanks to the fast absorption and improvements of imported technologies.

The second component of the success is incremental product innovation based on upgrading imported technology. However, it is worth noting that since the domestic demand of developing countries cannot be enough to be the only driving force of the progress (Porter, 1990), the external demand has to make good the lack of this factor.

The product innovation provides an opportunity for a domestic company to sell products that could not be reproduced by its competitors for a while. The simplest way to do it is manufacturing the technologically sophisticated product whose novelty is provided using so-called closed product architecture (OECD, 2005). In this case, a large variety of the product can be provided by a complicated integration procedure based on firm's know-how. The careful technology process validation is necessary. It means that rigid relations (vertically integrated corporations) have to unite participants of the value-added chain. The outlined mechanism of gaining and maintaining competitive advantage was successful in Japan in 1980th (OECD, 2005).

The countries of South-East Asia imitated the Japanese strategy based on costs reduction and incremental product innovations driven by imported technologies. At the investment stage, actions need involving and supporting all available channels of knowledge diffusion to provide the fast growth of absorption capacity of enterprises. The open information channel and that of commercial knowledge transfer are of great importance (Golichenko, 2013). The performance of the third channel is much less significant at this stage of development.

For an adequate performance of the open information channel, it is extremely beneficial to develop the education of secondary and tertiary levels, vocational training, the processes of copying and inverse engineering. As the experience of China shows, the strict government bargaining power may assist to attract foreign investors in intra-firm training even outside of the application area of foreign direct investment (OECD, 2009).

If the diffusion of the knowledge of foreign origins takes place through the commercial knowledge channel, the substantial factors of this process are international trade, foreign direct investment (FDI) and intellectual property rights. FDI may be a key element of economic development on the stage (Guellec and van Pottelsberghe, 2001). However, FDI does not bring the advanced technologies in the absence of the balanced, proactive government policy, even if FDI volume is impressive (OECD, 2009).

South Korea gives us an example of the rational policy aimed at the arrangement of a relationship between domestic industrial modernisation and outside world. In this country, the companies' orientation to the external market was combined with the policy of import substitution. The policy was based on public financial support for the technology catch-up. Exemption from taxation for imported intermediate, long-term fiscal privileges, subsidies for prices of energy, transportation and equipment took place for selected types of economic activity. Besides, rights to intellectual property were strictly observed. Since from the very beginning Korea had refused to use FDI as a factor of technological development (Golub, 2003), it invested in human capital and R&D, that is, the focus was made on creating human resources in science and technology.

Although the technology catch-up processes occurred both in China in the 1960s and 1980s and Korea in the 1990s, nevertheless they had significant differences. China did not wait like Korea for final shaping its technology catch-up processes (OECD, 2008, 2016). The government was introducing the "Market for Technologies" model to build up technological opportunities. Special economic zones with a status close to free trade were created. Chinese firms were motivated to enter markets of developed countries. They were evolving successfully in processes of fragmentation of global value-added chains. However, by the middle of the second half of this century, the Chinese technology miracle became declining. Something similar had happened to Japan in the early 90s of the last century after the explosion of "economic bubbles."

3.2 How to enter world markets at investment (catch-up) stage

The fragmentation processes have become widespread in some industries. An example of such a phenomenon is computer production industry where, in the early 80's, vertically integrated structures were dominated. In the transition to personal computers, a computer from a product of closed architecture turned into a product of open knowledge. It was a result of standardisation of components of computer equipment, modules of computer systems and their interfaces.

The fragmentation created new opportunities for developing countries to take advantage of tapping into new technologies and catching up the latest technological achievements. These opportunities sometimes allow firms of these countries to pass through the multi-stage process of innovative development and reach an innovative maturity creating intra-link and inter-link innovations in global value-added chains. Standardization and modularisation of supplied components virtually weaken the requirements for control and monitoring understanding codified information embedded in the ingredients. As a result, a customer has considerable freedom to choose a supplier, and a company of global production network can participate in a variety of global value-added chains. Under these conditions, a firm of global production networks can choose one of the following types of innovative strategies.

- The support of the previous and the development of new competitive advantages in the link of the GVC.
- The creation of competitive advantages in some new links of former or new individual value chains.

- The development of competitive edges owing to functional innovations in a link or between links or several chains.

In the framework of the first strategy, companies try to reduce the cost of production to support already existing competitive advantages in the link. This purpose can also be achieved by introducing process innovations. The companies might also introduce product innovations to get new competitive advantages in the link on this occasion. The level of technological knowledge modularisation in the relationship guides a necessary degree of innovative novelty.

Following the second type of the strategy, the task is to reach competitive advantages in a new link of the GVC using freedom of interchain expansions. It also means that the company can "jump" to another chain if there is a way to apply its technology or product in a new chain. It is not difficult to do, for example, if the technology or outcome of the company is of generic nature and can be quick enough adapted to the new environment after minor changes.

The third type of the strategy provides competitive advantages due to fictional innovations. Functional innovations can take place in the same individual link or other links of either the former or new chains. The essence of functional innovations lies in substantial expansion, integration or changes of functions of enterprises.

All these three options can be mixed in some proportions depending on the stage of development of competitive edges.

3.3 How to shape and advance innovation modes at the stage based on ingenious or disruptive innovations

There are two trends of great importance in the world economy. The first is the transition of production from mass production to the individualised output of higher quality goods. The second is the shift from the integrated technologies towards technological modules which relationship can be quickly rebuilt to produce a variety of products meeting the individual demand of customers.

At this stage of development, there is the switch of public policy from supporting individual firms and organisations to the development of clusters of interconnected firms and research organisations, i.e. setting up system-integration and network models of continuous innovation. The regulation of cooperative processes takes two dimensions. The first addresses to move away from traditional supply-push policies towards a model based on joint development including public-private partnerships and networks of firms and actors both outside and inside national borders. The second dimension is associated with the market-pull or contractual relationship between public research and demand from the business sector (OECD 2011a).

Channels of commercial knowledge transfer become large-scale and more complicated. The open information channels and channels for the transformation of open knowledge into pre-competitive and competitive one are being intensively developed.

Also, it is worth noting that the essential feature of this stage is the diffusion of radical innovation. As it is known in the literature, problems with diffusion, as a rule, arise for radical or disruptive but not incremental innovations (Edquist, 2006). So that innovations could not be only commercially viable but also might be adopted quickly enough by consumers, public policy has to stimulate demand pull. In the framework of this demand policy, the government should influence innovation through reducing barriers to innovation activity. It ought to facilitate both the origin of new markets and the reconstruction of established markets (OECD, 2011b).

It should be noted that the public policy of technology push has to encourage the firms whose activities are related to high technologies to shaping and extending research knowledge bases. A firm innovating in high-tech fields is usually engaged in internal R&D activity. It forces the firm to form a particular knowledge base that is hard to imitate or replicate by its competitors (Grimpe and Kaiser, 2010).

The uniqueness of this research knowledge base is enhanced by the usage of tacit knowledge of firm's highly skilled personnel. Strengthening the knowledge base is facilitated by the organisational capability and routines of the firm, which allow efficiently managing this base. The specificity and uniqueness of the base and

regulatory capacity are assets of the firms that can shape the foundation of its isolationist barriers protecting from competitors. At the same time, a firm cannot ignore external sources of knowledge in innovation activity (Lavie, 2006).

Therefore, the critical issue of innovative development of the company at this stage is, on the one hand, the creation of conditions for its openness to external new knowledge sources, and, on the other hand, the isolationism and identity provided by its original research knowledge base.

3.4 How to move beyond incremental improvements to creation of highly innovative technologies

For a catching-up country, it is the quickest and easiest way to increase its technological capacity significantly by organising flows of technological knowledge from the outside world. However, as the country's technological capability is being developed, the country's innovation strategy must change. The span of time is needed to transform catch-up innovation modes into ones aiming at disruptive and ingenious innovations.

As a result, the "catch-up" (or almost "caught up") country faces the problem: how to create a post-imitation national innovation system that would give an opportunity for transition to the disruptive and radical innovation-driven stage. The need to address this problem is still relevant both for Japan and South Korea (OECD, 2014, 2015). The capacity of the development model based on the technology catch-up has been exhausted for the former, and it is close to exhaustion for the latter.

In South Korea, awareness of a need for the shift to the new paradigm of economic development mostly based on the creation and dissemination of disruptive and ingenious innovations came in the late 90s of the last century. As a result, the chaebols were seriously restructured and the leading role of the state was significantly reduced in the NIS. Besides, South Korea’s government, improving conditions for innovation, began to pursue pro-competitive policy, and continued to liberalise product market and labour markets. Reasonable efforts were made to develop venture and small business.

In the 1990s, Japan faced a problem: how to design post-catch up national innovation system that would give an opportunity for transition to the radical innovation-driven stage (Goto and Kazuyuki, 2009). At the end of the last century to address the challenge, Japan government decided now to "catch up" not high technology products as it was before but the elements of the U.S. institutional NIS mode. First, the process of "catching up" affected the institutional mechanisms for R&D development, technology transfer from universities to industry, and the cooperation of public research organisations, universities, and industrial enterprises.

How effective were these reforms? On the one hand, they led to tangible results: companies' annual expenditures on R&D increased. During the period of progressive reforms, the universities applications for domestic patents almost reached the level of U.S. universities. The number of academic spin-offs became compared with the U.S. universities' number (Shimoda, 2009). On the other hand, the revenues that Japanese universities had received from licensing were still meagre. Only a few academic start-up firms reached the stage of IPO (Initial Public Offering). In other words, it appeared uneasy to get out of the catching up the trap in which the country felt. It means that during the investment-driven stage, the policy has to facilitate building the resource and institutional foundation of transition to the next stage driven by ingenious and mainly radical innovations.

As for South Korea, it is worth noting that success in country's shift to a new model of development is noticeable. However, the development of a more advanced model of NIS requires an efficient organisation of new fundamental knowledge generation, enhancing processes of its transformation into pre-competitive and competitive one, creating the practical system of technology transfer of commercial knowledge.

Therefore, one needs to recognise that the simple catch up strategy leads eventually to a dead end position at the current level of the market and technology development (Golichenko, 2010). Apparently, during passing the investment (catching-up) stage, the institution and resource base for the transition to the next stage should be brought into being.

4. Conclusion

The economic success of NIS actors is determined mainly by their paradigm. Factors shaping this paradigm are:

- The stage of development through which the country has been moving.
- Channels for the dissemination of knowledge and technology and the effectiveness of their functioning.
- Behaviour models or mode of NIS actors providing success in passage through the stages of country's development.
- Efficient interaction of domestic companies with international markets.
- The ability of NIS actors (including government) to move to the emerging new paradigms corresponding to a higher level of innovation development in time.

While moving through the stage of catching up the known-to-the world market technologies, i.e. the investment stage, the NIS actors are actively using open information channels and channels for commercial knowledge transfer. The channels facilitate diffusion of technological knowledge and other innovative resources from the outside world to the country. At the stage driven by ingenious or disruptive innovations, the operation of knowledge dissemination channels is urgent, but chains for a transformation of open (public) knowledge into pre-competitive and competitive one begin to play a decisive role in the innovative activity.

The success of the NIS at the investment stage is, by and large, determined by the ability of domestic enterprises to establish a cycle of interaction between markets and processes of imitation (catch-up) of technologies. Factors contributing to functioning this mechanism are the high elasticity of demand and relatively low production costs.

The driver of development is external demand and domestic producers' supply to satisfy it. More precisely, the opportunity to offer domestic production in foreign markets gives the basis for competitiveness and economic growth of the country. These opportunities are realized if domestic enterprises can reap the fruits of modern technological and organisational revolution. Besides, the institutions that are traditionally attributed to this stage must be introduced at the investment stage before the beginning of the next step

At the stage based on ingenious and disruptive innovations, domestic companies, developing their absorbing capacity, not only apply and improve known-in the world market technologies but also create radical new ones. Two significant trends of production system dynamics are being used here. The first is the transition from mass products to higher-quality goods designed for an individual customer, and the second is progress in the modularity of technology and organisation.

References

Amador J. and Cabrial S. (2016) “Global Value Chains: a Survey of Drivers and Measures”, Journal of Economic Surveys, Vol 30, pp. 278–30.

Arndt, S., & Kierzkowski, H. (2001) Introduction. In S. Arndt, & H. Kierzkowski (Eds), Fragmentation: New Production Patterns in the World Economy (pp. 1–16), Oxford University Press, Oxford.

Bernard A.B. & Fort T. C. (2015) “Factoryless Goods Producing Firms”, American Economic Review: Papers & Proceedings 2015, Vol 105, No 5, pp. 518–523.

Castellacci, F., and J. M. Natera. 2013. “The Dynamics of National Innovation Systems: A Panel Co-Integration Analysis of the Co-Evolution Between Innovative Capability and Absorptive Capacity.” Research Policy, Vol. 42, No. 3, pp. 579–594.

Castellani, D., & Zanfei A. (2007), “Internationalisation, Innovation and Productivity: How Do Firms Differ in Italy”? The World Economy, Vol 30, pp 156-176.

Chesbrough H. (2003) Open Innovation, Harvard University Press, Cambridge, MA.

Dopfer, K. (2004) "The Economic Agent as Rule Maker and Rule User: Homo Sapiens Oeconomicus", Journal of Evolutionary Economics, Vol 14, No2, pp. 177–195

Edquist C. (2006). Systems of Innovation: Perspectives and Challenges. In: R. R.Nelson, D. C. Mowery & J.Fagerberg (Eds.), The Oxford Handbook of Innovation (pp. 181–208). Oxford University Press, Oxford.

Fagerberg, J. & Godinho, M.M. (2006). Innovation and catching-up. In In: R. R.Nelson, D. C. Mowery & J.Fagerberg (Eds.), The Oxford Handbook of Innovation (pp. 514-542). Oxford University Press, Oxford.

Gereffi G., Humphrey J., & Sturgeon A. (2005) “The governance of global value chains”, Review of International Political Economy, Vol 12, pp. 78–104

Golichenko O. and Y. Balycheva (2016) “Dependence of Innovation Strategies of Russian Companies on Technology Intensity: Structural and Dynamic Aspects”, In I.Aaltio and M. T. Eskelinen (Eds.), Proceedings of the 11th European Conference on Innovation and Entrepreneurship (pp. 221-230). The JAMK University of Applied Science, Finland,.

Golichenko O. (2016). The National Innovation System. Problems of Economic Transition Volume 58, 463-481.

Golichenko O. (2013), “The Methodology of National Innovation System Analysis”, In the book ed. L. Al-Hakim, C. Jin (Eds,), Quality Innovation: Knowledge, Theory, and Practice (pp. 94-123). IGI Global. Hershey Pennsylvania, USA.

Golichenko O. (2011), The Basic Factors for Development of the National Innovation System: Lessons for Russia, (in Russian with an abstract in English), Nauka. Moscow.
Golichenko, O. (2010) "Modernization and Reforming of Innovation Strategy of Russia: Problems and Solutions, In Russian with an abstract in English, Voprosy Economici, Vol 8, pp. 41-53.
Golub, S. (2003) "Measures of Restrictions on Inward Foreign Direct Investment for OECD Countries", OECD Economic Studies, Vol. 36, pp. 54-68.
Goto A. & M. Kazuyuki (2009) "Technology Policies in Japan: 1990 to the Present", In 21st Century Innovation Systems for Japan and the United States: Lessons from a Decade of Change (pp.79-101), The National Academies Press, Washington.
Grimpe C. and Kaiser U. (2010), "Balancing Internal and External Knowledge Acquisition: The Gains and Pains from R&D Outsourcing", Journal of Management Studies, Vol 47, No 8, pp. 66-72.
Guellec, D. and van Pottelsberghe B. (2001) "R&D and Productivity Growth: Panel Data Analysis of 16 OECD Countries", OECD Economic Studies, No. 33.
Hekkert, M. P., Suurs, R. A. A., Negro, S. O., Kuhlman, S. & Smits, R. E. H. M. (2007) "Functions of Innovation Systems: A new Approach for Analyzing Technological Change. Technological Forecasting and Social Change, Vol. 74, No 4, pp. 413–432.
Johnson, A. (2001) "Functions in Innovation System Approaches." Paper presented at DRUID's Nelson-Winter Conference, Aalborg, Denmark
Lavie D. (2006) "The Competitive Advantage of Interconnected Firms: an Extension of the Resource-based View" Academy of Management Review, Vol 31, pp. 638–658
Lundvall B-Å., (ed.), (1992). National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, Pinter, London.
Lundvall B-Å. (2007) "National Innovation Systems: Analytical Concept and Development Tool." Industry and Innovation, vol. 14, No. 1, pp. 95–119.
Nelson, R. R. (1993) National Innovation Systems: A Comparative Analysis. Oxford University Press, New York:.
Niosi J. (2002). "National systems of innovations are "x-efficient" (and x-effective) Why some are slow learners?" Research Policy Vol. 31, No. 2, pp. 291–302.
OECD, (2016), Enabling China's Transition towards a Knowledge-based Economy, OECD, Paris.
OECD (2015), Economic Surveys: Japan 2015, OECD, Paris.
OECD, (2014), Industry and Technology Policies in Korea, OECD, Paris.
OECD (2011a), Business Innovation Policies: Selected Country Comparisons. Paris, OECD.
OECD (2011b), Demand-side Innovation Policies. Paris, OECD.
OECD (2009a), Innovation and Growth: Chasing a Moving Frontier. OECD and the International Bank for Reconstruction and Development/The World Bank, Paris.
OECD (2009b, Reviews of Innovation Policy: Korea, OECD, Paris.
OECD (2008), Review of Innovation Policy: China, OECD, Paris.
OECD (2005), Innovation Policy and Performance: A Cross-Country Comparison, OECD, Paris.
Porter M. The Competitive Advantage of Nations. N.Y: The Free Press. 1990
Shimoda, R. (2009). Reform of University Research System in Japan: Where do They Stand? In 21st Century Innovation Systems for Japan and the United States: Lessons from a Decade of Change (pp. 40-56), The National Academies Press, Washington.

Innovating in the Fashion Industry for a More Sustainable Production and Consumption

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Abstract: The fashion industry is nowadays characterized by an accelerated rhythm of production and high materialism, which stimulates consumer needs, clearly creating excessive consumption. Textile products, or clothes, tend to have a very short life span, which leads to a lot of waste along different dimensions. For this reason, it is necessary to innovate and question the way we think about fashion. The main objective of this study was to understand how the fashion industry might be restructured so as to guarantee production and consumption patterns which would not have such a negative environmental impact. To this end, the current characteristics of the textile and clothing industry were analysed together with the content of the selected YouTube channels focused on the slow fashion concept. The proposed solutions seem relevant for the environment, promoting recycling and the reuse of items, as well as affecting transport and the education of the consumer. Factories to transform clothing for reutilization need to be built, more shops selling second-hand clothing need to be opened, and packaging needs to be more ecological. Consumers need to be geared towards using second-hand clothes and need more education and awareness in this direction. Slow fashion is a new concept, which we would like to see introduced as opposed to fast fashion proving that it is possible to innovate in our production and consumption patterns, while aiming for profit in a more balanced way and while respecting employees, society and the environment. Slow fashion emphasizes quality and not quantity, while also slowing down production and purchasing habits.

Keywords: Fashion, environment, scarce resources, responsible behaviour.

1. Introduction

According to the World Commission on Environment and Development (1987, p. 37), sustainable development "seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future". It represents a long-term approach which has as its objective to develop and achieve a healthy community through a joint effort concerning economic problems, as well as social and environmental issues.

The way we interpret development and how we act about it as a society has real consequences. This responsibility falls on everyone individually because the survival of humankind depends on choices we make and on the balance between individual needs and the needs of the surrounding environment. This is why our decisions and actions, as individuals, organizations and as communities are vital to make a difference we all need so much.

The current fashion industry is characterized by the fast pace of subcontracted production, by materialism and by the endless number of trends. This panorama, together with marketing communications, continuously stimulates consumer needs, creating a clearly excessive consumption.

Today, environmental and social concerns are increasingly perceptible. The question of sustainability has gained relevance within corporate cultures and the mind of the consumer and the current patterns of production and consumption are being increasingly questioned.

During the last decades, there has been a substantial growth in the number of successfully implemented instruments, agreements and treaties related to sustainability. New measures are related to climate change, biodiversity, agriculture, poverty, trade, investments, among others. The Objectives of Sustainable Development (OSD) are, precisely, one of such instruments and consist of a set of 17 objectives that imply a vast range of development problems that guide national policies in international cooperation activities.

The focus on the achievement of sustainable development objectives is clearly an opportunity for innovation and the creation of new markets. It is also a possible source of competitive advantage for companies that could benefit from partnerships or even a positioning marked by the use of OSD as an "anchor" of the brand and as a means of creating brand equity. For this reason, companies should not look at OSD as a barrier to their activity, but rather as a part of their identity and their relationship with the environment and the consumer.

2. Background of the study

Sustainable fashion, or slow fashion, is an alternative to today's clothing production and consumption patterns, proving that it is possible to implement a different system in which profit making is balanced with respect for workers, society and the environment.

Unlike fast fashion, which speeds up manufacturing process and shortens the lifespan of clothing items, this logic places an emphasis on quality rather than on quantity, calling for greater environmental and societal awareness and a reduced pace of production and purchase. Slow fashion is essentially the creation of clothing that promotes ecological integrity, social quality and an emotional connection through products, practices employed and relationships created (Fletcher, 2012a).

Sustainable fashion can therefore be seen as an ideology or a way of thinking about the world which, when applied through a designer, a choice of the consumer or a particular method of production, can have a very positive impact on the lives of employees, consumers, society and the environment.

3. Methodology

Mindful of the importance of a sustainable and conscious approach to clothing production and consumption as well as of a growing public awareness in this matter, we have opted to focus our research on the Objective of Sustainable Development no. 12, which consists in promoting the guarantee of sustainable production and consumption patterns.

The analysis of this OSD was made through the association with the textile and clothing industries, whose current patterns of production and consumption are largely incompatible with sustainable development. We combined this analysis with a review of consumer interests and perceptions in order to get a more comprehensive view. We searched the social network YouTube, which belongs to Google, with the keywords “slow fashion” and “sustainable fashion”. In the channels identified with the most subscribers, we reviewed the content. We limited the search to the users who used the topic of slow fashion as one of the main or recurring themes of the channel. For the remaining users, we analysed the content by randomly selecting seven videos from their channels.

4. Results

Some of the measures can be of special interest when dealing with the promotion of sustainability in the textile and clothing industries. They are presented below. These measures are organized according to the garment life cycle. In order to indicate concrete solutions, we have chosen to focus on a company that operates in the area of textile management and recycling, the organisation H Sarah Trading.

5. A proposal of measures to create sustainable production and consumption patterns in the fashion industry

At the global level, we risk exceeding the limit of resources that the Earth can provide us, as well as the limit of garbage and pollution that it can bear. Thus, one of our options for continued economic growth will be to shift our current production and consumption patterns, based on a linear system of extraction, production, consumption and waste, to a circular system that mimics the natural processes in which there is no waste but which can use the outputs in other processes. This model of sustainable development means that the resources we extract and produce are kept in circulation through reuse, recovery and recycling. In this way, economic growth is separated from the consumption of new resources, ensuring greater efficiency in the utilization of resources already existing in the production process.

At the level of the textile and clothing industries, this translates into the implementation of a circular life cycle of the product, which is constituted by six essential phases, as shown in Figure 1.

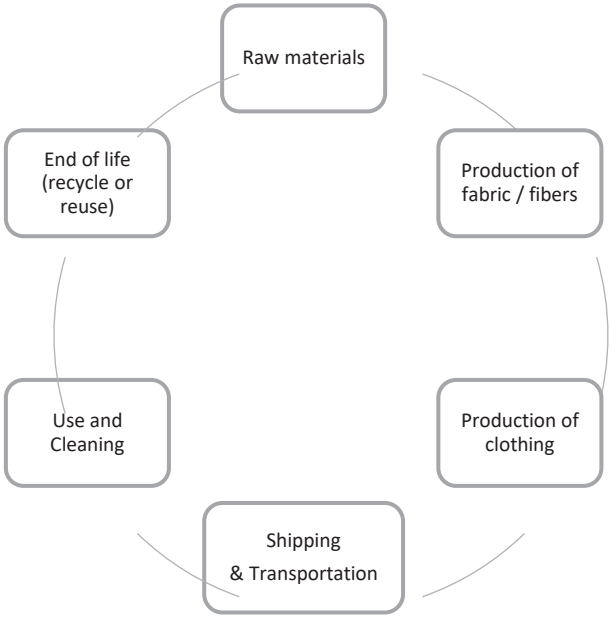

Figure 1: Circular product lifecycle (based on Wallender, 2011)

The understanding of these phases is important for the implementation of solutions since in order to cement sustainability in the fashion industry, all the activities involved in the design and use of a garment must be taken into account, from the manufacturing of the materials until the consumer discards them. In this way, solutions can be implemented at both the production and the consumer level.

6. Solutions at the production level

One might ask the following question: How can the business sector contribute to slow down the fashion industry?

- One possible alternative to implement in the fashion industry would be the training of designers in methods such as "zero waste". This method may consist of the elimination (during the cutting of the fabric) of the spaces between the various parts that make up the garment, in order to create a situation of patterns that "fit" together; or in the addition of scraps of fabric to the clothing in a creative way. All this in order to get the most out of the fabric used and to reduce the amount of material wasted.
  Design plays a very important role since it has an impact in all phases of the process: from the transformation of the raw material to the end of life of the garment. Therefore, the products must be designed in such a way that their recycling is possible. Thus, with a better use of materials, companies could not only reduce costs but also benefit the environment.
- Another alternative is the creation of more versatile garments, that is, pieces that can be used in different ways and that allow the hypothesis of updating and adaptation as new trends emerge. In turn, this update of clothing items involves the implementation of sewing workshops in stores (such as Mango, Zara, among others), so that customers can change, as they wish, the pieces of clothing purchased, by way of the good state of conservation of the these garments and the payment of a certain amount. The process of altering the clothes can be done by the customers themselves (who already know the art of sewing or who want to venture into it) or can be made by small factories with artisans (for those who prefer to see the process to be executed by other hands). This possibility of the customization of clothing would give customers the opportunity to closely monitor the entire customization process, generating a greater emotional attachment on their part, to their clothes. This will, consequently, stimulate greater care with the clothes that these individuals own.
- In order to ensure decent work processes, companies could highlight on the clothing labels all the countries through which the item went, giving more transparency to the production process. In addition, they could seek to associate themselves with Fairtrade certification and labeling organizations.

7. Solutions at the transportation level

Companies in the textile and fashion industry should take into account the ecological footprint that they leave, as regards the question of how the distribution of their products is achieved. Sustainable distribution should have the least possible impact on the ecological and social environments.

- To move products to their destinations with the least possible environmental impact and at the lowest cost, companies can use two solutions: (1) the optimization of the materials used in the production of transport packaging and (2) the way products are loaded onto the trucks.
  Eco-friendly and sustainable packaging is made from recycled materials, reducing the waste of resources during production. Given that millions of tons of packaging are used annually, the weight of packaging is a factor that can also make distribution and transportation more efficient (Richtel, 2016). Thus, reducing the weight of the individual packages by a few grams can easily add up to a large reduction in the total weight of packages used. On the other hand, the way the product is packed can also bring benefits: by using packaging of an adequate size for the product, it is possible to save space and costs in the shipping process. Right-sized packaging ensures that the product is packed safely, minimizing the need for fills (e.g., styrofoam). These distribution solutions reduce carbon emissions and the impact of waste on landfills.
- This eco-packaging policy can also be applied to delivery straight to the consumer. If the packaging in which the customer receives his or her order is duly identified and promoted as being environmentally friendly, the company can demonstrate its contribution to the preservation of the planet and of its natural resources. Firms will in this way convey an image of concern about sustainability and about social responsibility.
- The use of hangers made from recycled materials in stores is also a small step towards sustainability.

8. Solutions at the reuse and recycling level

In the circular cycle of clothing, recycling and reuse companies play a very important role. The entity we used in this research, H Sarah Trading, is engaged in textile transformation and in the re-routing of clothes (new or second hand), in order to avoid that its destination is the landfill. At H Sarah Trading, after clothes are collected, they undergo an exhaustive process of selection and packaging, followed by the routing to different destinations, depending on the state of conservation in which the materials are found. They can go to institutions/charity stores, if they are in good condition; they can be recycled and give rise to new products when they are no longer in a condition to be used again; they can also be exported, since in Portugal there are no companies specialized in the processing of used clothes (H Sarah Trading, 2017). As such, these must necessarily be routed to countries such as India and Pakistan, among others.

After the analysis, we would suggest:

- The construction, in this specific case, of a textile processing plant that would be used to complement this entire cycle of recycling and reuse, eliminating the need to export and allowing some materials such as cotton and linen to be recycled.
  In addition to reducing the amount of waste, a factory of this kind would also boost the local economy by creating jobs and increasing local empowerment.
  The plant could also attract potential partnerships with larger companies for waste management.
- The creation of partnerships is a way that could allow H Sarah Trading to collect goods that, from the perspective of the donor textile company, may be damaged or not in a condition to be sold, but are still good enough to be reused or recycled.
- Another measure that the company could apply could be to invest in collection campaigns in the community where it is located. In this way, it would promote social awareness and drive attention for the company's mission. This measure could be implemented by conducting campaigns at the local level in schools, universities, companies and even in public well-selected places, through the distribution of flyers, holding lectures and allocating specific containers for the collection of garments in strategic locations. The campaign could then be replicated in other cities and regions of the country, contributing to building sustainable fashion awareness. H Sarah Trading could also consider distributing their containers throughout the country.

- Finally, H Sarah Trading could also consider creating second-hand clothing stores. With the clothes collected through their campaigns and collection containers, the company could use the items in good condition for sale, at low cost, in second-hand stores. In addition, it could use articles from partnerships with the textile companies referred to above which are not in a condition to be sold from the perspective of those companies but which are nonetheless available for sale in these second-hand clothing stores.
  Selling second hand clothes gives them a new life and to people who buy them a good purchasing opportunity. People visiting second-hand stores are perceived by some as being in impoverished circumstances, but this is not necessarily the case. A part of second-hand customers seek good quality garments at a reasonable price or look for unusual pieces not replaceable by high-street stores.
  Second-hand activity discussed herein would be complementary, generating an extra profit. The success of Goodwill, the American company, could be used as an example and as an inspiration.
  Currently, the main focus of sustainable fashion is to reduce the impact of products by improving manufacturing processes and by increasing the recycling of fibers and textiles. However, the consumption of clothing by the customer is the essential part of the problem and both should be approached simultaneously.

9. Fashion consumers and slow fashion trends – A look at YouTube channels

As a result of the defined criteria, we reviewed 13 YouTube channels specifically interested in slow fashion, a concept which is gaining popularity. We randomly selected seven videos from each of the channels and analyzed their content. YouTube is an online platform on which content can be voted and on which authors may receive feedback about the interest their video has caused. This evaluation may possibly influence future decisions about the content of the channel. Viewers can also subscribe to the channel they like in order to not miss future videos. The initial screening and the selection of channels with a substantial number of subscribers makes us believe that the analysed content is a good representation of the interest of our research. We have classified the content in three categories:

- Fabric. Fabric composition, characteristics and care recommendations. Advantages and disadvantages of specific types of fabric. Quality of fabric. Quality versus price.
  We have found videos explaining the basic types of fabric and the differences between them. Natural and artificial fibres have different characteristics, which should be considered when choosing a garment. Natural fibres allow the skin to breathe. On the other hand, artificial fibres get dry quickly and are recommended for sports clothing.
  The obvious question is how much (more) a natural fibre is worth (and whether it is as discussed in some videos), and up to what extent we should be driven by quality. Users seem to enjoy the content where the YouTuber explains their reasoning when making a decision regarding the use of some fabrics (frequently dropping the use of artificial fibres). Videos showing how to recognize poor and good quality in clothes and how to dress well on a budget are also sought out.
- Garments and brands. Product reviews, product recommendations and product seeking. Brand reviews. Brand recommendations.
  Users enjoy watching product or brand reviews. Such reviews, especially when made by trusted (i.e., with ethical spirit, well-selected cooperation criteria and subscribed by several users) YouTubers, can be used as part of their successful business activity. It is important that the review goes in line with the channel idea and includes a personal (and honest) opinion. In this category, we have also found several videos with a list of essential pieces in the (small) wardrobe.
- Dealing with excess. Thoughts and considerations. Seeking opinions.
  There is a clear interest in videos suggesting how to style a different piece of garment in several ways ("how to re-wear…"; "x ways to style…") and on how to maximize the garments already in the closet (a "capsule wardrobe" concept). The art of combining a few pieces of clothing has quite recently turned into an interesting business opportunity. There has been a rise in the offering of online courses on how to build a functional wardrobe and on how to avoid excessive, compulsive purchases.
- Another group of videos focuses specifically on how to deal with the excess of clothing that we already have and that we do not use (but that we sometimes have difficulties in letting go of). We have also found videos on how to shop in the slow spirit, with packing and travelling tips.

There are also ethical reasons behind buying less. Users were interested in how to combine fashion trends and ethics, where to find ethical fashion brands, and which brands actually follow the ethical trade or the fairtrade movements.

10. Solutions at the consumer level

The consumer is constantly led to believe that he or she has to consume at a rapid pace. However, as concerns being responsible for the planet, we need to start feeling the power we posses as consumers. Consumer power is revealed when making decisions to buy (or not) from a certain brand, at a certain moment, or in a certain quantity. For this reason, to change the current system we can adopt behaviors as simple as questioning how the products we consume are made, what the impact of the production process is, how the way we eat is influenced by external factors or how material values influence our personal values and the relationships we maintain with what surrounds us. However, these seemingly simple behaviors are not obvious to most people, and many of them remain unfamiliar with the problems of the fashion industry. Thus, the first step to change is education.

- One way to educate the consumer about fast fashion practices and sustainable alternatives is storytelling, which is a marketing tool that combines audio-visual resources with words for compelling "storytelling". This tool is a powerful means through which companies can convey their personality in a memorable way, as well as other relevant information or even ideologies about the complex world in which we live.
  Narratives about the history of clothing can be communicated by introducing people and processes behind design, production or even recycling and reuse. Thus, through a holistic approach to the life cycle of clothing, the narrative contains greater transparency and greater communicative power. This, in turn, increases the capacity to educate the consumer and allows for the creation of a connection through the communication of the value of the product and the production processes involved in its creation.
  Being able to identify with company values encourages customer engagement with transmitted ideologies such as sustainable fashion. That is why storytelling is an effective way to encourage commitment in terms of conscious and responsible fashion consumption. Numerous studies over the years have proven that our brains are much more involved and attracted by stories than by facts. According to Gillett (2014), "when we read a story, not only are the parts of language lit up in our brain, but also any other part of the brain that we would use if we were to actually experience what we are reading".
- There are other ideas for stories such as using the voice and input of users/consumers or to communicate values such as resistance, diversity and quality in order to inspire people to connect with communities, with their personal identity or with nature.

11. Discussion

Nowadays, we live in a society of disposable clothing that remains less and less time in the closet. We buy more clothes than ever and use more synthetic fibres. Ready-to-wear collections are made quickly, in a standardized and economically feasible way, often using subcontracted production, so that consumers can constantly acquire the latest trends at a remarkably low price. This system has perpetrated irreparable damage to communities and to the ecosystem, undermining the foundations of life on Earth.

Some of the consequences include the exploitation of subcontracted workers, considerable environmental impact and the distortion of the consumers' perspective and their sense of value given to clothing.

Generally, getting new trends to the shops so quickly and at such a low price is only possible through subcontracting to countries with extremely cheap labor. Therefore, if a company is not satisfied with the pace of production, it can easily find a replacement who will do it faster instead of improving the relationship with the employee. In addition, many of these factories put production requirements above worker safety, resulting in disasters such as the collapse of the Rana Plaza building, in 2013, which resulted in the death of about 1,200 workers (Kasperkevic, 2016). That specific factory produced garments for brands such as H&M, Mango, Primark and GAP.

In terms of environmental impact, the problem lies not only in the production of clothing but also in the actions of the consumer and the waste generated. In manufacturing, a part needs to be spun, woven, cleaned, bleached, dyed, printed, cut and sewn. Thousands of litres of water, pollutant chemicals, and dozens of pesticides are used in the cultivation of materials such as cotton and a large amount of energy (such as transport), which results in the emission of CO2, is also used. Regarding consumption, data from the Portuguese Environment Agency indicates that 5% of 4,607 tons of urban solid waste is composed of garments or household linen that end up in a landfill or are incinerated (Tomás, 2016). Even the clothes that are donated often end up in the trash, due to the poor quality of the items, which cannot be reused. As if that were not enough, the fact that these parts are made of cheap materials and petroleum-based fibres, which do not decompose easily (such as polyester and nylon), means that it takes years for them to degrade, increasing pollution.

Part of the reason we throw so much clothing away is that we no longer bother with repairing the pieces. If clothing looks cheap and disposable, we treat it this way. According to Fletcher (2012b), the most problematic feature of fast fashion is, most probably, the consumerist mentality that it promotes. Based on a marketing communication mindset for the spreading of dominant forms of thinking about image, language and products, fast fashion limits our ideas about what fashion can be and normalizes low quality and the short durability of pieces. That is, it is a system that creates its very own conditions for survival.

For this multitude of complex problems there seems to be a multitude of solutions that seek to balance profit with other economic, social and environmental aspects of sustainability in companies. It is our individual choice to make a change in what are at times complex, societal structures we are a part of.

12. Conclusions

With this study we have aimed to understand how companies and consumers can contribute to the promotion of sustainable production and consumption standards in the textile industry and linked to fashion. We have suggested a number of solutions in the context of sustainable fashion with which it may be possible to achieve benefits, both at the community and at the environmental levels. The adoption of these measures is not only desirable but essential to determine the long-term success of sustainability policies.

Figure 2 summarizes our proposals – at the production level, at the reuse and recycling level, at the consumer education level, and at the transportation level. We propose a change of culture in the sector, acting on both production and consumption dimensions. Changing the culture in the entire industry is only possible if there is communication and the need for such a change is seen to exist. To this end, the government as well as relevant sectoral companies can make their contribution. Investing in responsible actions brings great benefits, including a better relationship with the consumer and greater resistance to international crises, which will far outweigh the costs involved. There will always be those who want to wear new clothes, so there is no risk to the sector in this respect. However, slow fashion promotes the reconsidering of purchasing habits and the slowing down of the pace of production. It emphasizes quality and not quantity, and a better use of resources along the value chain, and encourages a greater societal awareness. In the very near future the most successful companies will be those that have been able to adapt to new business models and pursue innovation while respecting societal well-being and the environment.

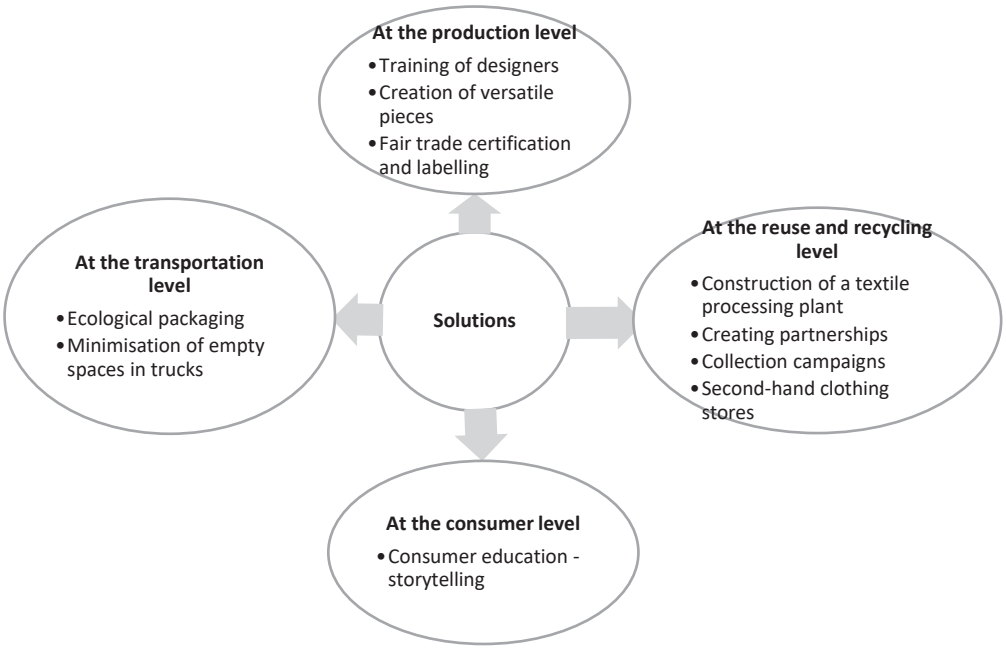

Figure 2: A summary of the proposals of the study

References

Fletcher, K. (2012a). Fashion and sustainability FAQS. Kate Fletcher sustainability design fashion. Retrieved 9 April, 2017, from http://katefletcher.com/fashion-and-sustainability-faqs/

Fletcher, K. (2012b). Kate Fletcher on fashion & sustainability. American Craft Council. Retrieved 9 April, 2017, from https://craftcouncil.org/post/kate-fletcher-fashion-sustainability

Gillett, R. (2014). Why our brains crave storytelling in marketing. Fast company. Retrieved 9 April, 2017, from https://www.fastcompany.com/3031419/hit-the-ground-running/why-our-brains-crave-storytelling-in-marketing

H Sarah Trading. (2017). O nosso processo. Retrieved 9 April, 2017, from http://www.sarah-trading.com/site/o-nosso-processo

Kasperkevic, J. (2016). Rana Plaza collapse: workplace dangers persist three years later, reports find. The Guardian. 31 May. Retrieved 9 April, 2017, from https://www.theguardian.com/business/2016/may/31/rana-plaza-bangladesh-collapse-fashion-working-conditions

Richtel, M. (2016). E-commerce: convenience built on a mountain of cardboard. The New York Times. 16 February. Retrieved 9 April, 2017, from https://www.nytimes.com/2016/02/16/science/recycling-cardboard-online-shopping-environment.html

Tomás, C. (2016). 230 toneladas de roupa vão para o lixo. Expresso. 10 January. Retrieved 9 April, 2017, from http://expresso.sapo.pt/sociedade/2016-01-10-230-toneladas-de-roupa-vao-para-o-lixo

Wallender, M. (2011). The lifecycle of a t-shirt. The Huffington Post. 30 June. Retrieved 9 April, 2017, from http://www.huffingtonpost.com/mattias-wallander/the-lifecycle-of-a-tshirt_b_887133.html

World Commission on Environment and Development. (1987). Our Common Future. Report of the World Commission on Environment and Development, 16. http://www.un-documents.net/our-common-future.pdf

Teamwork and Innovation: The Moderating Role of Reward in the Fashion Industry

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Abstract: One of the industries that is quite vulnerable to the changes of consumer demand is fashion industry. In the fashion industry, the life cycle of a product is short, and differentiation advantages are built on brand image and product style, which can be imitated immediately. The importance of innovation for small and large firms in the developed and developing countries has provoked an immense interest of social scientists and practitioners to scrutinize this topic from many perspectives. In this study, we suggest that to propel innovation in the fashion industry, instead of individual work, teamwork is an ideal frame to foster the successful of new products development. Previous study stated that teamwork is essential to sustain the realization of the new product since it involves many areas of section. Thus, in this study, we try to explore to which extend teamwork may augment innovation in SMEs fashion industry in Indonesia. Moreover, even though a fashion industry is a business driven by art and passion, we also argue that reward is an essential factor for driving innovation. Hence, we also explore to which extend reward may strengthen the relationship between teamwork and innovation. According to the authors knowledge, despite a few of literature studies about teamwork and reward to innovation, but the teamwork and reward have been analyzed separately. Since all the team can get reward from the success of innovation, and it gives them more motivation to innovate, thus we proposed that reward could strengthen the impact of teamwork to innovation. Using ordinary least squares (OLS)- regression analyses, 50 designers from SMEs in distro- fashion district in Bandung - Indonesia were asked to complete the questionnaires. The result shows the impact of teamwork on innovation is moderated by reward, but in a negative way and the result has advanced the prior studies on innovation.

Keywords: innovation, teamwork, reward, SMEs and fashion industry

1. Introduction

Bandung is one of cities in West Java that the creativity of human resources is still recognized at national level.

In addition to title as a city with high creativity and innovation, Bandung is also famous of its fashion, art, culinary and beauty. The high population growth in Indonesia also implicates on the need of clothing products.

This condition opens an opportunity for the clothing manufacturers and fashion business to develop in Indonesia including Bandung, one of the cities in Indonesia that is potential for the profitable clothing industry.

The emergence of shopping places in Bandung has made this city increasingly potential as fashion shopping destination for tourists.

Due to the rapid growth of fashion industry in Bandung, many of the business actors are deliberately choosing business of Factory Outlet (FO), Clothing Company (CC) or Distro (Distribution Store) to earn monthly high profit. Along with the increasing number of distro established in Bandung, the competition has been raising among them. Companies should make strategy in marketing products to maintain its existence in fashion business. While implementing its strategy, a company as an organization will sometimes have to deal with changes. The dynamic of demands, trends and consumer's taste leads to a situation where a company should be adaptable, creative and innovative. The similar thing happens to distro, this fashion business is also demanded to provide products as attractive and unique as possible. Product innovation is required not merely to create new product, but also to discover new market opportunity, as well as creativity to connect existing business networks. However, further research is required to find out the driving factors of innovation (Menon, et al., 1999).

In the research, they suggest further exploration related to variables considered capable to support innovation such as the delivery of reward and teamwork. Teamwork is a collaboration of several people in a form of group work. Former studies highlighted the imperative role of teamwork to elevate the innovation of product.

Teamwork is required to support the success of the new product, and it involves many areas of department (Macchion, et al., 2017). Although there are many studies researching teamwork but only a few relate the teamwork with innovation (Naveh & Erez, 2004). Teamwork can affect an organization's achievement, and teamwork is believed to be one of variables that can influence innovation (Fay, et al., 2014). A team can be solid if the members are willing to share, provide constructive response, support and appreciate desire and success of each team members.

Rewards given to individuals or teamwork lead to satisfaction therefore will motivate a team to be more innovative in generating creative ideas. It will affect the productivity, and encourage each individual and team to be more responsible and innovative (Amabile & Pratt, 2016).

Despite the relevance of their contribution to innovation, but the possible links between the teamwork and reward have not been analyzed. In this study, we argue that if the team member could get reward from the successful of a new innovative product, and it will motivate them to be more innovative, thus we proposed that reward could strengthen the impact of teamwork to innovation. Referring to the explanation, arising an interest to conduct further research on the impact innovation; we want to figure out how reward can affect as moderation of relationship between teamwork and innovation. We hope this study may contribute to the existing of innovation studies.

2. Theoretical Background and Hypothesis

2.1 Innovation

Innovation has wider meaning than simply findings. Innovation is a process to transform creative ideas into products, services or operation methods. Innovation can also be interpreted as each brand new idea or concept that has never been exist or issued beforehand. An innovation usually consists of new breakthrough based on a particular research of the innovator (the person who creates an innovation). Innovation is commonly made on purpose by the innovator through various actions or planned research. It can be concluded that innovation is a creative process of new invention that is different to the existing ones. Being innovative for an entrepreneur is a process to transform an opportunity into concept and ideas that can be sold (Gunawan, Jacob and Duysters 2016). A change of view and behavior in society is generally an aspect that influences buying pattern and behavior. Therefore, innovation should always close to market, direct to market and be market-driven.

Innovation consists of three types according to (Kuratko & Richard M., 1995) namely 1. Discovery; 2. Development; 3. Duplication; and 4. Synthetic. The explanation is as following: 1) Discovery, creation of new product, service or process which has never been done beforehand, this concept tends to called revolutionary.

2) Development; is a development of existing product, service or process. This concept applied as idea to develop existing things. 3) Duplication, is imitating existing product, service or process. However, duplication is not only imitating but also adds creative touch to enhance previous concept therefore the new one has more capability to win the competition. 4) Synthetic, is the combination of existing concepts and factors to become a new formula. This process includes collecting a number of existing ideas or products to be molded into product that can be applied in new way.

According to Osajolo (2008) there are three types of innovation as follows: 1) Product innovation, which is often perceived as the most visible innovation to increase revenue. According to (Gunawan, et al., 2016) product innovation is defined as a product changes in material, fitur and design, but the changes is size and color is not considered as representation of innovation. 2) Process innovation is an innovation to provide facility to maintain and improve quality and to cut cost. 3) Market innovation is an innovation regarding to improvement of market target by serving mix target market. Innovation is essential for business actors to change market and existing "rule of the game". Business people can create new product types that are beneficial for market therefore consumers have a wide range of choice. Innovation is also important for companies to survive in dealing with technological development and dynamic consumer demands. If the company cannot keep up with the changes, the company sustainability will gradually weaken (Gunawan, et al., 2016).

2.2 Reward

Reward or recognition which is given to individual as well as team work can provide satisfaction to the individual or team work (Sarin & Mahajan, 2001). Such satisfaction can motivate them to be more innovative and to generate more creative ideas. It can also affect their productivity, spur each individual and team work to be more responsible and encourage themselves to take risks. According to (Hariandja, 2002), compensation is an overall remuneration accepted by employees as a result of work execution at an organization in form of money or others which can be in form of salaries, wages, bonuses, incentives, and other benefits such as medical benefit, holiday allowance, meal allowance, leave pay, etc.

When employees join a company or organization, indirectly appear various expectation that their needs can be fulfilled by the company. Usually, as reward of their contribution in achieving some corporate goals, the company will give material or immaterial rewards. In addition to remuneration, reward is also expected to encourage employees for higher achievement. Rewards can also be utilized as event to spread information; it can also draw personnel's attention and deliver information or remind them about the importance of something rewarded compared to others. As trainings that can motivate, rewards can also increase motivation among company personnels with performance measures, therefore it can help them in deciding how they allocate their time and efforts.

Rewards can be categorized into two categories, namely: intrinsic reward involves self-satisfaction received by someone whose work has successfully been completed and reached particular goals. In order to improve intrinsic reward, management can use various techniques such as augment responsibility, participation in decision making, and other efforts in order to enhance self-respect and encourage someone to be the best. While extrinsic reward consists of compensation given to personnel, either direct, indirect or non-monetary compensation. Direct compensation is a direct payment such as salaries or basic wages, over time or holiday honorarium, profit sharing, and other bonuses based on personnel's performance. Indirect reward is all payments for the personnel's welfare such as accident insurance, pension insurance, travel honorarium, medical benefit. Non-monetary reward can be an extra given by a company to its personnel such as working space with exceptional location and facilities, special parking space, and distinctive title. Forms of rewards or recognitions given to employees of a company are: Praise, Facility, Bonus, and Salary Increase (Mulyadi & Setiawan, 2001).

Creative behavior of an organization can be motivated by one of inputs in working environment that is reward (Amabile, 1997). Reward can be utilized as media to control, manage, and improve individual performance or team work. The policy in giving reward can support innovation in an organization. According to Bock and Young (2002) extrinsic reward that is believed capable to increase employee's motivation is reward in the form of money, career promotion, and educational opportunity. In their research, Sarin and Maharajan (2001) explain that reward is believed to have a positive impact towards new product developments. Base on previous illustration, a hypothesis drawn is:

H1 : Delivering rewards to employees has positive impact on innovation.

2.3 Teamwork

Mulyadi and Setiawan (2001) state that a teamwork is a group of people based on their complementary expertise, work together to achieve a common goal together. Teamwork creativity will affect the organization.

In their research, Woodman et al. (1993) state that composition of a team, characteristic, and processing factors in that team has a relationship on creative result in a teamwork. A teamwork can support innovation through distinct and background differences among the team members, shared openness to ideas, develop challenges of ideas, and share commitment to projects (Amabile, 1996). Teamwork performance can be measured by the existence of expertise diversity in the teamwork where each member can communicate well, open to new ideas from its members, develop challenges to each work, trust and help each other and have engagement in progress work. Former studies highlighted the essential role of teamwork to elevate the innovation of product. Teamwork is required to support the success of a new product, and it involves many areas of department (Macchion, et al., 2017).

According to Robbins (2013), there are three types of teamwork, namely: 1. Problem solving team; 2. Self-managed team; and 3. Cross functional team. The following is the explanation: (1) Problem-solving team is a

team that is formed to overcome various problems arisen in an effort to improve productivity. Basically, this team activity is identifying various problems, discuss how to solve the problem and take corrective action. (2) Self-managed team is a team intended to improve productivity by giving authority to a group to manage their work such as scheduling work, determining work method, supervising members, giving reward and punishment for its members and recruiting. The member of this group usually derived from one department of the same task. (3) Cross functional team is a team aimed at completing specific task, such as developing new product or planning. Members of this team derived from various departments that have different expertise and orientation who work together to achieve one goal.

Cooperation in a team is one of the characteristics of a high performance company. Teamwork is one of the backbones in an organization, because the team can move faster and be more innovative in overcoming problems faced by the company compared to what an individual can do. Based on the previous studies, a hypothesis purposed in this study is:

H2 : Teamwork in a company contributes positive impact on innovation

2.4 Reward and Teamwork in an effort to improve innovation

Rewards policy is believed to be able to motivate creative behavior in an organization (Amabile & Pratt, 2016). Dreher dan Daugherty (2001) in their book stated that reward is one way to encourage organization members to achieve more creative works. On the other side, teamwork allows a company to be more agile, flexible and responsive in dealing with challenges or problems and competition. In addition, many managers assume that team can cut off company bureaucratic line and develop new ideas more smoothly (Wei & Atuahene-Gima, 2009).

If a company recognizes the important of teamwork and give more reward to their efforts to innovative, they will be more innovative to create a new product. Therefore, we see that teamwork supported by reward can accelerate company innovation. In our point of view, reward will encourage teamwork to reach higher achievement and to take risks thus innovation will also improve. This explanation leads to the next hypothesis:

H3: Reward moderates the influence of teamwork on innovation.

3. Research method

Type of this research is quantitative method using OSL (Ordinary Least Square), to see the causal relationship of variables on research object. In this study, product innovation is the dependent variable; the independent variable is teamwork and reward as the moderating variable. Data were collected using questionnaire distributed to 50 employees at 20 distro outlets in Administrative Village Citarum Bandung Wetan. Samples were chosen using purposive sampling technique. All tests and analysis are processed using software IBM SPSS version 23.

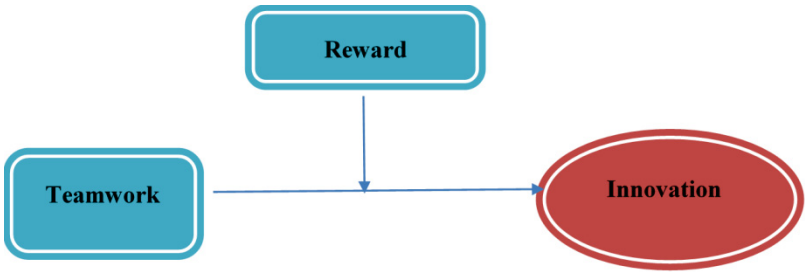

Figure 3.1: The Moderating Role of Reward

Reward is overall remuneration received by employees as result of performance in organization. Reward can take form of money such as salary, wage, bonus, incentive, benefits and other forms (Hariandja, 2002). Reward is measured using dimension: salary increases, bonuses, praises, promotion, facilities provision commensurate with the employee's hard work and loyalty. Teamwork exists through distinctions or background differences of team members, shared openness to ideas, build challenges to ideas, and sharing commitment to projects (Amabile, 1996). Teamwork is measured by sharing new ideas, teamwork makes less heavy job and teamwork leads to help and trust each other. Product innovation is change in a product: material, fitur and design,

however the size and color is not considered as representative of innovation (Gunawan, Jacob, & Duysters, 2016). Innovation is measured by how the company is known as innovative, number of new products annually and how the new product can be differed to its competitors. For the quantitative process, the responses are scored ordinally from highly agree, agree, less agree, not agree to highly not agree.

4. Result and Analysis

Data analysis technique used is Ordinary Least Square (OLS) linear regression. Before the regression, the data were firstly tested for their normality using Kolmogorov-Smirnov Test and value resulted is 0.20, higher than 0.05 therefore it can be concluded that the data were normally distributed.

Validity test method used in this research is Pearson Product Moment correlation analysis. A statement is considered valid if r-count value>r-table value. Invalid statement has to be excluded from the questionnaire or replaced with another question. The result show that all statements of variables innovation, reward and teamwork have r-count higher than r-table (0,2353) therefore all statements used in this research are valid.

Questionnaire's reliability is tested using Cronbach's Alpha where the instrument is considered reliable if the value is 0.600. The test shows that the value is higher than 0.60

The result shows that Reward and Teamwork has strong relationship to innovation. The following table illustrates correlation of teamwork on innovation is 0.376 while on reward is 0.096. Reward has correlation on innovation at 0.416. Therefore, it can be considered that the relationship of dependent and independent variables are fairly strong.

Table 4.1: Correlations of Innovation, Reward and Teamwork

Correlations

		Innovation	Reward	Teamwork
Innovation	Pearson Correlation	1	.416**	.376**
	Sig. (2-tailed)		.003	.007
	N	50	50	50
Reward	Pearson Correlation	.416**	1	.096
	Sig. (2-tailed)	.003		.509
	N	50	50	50
Teamwork	Pearson Correlation	.376**	.096	1
	Sig. (2-tailed)	.007	.509	
	N	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed)

Precondition of regression model is the absence of multicolinearity. In multicolinearity, the decision is taken using two ways (Barrow, 2009): if tolerance value approaches 1 and Value of Inflation Factor (VIF) at regression model is lower than 3.00, the model is free from multicolinearity. The test shows that tolerance value is close to 1 and VIF is lower than 3.

Table 3.2 shows that teamwork has positive and significant effect on innovation (β=0.34, $p<0.01$). In addition, the coefficient table shows that reward has positive impact on innovation with significant value at (β=0.38, $p<0.01$)

Table 4.2: Regression Test of Teamwork and Reward on Inovasi

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.329	1.920		2.255	.029
	Teamwork	.307	.112	.340	2.746	.009
	Reward	.175	.056	.384	3.104	.003

a. Dependent Variable: inovatif

Table 4.3: Regression Test of Reward on Inovasi

Hypotheses testing	**Model 1** Innovation	**Model 2** Innovation
Teamwork	0.34**	2.80*
Reward	0.38**	2.43*
Two- way interactions		
Teamwork*Reward	-	-2.13*
R2	0.29	0.35
Adjusted R2	0.257	0.310
F	9.491	8.310
N	50	50

*p<0.05
**p<0.01
***p<0.001

Based on the empirical study, it can be concluded that: Reward affects significantly on Innovation (β=2.81 p<0.05) since the statistic test results shows p-value lower than 0.05 therefore hypothesis 1: Delivering rewards to employees can affect company innovation thus increasing reward will increase company innovation. It is in accordance with previous research (Sarin & Mahajan, 2001) that reward contributes positive impact to organization due to satisfaction after receiving the reward which then motivate them to work better and generate innovative ideas.

Teamwork gives positive and significant impact on innovation. The analysis shows (β=2.43, p<0.05) thus hypothesis 2: Teamwork in a company contributes positive impact on innovation is accepted. Teamwork can increase innovation in a company since creative ideas are generated from both formal and informal communication and discussion of the teamwork. Therefore, increasing togetherness in teamwork can spur innovation.

In this research, reward significantly strengthens causal relationship of teamwork and innovation but in negative direction. The value standardized coefficient beta is (β=-2.13 p<0.05). Thus, it can be concluded that hypothesis 3: Reward moderates the relationship of teamwork and innovation is accepted even though in negative impact.

5. Conclusion and Discussion

This study found that teamwork has impact on innovation and reward significantly affects innovation. Thus, firms should keep maintaining and improving innovation and reward in the firms. Nevertheless, reward significantly impact the relationship of teamwork and innovation in a negative way. This research reveals interesting findings that reward contributes negatively to teamwork and innovation. The possible explanation of this situation is, SMEs in Indonesia usually distribute rewards individually where teamwork reward is not particularly prioritized in the companies. Individual rewards will lead to competition among the teamwork members therefore and it has not provided secure feelings in collaborate among the members. Individual reward may reduce teamwork cooperation in improving company innovation. Reward that has not accommodated teamwork is the most common of the teamwork failure in organization (Woodman, et al., 1993). Teamwork that has been running well can be negative if the reward system implemented by the company does not support trust or beneficial for each member of the teamwork. Therefore, in addition to

awarding incentive individually, the company should add and develop incentive that can be received by teamwork members as a result of cooperation in the company.

References

Amabile, T. M., 1996. Assesing The Work Environtment for Creativity. Academy of Management Journal, Volume 39.

Amabile, T. M., 1997. Motivating Creativity in Organizations : On Doing What You Love and Loving What You Do. Volume 40.

Amabile, T. & Pratt, M., 2016. The dynamic componential model of creativity and innovation in organizations: Making progress, making meaning. Research in Organizational Behavior, Volume 36, pp. 157-183.

Barrow, M., 2009. Statistics for Economics, Accounting and Business Studies. United Kingdom: Prentice Hall.

Bock, G. W. & Young-Gul, K., 2002. Breaking the Myths of Rewards : An Explanatory Study of Attidus About Knowledge Sharing. Information Resources Management Journal.

Dreher, G. & Dougherty, T., 2001. Human Resource Strategy: A Behavioral Perspective for the General Manager. s.l.:McGraw-Hill Companies, Inc., New york.

Fay, D., Shipton, H., West, M. A. & Patterson, M., 2014. Teamwork and Organizational Innovation: The Moderating Role of the HRM Context. Creativity and Innovation Management.

Gunawan, T., Jacob & Duysters, 2016. Network ties and entrepreneurial orientation: Innovative. International Entrepreneur Management.

Hariandja, M. T. E., 2002. Managemen Sumber Daya Manusia. Jakarta: Grasindo.

Hariandja, M. T. E., 2006. Managemen Sumber Daya Manusia (Pengadaan, Pengembangan, Pengkompensasian, dan Peningkatan Produktivitas Pegawai). Jakarta: PT. Gramedia Widiasarana Indonesia.

Kuratko, D. F. & Richard M., H., 1995. Entrepreneurship. s.l.:s.n.

Mangkunegara, 2002. Manajemen Sumber Daya Manusia. Bandung: PT. Remaja Rosda Karya.

Menon, et al., 1999. Antecedents and Concequences of Marketing Strategy Making : A Model and a Test. Journal of Marketing, Volume 63.

Mulyadi & Setiawan, J., 2001. Sistem Perencanaan dan Pengendalian Managemen. Jakarta: Salemba Empat.

Naveh, E. & Erez, M., 2004. Innovation and Attentiontion to Detail in the Quality Improvement Paradigm. Management Science, Volume 50, pp. 76-86.

Ojasalo, J., 2008. Management Innovation Networks : A Case Study of Different Approach. European Journal of Innovation Management.

Robbins, S., 2013. Organizational Behavior. 15 ed. s.l.:Pearson.

Sarin, S. & Mahajan, V., 2001. The Effect of Reward Structures on the Performance of Cross-Functional Product Development Teams. Journal of Marketing, April.Volume 65.

Wei, Y. & Atuahene-Gima, K., 2009. The moderating role of reward systems in the relationship between market orientation and new product performance in China. International Journal of Research in Marketing, Volume 26, pp. 89-96.

Woodman, Richard & Sawyer, 1993. Toward Theory of Organizational Creativity. Volume 18.

Entrepreneurship for All: An Exploration of the Impact of Entrepreneurship Education across Disciplines

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Abstract: Increasingly, international entrepreneurship education policy has been attracting research attention (Smallbone & Welter, 2010). Entrepreneurship education has been pushed to the top of socio-economic and political agendas, and is currently a high priority imperative for government policy makers (Mitra and Matlay, 2004). It is widely recognised that the benefits of entrepreneurship education are not limited to the creation of new business ventures and subsequent new jobs, but will also develop key competencies of students, encourage innovative mind sets and as a consequence enable them to be more creative and self-confident in whatever they undertake. It has been highlighted by (Hytti & Kuopusjärvi, 2004, p.6) that there is also a distinction between preparing people to be enterprising/entrepreneurial and preparing them to be entrepreneurs. Additionally, there is an increasing role for entrepreneurship in a complex world where there are constantly changing needs of a very diverse population due to changes in society, technology and the economy. The design of specific entrepreneurship modules for non-business disciplines are key to making students more employable, giving them skills and knowledge required across all disciplines (Hamouda and Ledwith, 2016). The aim of this paper is to investigate the impact of the integration of entrepreneurship across third level programmes and explore its impact on the development of entrepreneurial mind-sets amongst undergraduate students. The findings are based on results of 137 surveys from graduates from across ten programmes in the Schools of Business and Humanities, Engineering and Applied Science and Nursing at Dundalk Institute of Technology, Ireland. The findings indicate that an entrepreneurship programme specifically designed for non-business students has had an overwhelming positive impact on their entrepreneurial attitudes and intentions. In particular, they have an increased entrepreneurial awareness and their level of confidence towards the consideration of starting a business as a viable career option has increased. The paper provides an innovative approach to entrepreneurship education and creates a framework for other third level institutions to develop similar initiatives to help lay the foundations for entrepreneurship to be the norm, and as such will also be of interest to researchers in this space.

Keywords: Entrepreneurship Education, Non-Business Disciplines, Impact, Culture, Graduates

1. Context and Rationale

In recent years, entrepreneurship education has increased both as a practice and as an area of study. The understanding and teaching of entrepreneurship is informed by a belief that the development of entrepreneurial capacity will bring economic and social benefits to regions, increasing both the quality and levels of employment. Entrepreneurship has been highlighted as 'one of the cornerstones of a modern, fully developed economy' Forfás (2007, p.5).

It is now widely accepted that the competitiveness and future prosperity of the Irish economy depends on the application of knowledge, innovation and entrepreneurship. There is a need to provide a sufficient quantity of skills to fill the emergent employment opportunities; to develop entrepreneurial skills which are relevant to all disciplines in an intrapreneurial context. In business, there is a need to provide the quality of skills required to drive growth and provide the diversity of skills to reflect the complexity of business.

In the Department of Jobs Enterprise and Innovation (2015, p.46) 'Action Plan for Jobs', the Government has set out a vision for Ireland to be among the most entrepreneurial nations in the world and acknowledged as a world-class environment in which to start and grow a business. It is vital that the role of entrepreneurship is optimised as an essential source of employment and wealth creation, thereby positioning entrepreneurship as a key element in the economic growth agenda. Hisrich et al., (2013, p.6) states that entrepreneurship plays an important role in the creation and growth of businesses, as well as in the growth and prosperity of regions and nations, however, they also recommend that in order to recognise, evaluate and exploit opportunities enterprising individuals are required.

There has been a call for entrepreneurship education to be embedded in all courses at third level to help develop and nurture entrepreneurial mind-sets (Fitzsimons and O'Gorman, 2013). Furthermore, it has been suggested third level programmes should take a multi-disciplinary approach to support the entrepreneurial ideas that emerge outside of business faculties (O'Keeffe, 2013). The Hunt report (2011, p.56) on the National

Strategy for Higher Education to 2030 in Ireland suggests that creativity and entrepreneurship must be encouraged to a much greater extent at undergraduate level.

Botham and Mason (2007, p.9) suggested that the widespread teaching of entrepreneurship is perhaps one of the reasons for the entrepreneurial nature of the United States economy. The call for culture and education to support entrepreneurship in Ireland is recognised in Forfás (2007, p.57). Ideally it suggests that culture and education will be mutually re-enforcing and complementary in fostering a spirit of enterprise throughout society, strengthening the motivation and capacity of entrepreneurs and potential entrepreneurs.

2. Entrepreneurship Education

It is widely recognised that the benefits of entrepreneurship education are not limited to the creation of new business ventures and subsequent new jobs, but will also develop key competencies of students, encourage innovative mind sets and as a consequence enable them to be more creative and self-confident in whatever they undertake. Mwasalwiba (2010), reviewed literature on entrepreneurship education and found that the most common definition for entrepreneurship education is that of an educational process designed to influence individuals' attitudes, behavior, values or intention towards entrepreneurship. He found there was relative agreement among academics that the main rationale for entrepreneurship education is more economic than social, with entrepreneurship being seen as a solution to economic problems, in particular employment.

However, there has been a move towards a behavioral view with a focus on entrepreneurship education to influence attitudes, values and a general culture. In this way, scholars are reluctant to associate entrepreneurship education strictly with new venture creation as a sole educational objective. It has been highlighted by (Hytti and Kuopusjärvi, 2004, p.6) that there is also a distinction between preparing people to be enterprising/entrepreneurial and preparing them to be entrepreneurs. The EU's position, in common with the OECD adapts a wider view of entrepreneurship and encourage the adaption of this in an educational context:

> *"Entrepreneurship refers to an individual's ability to turn ideas into action. It includes creativity, innovation and taking calculated risk, as well as the ability to plan and manage projects in order to achieve objectives. This supports everyone in day-to-day life at home and in society; makes employees more aware of the context of their work and better able to seize opportunities, and provides a foundation for entrepreneurs establishing a social or commercial activity."* (European Commission, 2008)

As entrepreneurship plays such a vital role in the development of an economy and the creation of wealth and jobs, the question for the educational sector is how to develop training programmes which will instill the necessary skills in students to allow them to operate as graduates in an entrepreneurial manner. Henry et al., (2003, p.196), asserts that at the individual level, students who have completed entrepreneurship programmes are more likely to:

- create more businesses and employment
- generate more business contacts
- have a broader range of skills and knowledge
- possess greater self-confidence in their entrepreneurial abilities
- test the commercial viability of their idea
- improve their employability even if they do not start a business

The European Commission (2008 p.26) has specified the importance of the development of entrepreneurship education at third level. It suggests that there are features of entrepreneurship education that are common within all disciplines and programmes and courses should be geared to the acquisition of generic and horizontal skills, aimed at making students:

> *'…. more creative/innovative; highly motivated; pro-active; self-aware; self-confident; willing to challenge; better communicators; decision-makers; leaders; negotiators; networkers; problem solvers;*

team players; systematic thinkers; less dependent; less risk averse; able to live with uncertainty; capable of recognising opportunities.'

The same report recognises that the teaching of entrepreneurship needs to be tailored to the specific needs of different fields of study. Volkmann (2004, p.185) states that entrepreneurship taught and learned on the basis of an interdisciplinary approach at universities, introduces new forms of knowledge and teaching methods as well as new problem-solving skills for students. Terms such as "multidisciplinary" and "interdisciplinary" entrepreneurship education are being used to explain models where collaboration occurs between different disciplines. The extent to which the collaboration occurs can range from side by side delivery of lecture material to the total integration of the different disciplines in a programme or a module or a single assignment project. Technological and Business disciplines are well suited to such collaboration.

3. Methodology

The overall objective of the study was to explore the impact of entrepreneurship education on the development of the students from across disciplines, in particular their understanding, attitudes to and interest in entrepreneurship as a result of engaging with entrepreneurship as part of their programme. An exploratory research approach was used to identify and investigate new insights suggested by the results of the study within the context of public policy and current practice in Ireland in the area of multi-disciplinary entrepreneurship education. An exploratory study is a valuable means of 'what is happening; to seek new insights; to ask questions and to assess phenomenon in a new light' (Robinson, 2002, p.59).

The primary research was designed to gain a perspective from graduates across disciplines at Dundalk Institute of Technology. The intention was to consider entrepreneurship education from a demand-side (both the attitudes towards and interest in entrepreneurship and impact and experience of entrepreneurship education from the students' perspective).

Programmes were identified from across disciplines at Dundalk Institute of Technology (DKIT) which included entrepreneurship as part of their programme. These students (a total of 356) were surveyed electronically in March 2018 using Survey Monkey sent out via e-mail (see www.surveymonkey.com) which collated the results and provided the means for analysing the responses. A survey provides an efficient tool for collecting background, quantifiable data from a specific sample, as well as gathering qualitative information from respondents in the form of experiences and views (Saunders et al., 2018). The survey response rate was 38%. The survey was broad in its application and was designed to collect both quantitative and qualitative information. The survey was structured into the following sections:

1. Sought to establish information regarding graduates' profile to include; their age, gender, nationality, background in family business, discipline, current stage of their programme, and also to confirm they have or are currently taking an entrepreneurship module as part of their programme.
2. Sought to determine their perception of the relevance of entrepreneurship to their programme.
3. Sought to elicit their perception of how entrepreneurship education (EE) has impacted the development of their entrepreneurial characteristics and skills
4. Sought to explore their understanding of and attitude towards entrepreneurship and how this has been impacted by their engagement with an entrepreneurship module.
5. Sought to investigate students' perception of the impact of the entrepreneurship module on their employability and career development.
6. Students were also asked how confident they feel to start a business at some stage in the future.
7. Finally students were asked to highlight what have they gained from their experience of participation in entrepreneurship as part of their programme.

4. Findings and Discussion

The survey was administered via e-mail to 353 participants across 10 undergraduate programmes at Dundalk Institute of Technology (outlined in Table 3). A total of 135 surveys were completed and analysed using Survey Monkey.

4.1 Profile of Survey Participants

Of the 135 respondents, 43 are male and 94 female. The age profile is spread across 4 categories as outlined in Table 1 below. The majority, 110 (81%) are Irish with the remaining students representing the international community which is reflective of the colleges growth and internationalisation.

Table 1: Age Profile of Participants (n= 135)

Age Category of Participants	**Male 43**		**Female 94**	
18-22 Years	20	47%	44	48%
22-26	10	23	27	29
27-39	8	19	8	9
40-50	1	2	11	12
50-65	4	9	4	4

Table 2: Nationality of Students (n=135)

Nationality	**Number of Respondents**	**% of Respondents**
Irish	110	81
European	9	7
Chinese	6	4
Malaysian	1	0.77
Saudi	6	5
Other*	4	3

* included; US, Czech and Kazakhstan

Table 3: Students' Area of Study (n=135)

Area of Study	**Current Year of Study**	**Number of Respondents**	**% of Respondents**
Community Youth Work	7 Y3, 3 Y4	10	7
Social Care	Y4	19	12
Business and Management	Y3	39	29
Marketing PR and Communications	Y4	6	4
Digital and International Business	Y4	9	7
Business and Technology	10 Y3, 3 Y2	13	10
Hospitality Management	7 (Y4), 3 (Y1)	10	7
Engineering Entrepreneurship	Yr4	7	5
Agricultural Science	11 Y3, 3 Y4	14	10
Early Childhood Studies	2Y3, 6 Y4	8	6

Students come from across a broad range of disciplines, Business, Social Science (Humanities), Engineering and Science. All of the students have either already taken or are currently taking an entrepreneurship module as part of their programme.

4.2 Students Attitude Towards and Understanding of Entrepreneurship

It is positive that the majority perceive entrepreneurial skills as very relevant (31%) and somewhat relevant (50%) to their area of study (as outlined in Table 4). There are comparisons across disciplines with the majority (90%) of those from Business disciplines considering these skills to be of relevance whereas this drops to (59%) amongst the Social Science disciplines and increases (91%) amongst the Science disciplines. Furthermore, the majority indicated that they have a very good (19%) or a fairly good (51%) understanding of entrepreneurship prior to taking the module. This understanding varied across disciplines; 48% amongst Social Science students and 80% amongst Business and Science disciplines.

Table 4: Students' Perception of the Relevance of Entrepreneurial Skills to their Area of Study (n=135)

Level of Relevance	**Number of Respondents**	**% of Respondents**
Very Relevant	42	31
Somewhat Relevant	68	50
Not Relevant at all	15	11
Unsure	10	7

Furthermore, it should be noted that the majority (70% had a very good (19%) and fairly good (51%) understanding of entrepreneurship prior to engagement with EE. This highlights exposure to entrepreneurship through other channels. However, it is interesting that 54% of students from Social Science indicated a poor (35%) or very poor (19%) understanding of the topic prior to taking the module.

Table 5: Students' Understanding of Entrepreneurship Prior to Engagement with Entrepreneurship Module (n= 135)

Level of Understanding	Number of Respondents	% of Respondents
Very Good	25	19
Fairly Good	69	51
Poor	30	22
Very Poor	11	8

4.3 Impact of Module on Student's Understanding and Awareness of Entrepreneurship

Students were asked to gauge their level of understanding and awareness of entrepreneurship and how this has changed since engaging with EE. This is detailed in Table 6. The majority (76%) have an increased understanding and awareness which indicates a positive impact. This rises to 81% amongst the Business students. However, it is interesting to note that for 33% of the Social Science students, they have no significant understanding and awareness of entrepreneurship since taking the module.

Table 6: Extent to which Students' Understanding of and Awareness of Entrepreneurship has Changed since Engaging with Entrepreneurship Module (n=135)

Level of Understanding and Awareness	No. of Respondents	% of Respondents
I now have a much greater understanding and awareness	50	37
I now have an understanding and awareness	52	39
I have no significant understanding and awareness	21	16
Unsure	12	9

In order to probe this area further, students were invited to highlight how key entrepreneurial characteristics and skills have developed since engaging with entrepreneurship education. The results are outlined in Table 7. It is considered that the areas of communication and presenting/pitching skills, teamwork and leadership skills have been well developed by the majority. Students felt that other core skills such as confidence, creativity and innovation, being an independent thinker had only increased a little (or perhaps are more cautious in their consideration of the development of these core skills during this timeframe). It is interesting that many felt that negotiation (58%) and persuasiveness (45%) had not changed at all.

Table 7: Perception of the Development of their Entrepreneurial Skills/Characteristics (n=135)

Characteristic/Skill	Increased a Lot	Increased a Little	No Change at all	Decreased a Little	Decreased a Lot
Confidence	28 (21%)	68 (50%)	35 (26%)	2 (1%)	2 (1%)
Creative/Innovative	28 (21%)	63 (47%)	40 (30%)	1 (0.75%)	2 (1%)
Determined/Driven	29 (22%)	49 (37%)	42 (31%)	10 (7%)	4 (3%)
Persuasive	17 (13%)	52 (40%)	59 (45%)	2 (1%)	2 (1)
Communication	35 (47%)	37 (50%)	26 (35%)	0 (0%)	2 (3%)
Independent Thinker	25 (34%)	43 (57%)	30 (40%)	1 (1%)	1 (2%)
Team Player	29 (39%)	32 (43%)	32 (43%)	6 (8%)	1 (2%)
Leadership	29 (39%)	36 (48%)	32 (43%)	1 (1%)	1.5 (2%)
Problem Solver	22 (29%)	43 (57%)	32 (43%)	1 (2%)	2 (3%)
Presenting/Pitching	35 (47%)	32 (43%)	29 (39%)	2 (3%)	2 (3%)
Networking	15 (20%)	44 (59%)	39 (53%)	0 (0)%)	2 (3%)
Negotiation	16 (21%)	39 (52%)	43 (58%)	1 (2%)	1 (2%)
Decisive/Assertive	19 (26%)	40 (54%)	39 (52%)	1 (1%)	1 (2%)

4.4 Entrepreneurship and Career Development

Students were asked to indicate how important they perceived Entrepreneurship Education (EE) to be for the development of their career as outlined in Table 8. It is reassuring to see that the majority (78%) perceive it to be important. The majority (90%) of those from Business disciplines have a positive perception towards linking EE to their career development. This contrasts with 60% from Social Sciences.

Table 8: Importance of Entrepreneurship Education for Career Development (n=135)

Level of Importance as perceived by the Students	Number of Respondents	% of Respondents
Extremely Important	42	31
Somewhat Important	64	47
Not Important at All	19	14
Unsure	10	7

They were subsequently asked to indicate the level of impact they feel (EE) has on key skills/characteristics for career development as detailed in Table 9. It is interesting to note that the majority feel that EE impacts positively on key skills and characteristics, in particular, creativity/innovation, developing new ideas, team management, planning, leadership and the pitching of new ideas to a panel. This reflects their perception of the impact of the module on the development of these core skills. It should be highlighted that 46% of Social Science students do not feel that their EE will help to make them more employable. Of this same group 41% did not feel their EE was important for their career development.

Table 9: Perception of Impact of EE on key Skills/Characteristics for Career Development (n=135)

Characteristic/Skill	Will have a Significant Impact	Will have an Impact	Will have No Impact at All
Creativity/Innovation	34 (46%)	46 (62%)	20 (27%)
Problem Solving/Critical Thinking	30 (40%)	49 (65%)	22 (29%)
Developing New Ideas	38 (51%)	44 (59%)	18 (24%)
Team Work	44 (59%)	35 (47%)	25 (29%)
Team Management	41 (55%)	40 (54%)	19 (26%)
Calculated Risk Taking	27 (36%)	45 (61%)	25 (38%)
Planning	39 (52%)	42 (57%)	20 (27%)
Leadership	32 (43%)	48 (65%)	20 (27%)
Networking	29 (39%)	47 (63%)	24 (33%)
Presenting and Pitching	44 (60%)	36 (48%)	20 (27%)
Negotiating	27 (36%)	47 (64%)	26 (35%)
Marketing	41 (54%)	36 (48%)	36 (48%)

Table 10: Perception of Impact of Entrepreneurial Skills on Employability

Statement	Number of Respondents	% of Respondents
I feel it will help make me more employable in the future	85	63
I do not feel it will help make me more employable in the future	35	26
I am unsure	15	11

Table 11: Perception of Importance of Entrepreneurship Education for Future Career Development (n=135)

Level of Importance	Number of Respondents	% of Respondents
Extremely Important	42	31
Somewhat Important	64	47
Not so Important	19	14
Not Important at All	10	7

4.5 Level of Confidence in Starting their own Business in the Future

Participants were asked to indicate how confident they feel about starting a business in the future. They were given three statements and asked to indicate which best describes them individually in terms of how confident they feel to start a business. Results are displayed in Table 12. The majority feel confident (22%) or very confident (44%) that they will start a business at some stage in the future. The majority (75%) of Business students feel confident about starting businesses while in contrast the majority (60%) of Social Science Students do not feel confident they will start businesses in the future.

Table 12: Level of Confidence to Start a Business in the Future (n=135)

Statement by Student	Number of Respondents	% of Respondents
I feel confident that I will start a Business at some stage in the future	30	22
I now feel very confident that I will start a Business at some stage in the future	60	44
I do not feel confident that I will start a Business at some stage in the future	45	33

4.6 Students' Experience of Entrepreneurship Education

Students were asked to indicate their experience of the module. This was left an open question in order to gauge opinions, attitudes and experiences further. There was a mix of responses which indicated a positive experience and included; an increase in confidence, development of team work skills, creativity and problem solving skills and other broad business development skills.

4.7 Increase in Confidence

Many students highlighted that their confidence has been increased through the process of researching and developing an idea through to pitching to a panel and speaking in public which developed a level of professionalism they may not have experienced before. It was also mentioned by some students that their confidence to pursue their ideas has increased:

'…I gained confidence, just because I am not an expert on a subject does not mean that I cannot pursue it!!'

4.8 Teamwork Skills

It was highlighted that one of the core skills to be developed was that of team work and team management as many of the tasks and projects initiated were team based. For many students, their course work to date had been at individual level so this experience offered the opportunity to develop a core skill necessary in both an intrepreneurial and entrepreneurial context.

'…. it gave me a great experience of leading a team and make sure the group is productive and the goals achievable.'

4.9 Creativity and Problem Solving Skills

Many students across all disciplines highlighted that the module provided an opportunity to develop their creative potential, critical thinking and problem solving skills. Some of the comments included:

'…I learned to think out of the box, how to create something from nothing.'

'..there are no rules, everything is possible!!'

'..it has helped me not only come up with ideas but actually flesh them out and realise whether or not they are viable.'

4.10 Business Development Skills

Students developed core business development skills such as networking, planning, communication and business acumen that will not only make them more employable and help with their career development but provides them with a toolkit that they can use for developing projects regardless of their discipline. Some students commented:

'…I gained a greater understanding of how business works and a gained a good overview of business development.'

'…an incredible increase in the understanding of how a business operates.'

'…from develop an idea, looking at all aspects in relation to that idea, how to market and pitch that idea.'

'..I do not intend to start my own business but the theory of learning will have a great impact when planning things like fundraisers or starting up a new activity group.'

'…I've always wanted to have my own business; I just needed the building blocks and some guidance to put me in the correct patch in able to achieve it'.

'.. gave me an insight into what employers and customers look for in an individual.'

4.11 Social Science Students

It is interesting that students from this discipline had a similar experience to the other cohorts as well as highlighting specific experience of social entrepreneurship:

'..I now know there is an opportunity for social entrepreneurship.'

'… I learned what social entrepreneurship is all about, how it impacts on society in a pro-community setting'.

' ….initially I wasn't sure how applicable this was to me, ..now after doing a rocket pitch, I feel more capable to create and plan ideas that will help me in youth work. It also let me identify and analyse what I actually want to do in the future.'

5. Discussion and Conclusions

The results indicate significant benefits for the graduates of all programmes across disciplines. Graduates are more confident, are experienced in idea generation and resourceful in pursuing opportunities to commercial value. These skills have obvious application in the setting up of a new business but are equally valuable in all organisations where the need for innovation is becoming more compelling. Furthermore, many students highlight they are confident they will start a business at some stage in the future. This is significant as it indicates that students are confident in their ability to pursue entrepreneurship as a viable career option going forward after graduation. This reflects a positive impact of entrepreneurship education across disciplines. This also indicates that a sizeable cohort have embraced the culture of entrepreneurship. This concurs with Mwasalwida (2010) in his review of entrepreneurship education literature which reveals a process designed to influence attitudes and intentions towards entrepreneurship.

Additionally, this study shows that students are not only developing a business idea for the purpose of earning their qualification, but are interested in the further development of their idea and application of the skillset acquired. These findings concur with Henry et al., (2003 pp 196-197) who highlighted that students who have completed entrepreneurship programmes yield certain direct benefits, for example; having a broader range of skills and knowledge; possessing greater self-confidence in their entrepreneurial abilities and improving their employability even if they do not start a business.

At higher education level, a central purpose of entrepreneurial education should be to develop entrepreneurial capacities and mind-sets. Research highlights the benefits of providing entrepreneurship education to those students outside the business school (European Commission, 2008). With a change in employment structures and sources, there is an ideal opportunity to introduce new sources of employment and present self-employment as an attractive and profitable alternative to the conventional career prospects for graduates.

The literature shows strong support for a multi-disciplinary approach to entrepreneurship education. The report of the European Commission (2008, p.29), states that traditional educational methods do not correlate well with the development of entrepreneurial traits and attributes and that multi-disciplinary collaboration is an essential element of building enterprising abilities. The strategy of 'Entrepreneurship for All' disciplines responds very well to the distinct aims of the Department of Jobs Enterprise and Innovation (2014), National Policy Statement on Entrepreneurship in Ireland which is to:

- Build the pipeline of entrepreneurs
- Build entrepreneurial capability
- Build the right conditions for entrepreneurship

In order to understand further the long term impacts of such a programme, a longitudinal study will be required to track the progression of the participants and understand the influence and benefits of entrepreneurship education post-graduation. This paper provides an example of an innovative response to the challenges presented by an ever changing global economy. The results clearly indicates the strategy of entrepreneurship education being offered to all students regardless of discipline is successful in making students more employable, giving them skills and knowledge required and in the long term generating an entrepreneurial culture which is a pre-requisite for sustainable economic growth.

References

Botham, J. and Mason, C. (2007), Good Practice in Enterprise Development in UK Higher Education. National Council for Graduate Entrepreneurship, Research report 004/2007.

Department of Jobs Enterprise and Innovation, Ireland. (2015). Action Plan for Jobs.

European Commission (2008). Entrepreneurship in higher education, especially within non-business studies - Final Report of the Expert Group. European Commission, Enterprise and Industry Directorate-General.

Fitzsimons, P. and O'Gorman, C. (2013). Global Entrepreneurship Monitor - The Annual Report for Ireland. Dublin City University Business School: Dublin.

Forfás (2007). Towards Developing and Entrepreneurship Policy for Ireland. Dublin: The National Policy and Advisory Board for Enterprise, Trade, Science, Technology and Innovation.

Henry, C., Hill, F. and Leitch, C. (2003). Entrepreneurship Education and Training. Aldershot: Ashgate.

Hisrich, R. D., Peters, P. P and Shepherd, D. A., (2013). Entrepreneurship. New York: McGraw-Hill.

Hytti, U. and Kuopusjärvi, P. (2004). Three Perspectives to Evaluating Entrepreneurship Education: Evaluators, Programme Promoters and Policy Makers. Paper presented at the European Foundation for Management Development, 34th Entrepreneurship, Innovation and Small Business Conference Turku, Finland.

Hunt, C., (Chairman) (2011). National Strategy for Higher Education to 2030 - Report of the Strategy Group. Dublin: Department of Education and Skills, Ireland.

Lumsdaine, E., and Blinks, M., (2003). Teaching Entrepreneurship to Engineers. Proceedings of the 2003 American Society for Engineering Education Annual Conference and Exposition.

Mitra, J. and Matlay, H. (2004). 'Entrepreneurial and Vocational Education and Training: Lessons from Eastern and Central Europe. Industry and Higher Education, Feb 2004, Vol. 18, Issue 1, pp 53-61.

Mwasalwiba, E.S. (2010) Entrepreneurship Education: a review of its objectives, teaching methods, and impact indicators. Education and Training, Vol. 52, No. 1, pp 20-47.

O'Keeffe, F. (2013 October 11). Can Entrepreneurs bring back prosperity? Working together, government, industry and academia can build an environment for entrepreneurship to flourish. Irish Times.

Robson, C. (2002). Real World Research: A resource for social scientists and practitioners. Oxford: Blackwell. pp 59-60.

Saunders, M. and Lewis, P. (2018). 'Doing Research in Business and Management: an essential guide to planning your project. Second Edition. Pearson. Pp 120-121.

Smallbone, D. and Welter, F. (2010). 'Entrepreneurship and Government Policy in Former Soviet Republics: Belarus and Estonia Compared. Environment and Planning C. Government and Policy, 28. Pp 195-210.

Volkmann, C. (2004). Entrepreneurial Studies in Higher Education. Higher Education in Europe'. Vol. 29, No. 2.

From Mind to Market: Innovation insights from the Welsh Life Sciences and Health Ecosystem

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Abstract: As a nation, Wales faces a number of social and economic barriers to the improved health and wealth of its population. Health innovation can play a key role in overcoming these challenges, providing improved patient health outcomes, reducing health system in-efficiencies and catalysing wider economic growth. Despite this, attrition rates of Life Science and Health SME's in the UK are high, with a multiplicity of barriers to successful innovation existing. Efficient innovation management processes are regarded as an indicator of successful innovation outcomes. Early intervention via the analysis of innovation characteristics can help assess both strengths and weaknesses, highlight barriers and enablers and provide an insight into the future direction and developmental requirements for the innovation. To overcome many of the barriers identified, access to appropriate knowledge, expertise and resource is imperative. This is reflected in the international rise of open innovation models, first popularised by Chesborough (2003). Innovation in health consists of a complex web of interaction between public and private sector actors. Ecosystem transparency plays an important role in facilitating collaborative relationships among actors of the Quadruple Helix, allowing entrepreneurs and firms to identify and access external sources of knowledge, expertise and resource. This paper describes the development and use of an innovation analytic tool, referring to case studies from a clinical innovation programme in Wales. This is coupled with an extensive mapping exercise of the Life Science and Health ecosystem across Wales. In combination, the approach promotes the creation of a trans-disciplinary open innovation environment, and mediates the creation of bespoke commercialisation pathways. Ultimately, the paper develops a framework to facilitate the co-creation of health innovation amongst actors from the Quadruple Helix in Wales.

Keywords: Innovation, Life Science, Health, Tool, Ecosystem, Collaboration, Translation.

1. Challenges facing Wales

Wales, once a power house of the industrial revolution, providing coal and steel to fuel industrial expansion globally, has witnessed a struggle in its transition from traditional industries to a new knowledge-based economy. The economic performance of Wales is seen to lag behind many of its national and international counterparts. The Gross Value Added (GVA) per capita in Wales, a common measure of economic output per head of population, ranked lowest across the four regions of the UK in 2015 (Office for National Statistics, 2017). Patterns of low economic output are supported by long term higher than UK average unemployment rates (Welsh Government, 2018).

Alongside the challenges facing the Welsh economy, the National Health Service in Wales (NHS Wales), faces significant challenges in providing high quality, consistent levels of healthcare in a sustainable manner. This is driven by an ever ageing population, increasing burdens of chronic disease in both young and elder populations and rising patient expectations (Bevan Commission, 2013) amongst other factors. Currently, the Welsh Government spends 48.4% of the £15bn devolved national budget allocated to Wales from the UK central government on Health, Wellbeing and Sport (Welsh Government, 2016). Of concern, is the current trends that growth in spending on Health and Care in Wales is beginning to outstrip wider national economic growth (UK Parliamentary Review, 2018). In 2014, The Nuffield Trust identified a growing financial gap between the services the NHS in Wales is expected to provide and what it can afford to provide. This financial gap in Wales is predicted to be in the region of £2.5bn by 2025/2026 (Roberts & Charlesworth, 2014). As a result, the current model of healthcare provision in Wales is considered unsustainable (UK Parliamentary Review, 2018), with a recognised need to re-evaluate service provision models.

2. The Life Science Sector in Wales

The Health and Life Sciences sectors are inherently inter-connected and play important roles in co-creating innovative solutions to health care challenges facing modern society. Globally, The Life Sciences sector possesses an exemplary history in the development of ground breaking medical

innovation. The Life Sciences sector is defined by the Welsh Government (2013) as: 'Pharmaceutical, Biotechnology and Medical Technology with wide ranging activities including research, testing, manufacturing and the provision of specialist services'. In Wales, the Life Sciences sector currently consists of over 350 companies and employs over 11,000 people (Welsh Government, 2018).

3. Theoretical Context

Innovation can be defined as the 'successful exploitation of new ideas' (Cox, 2005) or in layman's terms taking ideas 'from mind to market'. Innovation in multiple forms, is associated with increased productivity levels (Hall *et al.,* 2009), which is considered to drive increased performance and efficiency, which in turn can manifest itself through both organisational growth and cost efficiency savings. Healthcare innovation is defined by Omachonu & Einsprach (2010) as the "*introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, outreach, prevention and research, and with the long term goals of improving quality, safety, outcomes, efficiency and costs."* Thus innovation from the Life Sciences and Health sectors will play a critical role in ensuring the sustainability of NHS services, improving patient health outcomes and driving wider economic growth in Wales.

However, health innovation is renowned for its challenging nature. Barriers to success commonly include significant capital requirements (DiMassi *et al.,* 2003), a complex and uncertain regulatory landscape (Wagner *et al.,* 2006) and often long developmental time frames (DiMassi *et al*., 2003), amongst many others.

Consequently, on average, only 17% of innovation processes (not specific to health) are considered successful (Strategyn, 2010), with project failure having a detrimental effect on the survival and growth of firms (Cefis & Marsili, 2005). The difficult nature of innovation in the UK Life Sciences sector is reflected by a three-year failure rate of 39% for SME's in 2011, highlighted by the UK Department for Business, Innovation and Skills (2011).

The innovation process is considered hard to manage (Cormican & O'Sullivan, 2004) with the initial stages described as 'Fuzzy' (Kim & Wilemon, 2002). Well managed innovation processes are considered to have a significantly positive influence on organisational competitive success (Adams *et al.,* 2006), however Small and Medium Sized Enterprises (SME's) commonly pursue a less structured approach to innovation (De Toni & Nassimbeni, 2003), which may offer insight into the high attrition rate of smaller companies identified previously. Frankel *et al.,* (2000) describe how established management practice competencies associated with increased performance, including the ability to quantify, evaluate and benchmark technological capabilities, often poses a significant challenge to contemporary organisations. Benchmarking is a common management practice associated with improved performance (Camp, 1989) which is described by Borsi *et al.* (2004) as "*an analytical management technique, which may be used to compare internal performance with the best external performance to identify strengths and weaknesses".*

Work by Cooper & Kleinschmidt (1995), identifies a high quality new product process, a clear well communicated new product strategy and adequate resources as the three greatest drivers of improved innovation performance. Findings are supported by Salomo *et al.* (2007) who identify that proficiency of project planning and process management are important determinants of ultimate new product development (NPD) success. Success factors identified throughout the literature also highlight the importance of external influences on the success of innovation efforts (Chang, 2003). The "liability of smallness" is a term used by Aldrich & Auster (1986), to describe the challenges SME's face with regards to a lack of resource including both financial and human capital, with small firms reported to commonly lack the multi-disciplinary skills base required for successful innovation activity (Bianchi *et al.,* 2010). Having linkages with actors who possess complementary assets is regarded to play a critical role in successful innovation with two main network benefits of resource sharing and knowledge spill overs described by Ahuja (2000). Acquiring knowledge and skills through collaboration is thus considered an effective and efficient way of successful innovation (Adams *et al.,*1998).

Open Innovation, a concept first popularised by Henry Chesborough (2003), refers to "*the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation*" (Chesborough, 2006). Knowledge creation is considered a social process (Nonaka and Takeuchi, 1995) and plays a central role in innovative activity (Cohen & Levinthal, 2000). Innovation thus emerges as a result of social interaction, when a diverse range of actors share complementary knowledge (Blomqvist and Levy, 2006). The Triple Helix Model described by Etzkowitch & Leydesdorff (1995) supports this view, proposing a co-evolutionary approach to technological development amongst actors from academic, industrial and governmental spheres.

4. Aims of this paper:

The positive influence the adoption of both strong innovation management practices and open innovation approaches by SME's can have on innovation outcomes has been outlined. This paper presents a framework to support the Health Innovation management process, utilising an integrated mapping methodology for the planning and implementation of knowledge transfer and commercialisation activities. The approach combines the use of an innovation analytic tool, and a Health Innovation ecosystem mapping exercise. In combination, the two outlined mapping processes facilitate the identification of actors and resources and the construction of bespoke commercialisation pathways for Health Innovation in Wales. This approach aims to increase the success rate of the translation and adoption of Health Innovation in Wales, increasing the pace and efficiency at which innovation is taken from 'Bench to Bedside'. The approach has application for practitioners, policy makers and wider Life Sciences and Health ecosystem stakeholders, promoting the co-creation of health innovation between ecosystem stakeholders.

5. Innovation Analytic Tool

Many tools have previously been designed to make managing the innovation process more simple (Cormican & O'Sullivan, 2004), however no single tool appears to have been widely adopted. Prior to the onset of innovation, it is important to assess the innovation capabilities and resources that exist. Learnings from such tasks generates Actionable Knowledge relating to the current and future requirements of specific innovation projects. This permits managers or practitioners to pinpoint areas of strength and weakness in their innovation armory when benchmarked against known best practice, and thus ensures often restricted project resource is allocated in the most efficient manner, to areas where intervention may be most effective. The use of Maturity Matrices (or otherwise referred to as star charts or radar charts amongst other terms) to assess innovation is not new, and is a methodology used across a broad range of subject areas (Arundel & Hollanders, 2005; Kohler *et al.,* 2013; Kaczynski *et al.,* 2008; Miguel *et al.,* 2017). Maturity Matrices allow the visual examination of multiple metrics simultaneously, permitting users to identify strengths and weaknesses through observations relating to the symmetry or the uniformity of data points (Atanassova, 2010). The use of Maturity Matrices also permits users to benchmark performance across multiple data sets. Further, Maturity Matrices permit the user to assess temporal changes between data sets, offering an effective way to demonstrate time series data (Atanassova, 2010). Consequently, the innovation analytic tool presented utilises a maturity matrices methodology to visualise performance indicators against identified best practice, aligning with the innovation audit technique suggested by Tidd *et al.,* (2005).

The Innovation analytic tool is designed to assess innovation capabilities and characteristics of in-vivo innovation projects, teams and organisations, that may enable or present a barrier to successful innovation outcomes. The result of such analysis provides a strategic blueprint which can subsequently be used to guide the future direction of the innovation planning process. The factors, against which innovation projects are assessed, were developed by identifying common Critical Success Factors relating to Innovation projects throughout the associated literature. Literature utilised in the design of the analytical model included work by Adams *et al.,* (2006) who outline seven broad themes of innovation management measurement including: Inputs Management, Knowledge Management, Innovation Strategy, Organisation and Culture, Portfolio Management, Project Management and Commercialisation. Rothwell (1992) identifies eight key characteristics related to successful innovation including, amongst others: High quality internal and external communication, Careful planning procedures, the presence of technological gatekeepers and high quality

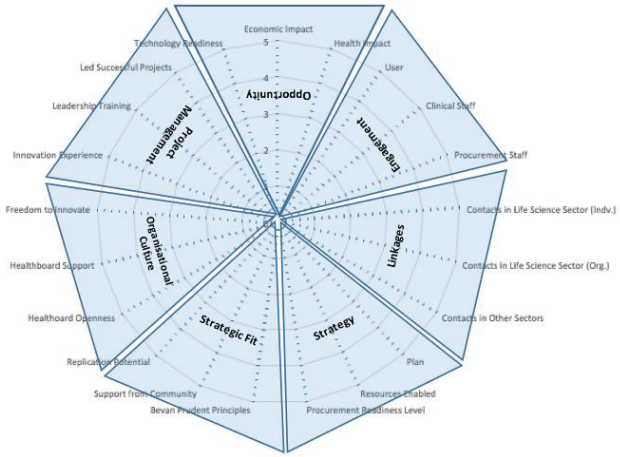
management. Other literature utilised in the design of the evaluation metrics included work by Cooper & Kleinschmidt (1995) and Pinto & Slevin (1988).

However, a 'one size fits all approach' seems unlikely to be most effective, as different forms of innovation across different industries possess differing developmental requirements and are governed by different external factors. This view is supported by Baker *et al.* (1983) who identify that critical success factors associated with projects vary according to business and project nature. The analytic tool therefore ensures the measurement variables are most appropriate to assess Health Innovation projects by incorporating perspectives of actors from the Life Science and Health sectors in Wales, using the findings of an exploratory questionnaire examining the barriers and enablers of the translation and adoption of Health Innovation.
The innovation analytical tool developed (Figure 1), was based around the work of Chiesa *et al.,* (1996) and Tidd *et al.* (2005), which latterly focusses around auditing innovation management. Tidd *et al.* (2005) suggests that "*organizations with no clear innovation strategy, with limited technological resources and no plans for acquiring more, with weak project management, with poor external links and with a rigid and unsupportive organization would be unlikely to succeed in innovation*". The auditing process used by Tidd *et al.,* (2005), utilised a scale based approach to assess innovation competencies in five different areas including: Strategy, Processes, Organisation, Learning and Linkages. The work then applies the information acquired to a maturity matrix, to produce a visualization of innovation forms, an approach which was adopted in the development of this analytical model.

The innovation analytic tool was initially piloted using the Bevan Commissions Exemplars Programme. The Bevan Commission Exemplars programme was designed to encourage NHS staff in Wales to develop, try out and test at speed, new ideas and ways of working within the Welsh NHS. Programme data was collected using questionnaires exploring self-assessed competencies in seven areas considered influential in determining innovation outcomes as well as assessing the opportunity trajectory and the strategic fit of the project (see Figure 1a and 1b). Question topic areas focused around: the proposed opportunity, participants engagement with stakeholders, participants linkages, participant innovation strategy, project strategic fit, organisational culture and participant project management. The questionnaire used a self-evaluative approach issued at three points (onset, mid-point and conclusion) throughout the 12-month programme duration. The questionnaire utilised a Likert or Summative-type scale, an objective measure used frequently across health research (Hartley, 2014). This approach aligned with that of the innovation audit methodology proposed by Tidd *et al.,* (2005). Results presented in Figure 1 illustrate the use of the Maturity Matrices methodology and innovation analytic tool for the Bevan Exemplars programme. Figures 1a and 1b show the construct of the innovation analytic tool, and Figures 1c and 1d demonstrate the use of the innovation analytic tool to assess the strengths and weaknesses of individual projects and to examine the overall cohort development.

a)

b)



Figures 1a and 1b show the construct of the innovation analytic tool used in the Bevan Commission Exemplars programme, which examines innovation characteristics around twenty-one indicators categorised into seven themes.

c)

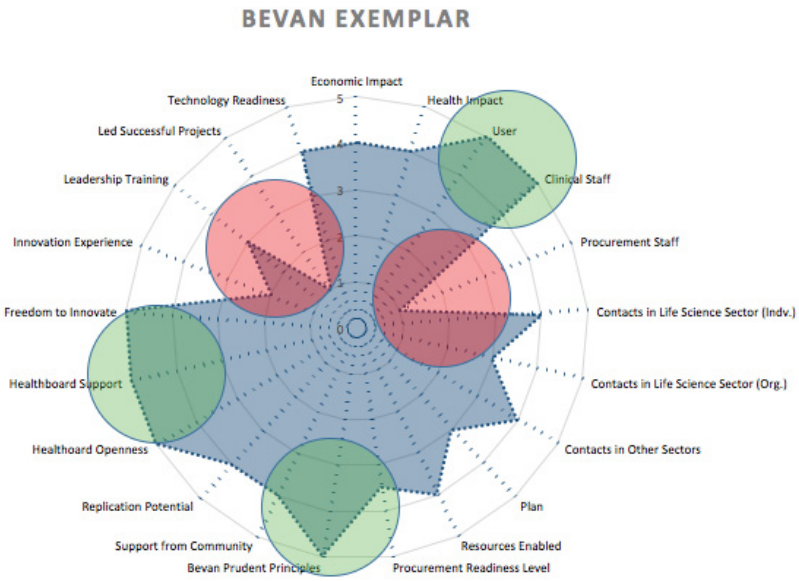


Figure 1c shows a representation of use of the innovation analytic tool to benchmark participant innovation projects, highlighting project strengths (green) and weaknesses (red).

d)

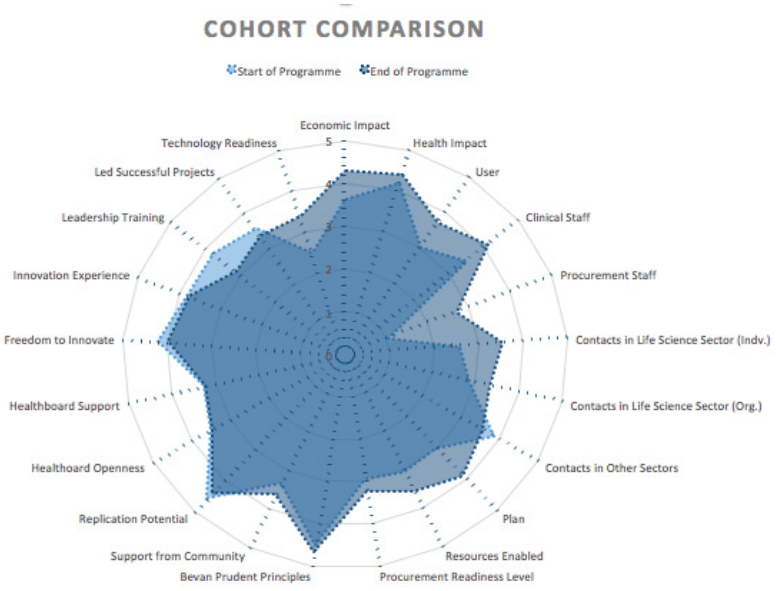


Figure 1d shows a representation of use of the innovation analytic tool to compare cohort development progress at the onset and conclusion of Bevan Commission Exemplars programme

Figure 1

To demonstrate the practical application of this tool, two case studies from the Bevan Exemplars are presented. The project described in Figure 2, focused around the *design and implementation of a palliative care educational programme in nursing homes, which sought to improve the quality of end of life care.* b)

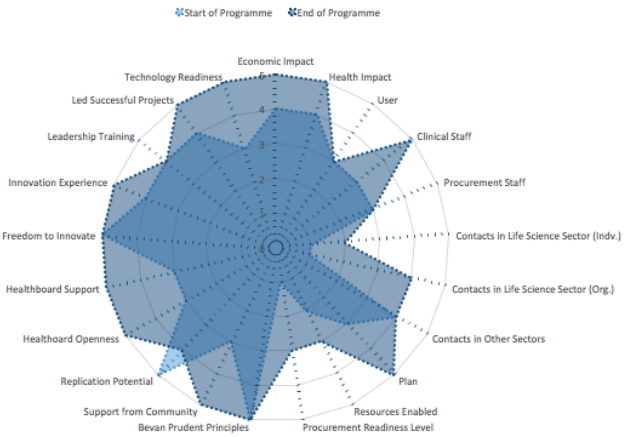


Figure 2: Representation of the use of the Innovation Analytic Tool in the assessment of participant projects on the Bevan Commission Exemplars programme. The Innovation Analytic tool shows innovation forms of participant at the onset (light blue) and conclusion (dark blue) of the Bevan Commission programme.

The initial innovation form identified at the onset of the programme (light blue) provided a source of insight and Actionable Knowledge relating to the needs of individual innovation projects and innovation teams. The project outlined in Figure 2, showed particular weaknesses when compared to best practice in areas including organisational culture and strategy (planning). This actionable knowledge allowed programme leads to adjust both the general design of the programme to trends reflected across the cohort as well as providing more personalised support to overcome individual project needs. Results recorded at the conclusion of the programme represented by the darker segment on the radar, highlighted significant improvements in multiple areas, including in areas such as project maturity, organizational culture and strategy.

The same approach was applied to the project described in Figure 3, which focused around the development of a “postcard scheme”, aiming to prevent multiple attendance at acute medical facilities relating to self-harm attempts.

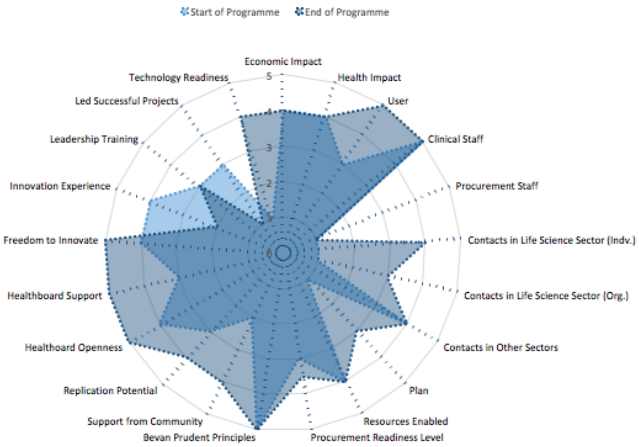


Figure 3: Representation of the use of the Innovation Analytic Tool in the assessment of participant projects on the Bevan Commission Exemplars programme. The Innovation Analytic tool shows innovation forms of participant at the onset (light blue) and conclusion (dark blue) of the Bevan Commission programme.

At the onset of the programme, the project described in Figure 3 demonstrated a lack of maturity in areas including project planning and Technology Readiness. At the conclusion of the programme, the innovation form produced by the Innovation Analytic Tool demonstrated improvements in the areas suggested.

Participant perspectives at the conclusion of the programme further support the notion that the use of the Innovation Analytic Tool had a positive effect on the quality of support provided by the Bevan Commission. The Bevan Commission was regarded as the key enabler to the development of Exemplars healthcare innovation projects with innovators acknowledging the "excellent support, resources and ideas" offered, as well as a "fantastic opportunity to gain knowledge and skills" facilitated through the structure provided by the programme, training and workshops.

6. Ecosystem Mapping:

As evidenced through the use of the Innovation Analytic Tool with the Bevan Commission Exemplars Programme, the Actionable Knowledge obtained from use of the Innovation analytic tool allows the construction of an innovation opportunity blueprint. This blueprint or innovation form provides a structural framework from which managers or practitioners can effectively design strategic approaches to support the translation and adoption of specific innovation projects aligning with the identified needs. As alluded to previously, innovation in Health requires a multitude of different expertise, knowledge, resources and services, not universally available from internal sources in many organisations.

Technological collaboration networks allow organisations to access such resource and to achieve a higher degree of innovativeness (Nieto & Santa Maria, 2007). Innovation in Health requires the interaction between multiple systems, involving both public and private sector organisations and their formal and informal networks. Such systems incorporate actors from Governmental, Industrial, Academic and Clinical spheres as well as third sector organisations and end users. Further, Health Innovation involves actors positioned at both the core and the periphery of their respective sectors, each playing varying roles to service the combinatorial nature of innovation. Considering Health Innovation in this broad multi-actor context the term Innovation Ecosystem is deemed more appropriate. A (21st Century) innovation ecosystem is described by Carayannis & Campbell (2009) as

> *"a multi-level, multi-modal, multi-nodal and multi-agent system of systems. The constituent systems consist of innovation meta-networks (networks of innovation networks and knowledge clusters) and knowledge meta-clusters (clusters of innovation networks and knowledge clusters)……..which in turn constitute agglomerations of human, social, intellectual and financial capital stocks and flows as well as cultural and technological artifacts and modalities, continually co-evolving, co-specialising, and co-opting…'.*

As this definition suggests, innovation ecosystems are complex and dynamic in nature, consisting of both tangible and intangible sources of resource and expertise. According to Walker *et al.,* (2008), complex problem solving tasks including stakeholder management, can benefit from mechanisms that increase the clarity of the problems through visualisation techniques. In order to facilitate Open Innovation approaches, thus enable actors to identify complimentary external sources of expertise, knowledge, resources and services, ecosystem transparency is required. Mapping of the actors and resources that exist amongst ecosystems offers a way of providing this clarity, and thus promoting open innovation approaches. The rest of this paper will describe an approach taken involving the mapping of the Life Sciences and Health ecosystem in Wales. Mapping of the Life Sciences and Health Ecosystem in Wales utilised a two-tiered approach. Initially, organisations were identified and latterly classified according to primary business activity using a model developed by Cooke, Kaufmann *et al.,* (2006) to describe the Life Sciences cluster in Munich, which was subsequently adapted and used by Davies *et al.,* (2011), to describe the Life Science and Health innovation ecosystem in South West

Wales (Figure 4). This allows actors to identify complementary collaborative partners across a wide reaching spectrum of business activity including supply chain partners, existing knowledge and expertise and sources of finance. It also provides actors with an understanding of their competitive landscape and allowing the identification of gatekeepers, of whom can facilitate access to desired markets.

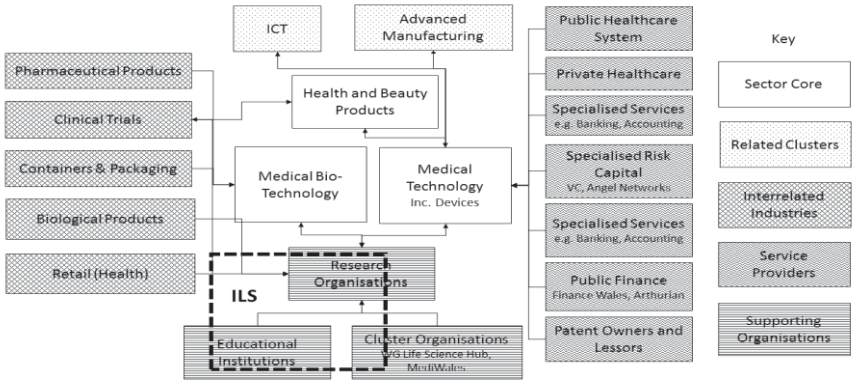


Figure 4: Model used to categorise Life Science and Health sector organisations in Wales taken from Davies et al., (2011) whom adapted an initial model by Cooke, Kaufmann et al., (2006) to describe the Life Sciences cluster in South West Wales.

According to Dovey (2009), innovation between collaborative partners is highly contingent upon trust.

Many constituent parts of the innovation process including creativity and idea sharing, depend on a high degree of trust existing between actors (Dovey, 2009). Consequently, the second stage of the outlined mapping approach involves the examination of the relational ties existing between organisations according to actor's perceptions on relational strength and the nature of such partnerships. This multi-dimensional approach to ecosystem mapping facilitates the creation of bespoke commercialisation pathways (demonstrated in Figure 3) based upon trusted relationships, reducing the amount of wasted time and resources of organisations.

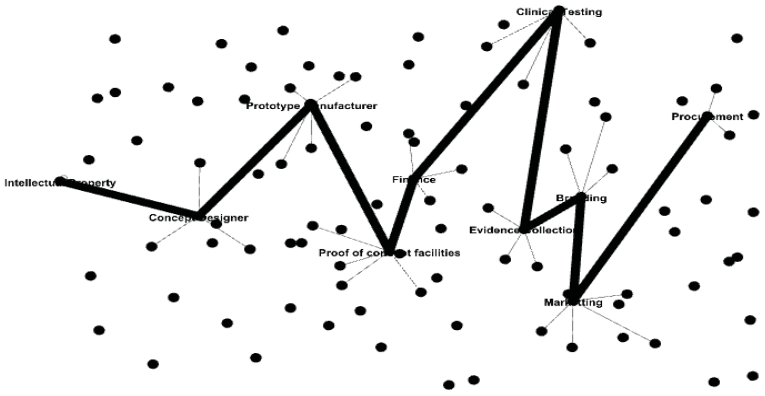


Figure 3: Representation of the use of the ecosystem mapping approach to create bespoke commercialisation pathways for the development of innovation utilising knowledge of actors and the relationships existing between them. Actors are represented using black nodes with edges (lines) used to describe relationships existing between actors. A representative commercialisation pathway is illustrated by the denser black line.

7. Conclusion:

This paper has outlined a novel approach to health innovation management using an integrated mapping technique. In combination, the use of both innovation opportunity mapping and ecosystem mapping approaches working in synergy promotes the translation and adoption of innovation.

Through identification of innovation characteristics and areas of weakness in innovation approaches, together with knowledge of actors, expertise and resources existing within the Health Innovation ecosystem, bespoke commercialisation pathways can be tailored to the needs of the innovation. This approach promotes an integrated ecosystem-centric approach to innovation, reducing the fragmented culture currently existing between Life Science and Healthcare delivery sectors in Wales. This approach aims to provide transparency and reduce the requirement for co-location, whilst promoting a trans-disciplinary, cross-sectoral approach to Health Innovation. Implementation of this approach stands to improve the success of health innovation in Wales, driving improved patient health outcomes and economic growth by supporting organisations throughout the innovation process.

References:

ADAMS, R., BESSANT, J., & PHELPS, R. 2006. Innovation management measurement: A review. International Journal of Management Reviews, 8, 1, 21-47.

AHUJA, G. 2000. Collaboration networks, structural holes, and innovation: A longitudinal study. Administrative science quarterly, 45, 3, 425-455.

ALDRICH, H., & AUSTER, E. R. 1986. Even dwarfs started small: Liabilities of age and size and their strategic implications. Research in organizational behavior.AMBROSINI, V., & BOWMAN, C. 2001. Tacit knowledge: Some suggestions for operationalization. Journal of Management studies, 38(6), 811-829.

ARUNDEL, A., & HOLLANDERS, H. 2005. Innovation strengths and weaknesses. European Trend Chart on Innovation, European Commission.

ATANASSOVA, V. 2010. Representation of fuzzy and intuitionistic fuzzy data by Radar charts. Notes on Intuitionistic Fuzzy Sets, 16, 1, 21-26.

BAKER, B. N., MURPHY, D. C., & FISHER, D. 2008. Factors affecting project success. Project Management Handbook, Second Edition, 902-919.

BEVAN COMMISSION 2013. Simply Prudent Healthcare – achieving better care and value for money in Wales – discussion paper

BIANCHI, M., S. C. ORTO, F. FRATTINI, AND P. VERCESI 2010. Enabling Open Innovation in Small- and Medium-Sized Enterprises: How to Find Alternative Applications for Your Technologies, R and D Management 40, 4, 414–430.

BLOMQVIST, K., & LEVY, J. 2006. Collaboration capability–a focal concept in knowledge creation and collaborative innovation in networks. International Journal of Management Concepts and Philosophy, 2, 1, 31-48BORSI, B., DÉVAI, K., PAPANEK, G., RUSH, H. 2004. The RECORD Manual Benchmarking Innovative Research Organisations in European Accession Countries, Budapest, January 2004, Directorate-General for Research.

CAMP, R. C. 1989. Benchmarking: the search for industry best practices that lead to superior performance. In Benchmarking: the search for industry best practices that lead to superior performance. ASQC/Quality Resources.

CARAYANNIS, E. G., & CAMPBELL, D. F. 2009. 'Mode 3'and'Quadruple Helix': toward a 21st century fractal innovation ecosystem. International journal of technology management, 46, 3-4, 201-234.

CEFIS, E., & MARSILI, O. 2005. A matter of life and death: innovation and firm survival. Industrial and Corporate change, 14, 6, 1167-1192CHANG, Y. C. 2003. Benefits of co-operation on innovative performance: evidence from integrated circuits and biotechnology firms in the UK and Taiwan. R&D Management, 33, 4, 425-437.

CHESBROUGH, H. 2003. Open innovation.

CHESBROUGH, H. 2006. Open innovation: A new paradigm for understanding industrial innovation. In Open Innovation. Researching a New Paradigm, ed. H. Chesbrough, W. Vanhaverbeke, and J. West, 1-12. New York, NY: Oxford University Press.

CHIESA, V., COUGHLAN, P. & VOSS, C A.., 1996. Development of a technical innovation audit. Journal of Product Innovation Management: an international publication of the product development & management association, 13(2), 105-136.

COHEN, W. M., & LEVINTHAL, D. A. 2000. Absorptive capacity: A new perspective on learning and innovation. In Strategic Learning in a Knowledge economy 39-67.

COOKE, P., KAUFMANN, D., LEVIN, C., & WILSON, R. (2006). The biosciences knowledge value chain and comparative incubation models. The Journal of Technology Transfer, 31(1), 115-129.

COOPER, R. G., & KLEINSCHMIDT, E. J. 1995. Benchmarking the firm's critical success factors in new product development. Journal of product innovation management, 12(5), 374-391.

CORMICAN, K., & O'SULLIVAN, D. 2004. Auditing best practice for effective product innovation management. Technovation, 24, 10, 819-829.

COX, G. 2005. Cox review of creativity in business: building on the UK's strengths. TSO.

DE TONI, A., & NASSIMBENI, G. (2003). Small and medium district enterprises and the new product development challenge: evidence from Italian eyewear district. International Journal of Operations & Production Management, 23, 6, 678-697.

DEPARTMENT FOR BUSINESS, INNOVATION AND SKILLS 2011. Strategy for UK Life Sciences.
DIMASI, J. A., HANSEN, R. W., & GRABOWSKI, H. G. 2003. The price of innovation: new estimates of drug development costs. Journal of health economics, 22, 2, 151-185.
DOVEY, K. 2009. The role of trust in innovation. The Learning Organization, 16(4), 311-325.
ETZKOWITZ, H., & LEYDESDORFF, L. A. 1995. Universities and the global knowledge economy: a triple helix of university-industry-government relations.
FRENKEL, A., MAITAL, S., & GRUPP, H. (2000). Measuring dynamic technical change: a technometric approach. International Journal of Technology Management, 20, 3-4, 429-441.
HALL, B. H., LOTTI, F., & MAIRESSE, J. 2009. Innovation and productivity in SMEs: empirical evidence for Italy. Small Business Economics, 33, 1, 13-33.
HARTLEY, J. 2014. Some thoughts on Likert-type scales. International Journal of Clinical and Health Psychology, 14, 1, 83-86.
KACZYNSKI, D., WOOD, L., & HARDING, A. 2008. Using radar charts with qualitative evaluation: Techniques to assess change in blended learning. Active Learning in Higher Education, 9(1), 23-41.
KOHLER, M., FELDMANN, N., HABRYN, F., & SATZGER, G. 2013. Service innovation analytics: Towards assessment and monitoring of innovation capabilities in service firms. In System Sciences (HICSS), 2013 46th Hawaii International Conference 1347-1356.
MIGUEL, V. A., ERNESTO, G., LR, V. P., & CARMEN, B. P. M. 2017. Innovation Environments: A Comparison between Mexico and BRICS. World Academy of Science, Engineering and Technology, International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, 10, 7, 2589-2594.
NIETO, M. J., & SANTAMARÍA, L. 2007. The importance of diverse collaborative networks for the novelty of product innovation. Technovation, 27, 6-7, 367-377.
NONAKA, I., & TAKEUCHI, H. 1995. The knowledge-creating company: How Japanese companies create the dynamics of innovation. Oxford university press.
OFFICE FOR NATIONAL STATISTICS 2017. Regional gross value added (balanced), UK: 1998 to 2016. [Online] [Accessed on 12th April 2018]OMACHONU, V. K., & EINSPRUCH, N. G. 2010. Innovation: Implications for goods and services. International Journal of Innovation and Technology Management, 7, 02, 109-127.
PINTO, J. K., & SLEVIN, D. P. 1988. Critical success factors across the project life cycle. Project Management Institute.
ROBERTS, A., & CHARLESWORTH, A. 2014. A decade of austerity in Wales?. The funding pressures facing the NHS in Wales to, 2025, 26.
ROTHWELL, R. (1992). Successful industrial innovation: critical factors for the 1990s. R&d Management, 22, 3, 221-240.
SALOMO, S., WEISE, J., & GEMÜNDEN, H. G. (2007). NPD planning activities and innovation performance: the mediating role of process management and the moderating effect of product innovativeness. Journal of product innovation management, 24, 4, 285-302.
STRATEGYN (2010). Innovation Track Record Study. http://www.strategyn.at/sites/default/files/uploads/TrackRecord_07.pdf
TIDD, J., BESSANT, J., & PAVITT, K. 2005. Managing innovation integrating technological, market and organizational change. John Wiley and Sons Ltd.
UK DEPARTMENT FOR BUSINESS, INNOVATION & SKILLS (2011). Strategy for UK Life Science.
UK PARLIAMENTARY REVIEW (2018). UK Parliamentary Review on Health and Social Care in Wales.
WAGNER, V., DULLAART, A., BOCK, A. K., & ZWECK, A. 2006. The emerging nanomedicine landscape. Nature biotechnology, 24, 10, 1211.
WALKER, D. H., BOURNE, L. M., & SHELLEY, A. 2008. Influence, stakeholder mapping and visualization. Construction Management and Economics, 26(6), 645-658.
WELSH GOVERNMENT 2013. Sectors Delivery Plan.
WELSH GOVERNMENT 2016. [Online] [Accessed on 12th April 2018] http://gov.wales/docs/caecd/publications/161220-action-en.pdf
WELSH GOVERNMENT 2018. Key economic statistics. [Online] [Accessed on 12th April 2018]
WELSH GOVERNMENT 2018. Life Sciences Sector in Wales [ONLINE] [Accessed on 12th April 2018]

Collaborative Learning in Entrepreneurship Education in a Japanese Business School

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Abstract: Entrepreneurship education is important for successful economic and social development. Business schools all over the world have become increasingly aware of the importance of entrepreneurship education and collaborative learning to expand global markets. Some previous studies assert that collaboration is a factor for success in higher education. Students improve their attitudes and communication skills by collaborative learning. Other studies argue that individual performance depends on team performance. Although entrepreneurship programs in business schools are often designed as team-based courses, research is scarce on collaborative learning in entrepreneurship education. This study examined the perceptions of collaborative learning in a sample of 17 international and 5 Japanese students taking an entrepreneurship course as part of an MBA program taught in English at a Japanese business school. Japanese students had more than 10 years of work experience. On the other hand, international students of eleven different nationalities had never worked full time or had less than three years of work experience. Semi-structured interviews were conducted in English for international students and in Japanese for Japanese students in June and July 2017. Data comprised 34,685 words in English and 17,433 words in Japanese. The KH Coder text-mining tool was used for qualitative content analysis to visualize concepts in the large text dataset and create a collocation network of linear connections. Results revealed that students reported that class participation and teamwork were important. Both Japanese and international students tend to participate more in group work and engage in class participation. However, their perception of the sessions, awareness of becoming an entrepreneur, and objectives in the course differed by nationality: international students focused on certain sessions such as business model, marketing, and entrepreneurship, although Japanese students remembered most sessions. International students think being an entrepreneur is difficult, but Japanese students thought that becoming an entrepreneur is an experience. Furthermore, international students focused on obtaining employment in Japan, whereas Japanese students focused on international collaborative learning experience and improving their English language skills. Collaborative learning for diverse classes of students should be enhanced in future courses.

Keywords: Entrepreneurship education, Entrepreneurship, Collaborative learning, Diversity, MBA, KH Coder

1. Introduction

The demand for entrepreneurship education in business schools has grown and internationalization has increased student body diversity (Deuchar, 2004; Keogh and Galloway, 2004; Tan and Ng, 2006; Vos, Celik, and Vries, 2016). Business schools around the world improve their entrepreneurship programs with the goal that students become entrepreneurs or develop entrepreneurial perspectives in their future careers (Koning, 2016). Collaborative learning is one way to enhance students' attitudes and performances in marketing, accounting, and management courses (Bacon, Stewart, and Silver, 1999; Caldwell, Weishar, and Glezan, 1996; Deeter-Schmeltz and Ramsey, 1998; Hampton and Grudnitski, 1996; Miglietti, 2002). It is vital in the workplace that workers skilfully collaborate on projects, share information, and help each other to meet the demands of increasingly diverse markets and clients (Janz, 1999; Mikkelsen and Gronhaug, 2000; Vos, Celik, and Vries, 2016).

1.1 Entrepreneurship and entrepreneurship education

Entrepreneurship is a key driver of economic and social growth because it improves economic efficiency, yields innovation, and creates jobs (Shane and Venkataraman, 2000). By offering entrepreneurship education, educational institutions support students' efforts to become entrepreneurs or to use entrepreneurial skills in their careers (Koning, 2016). Entrepreneurship is widely defined to mean personal development, creativity, self-reliance, resourcefulness, and dynamism used to become *entrepreneurial* (Lackéus, 2015). The definition of entrepreneurship in a narrow sense applies to recognizing opportunities, business development, self-employment, creative ventures, and growth to be *an entrepreneur* (Fayolle and Gailly, 2008; Mahieu, 2006; QAA, 2012). Jones and English (2004: 416) defined entrepreneurship education as 'a process of providing individuals with the ability to recognize commercial opportunities and the insight, self-esteem, knowledge and skills to act on them'. Lackéus (2015) suggested that value creation is a common core in entrepreneurship education. The European Commission (2008: 10) defined entrepreneurship education as comprising four elements:

1. Developing personal attributes and skills that form the basis of entrepreneurial mindset and behaviour (creativity, initiative, risk-taking, autonomy, self-confidence, leadership, team spirit, etc.);
2. Raising the awareness of students about self-employment and entrepreneurship as possible career options;
3. Working on concrete enterprise projects and activities;
4. Providing specific business skills and knowledge of how to start a company and run it successfully.

These four elements address entrepreneurship in its wide and narrow sense. Regarding the topics in entrepreneurship education, business plan is one of the most common approaches to teaching entrepreneurship (Honing, 2004; Solomon, 2007).

1.2 Entrepreneurship and entrepreneurship education in Japan

The Global Entrepreneurship Monitor (GEM) is a well-known research project involving a comparative measurement of entrepreneurial activity in the world. It began in 10 countries, including Japan, in 1999, and as of 2016, it compares the impact of entrepreneurial activity on the national economy of 66 countries. The objective of GEM research is to clarify the growth process of venture companies, to understand the factors that activate entrepreneurial activity, and to make important policies with policymakers in each country on issues such as national economic growth, competitiveness, and employment (Mizuho Information & Research Institute, 2017). Among the seven major countries (the United States [US], Japan, Germany, the United Kingdom [UK], France, Italy, and China) in a survey in 2016, the US, the UK, and China were in the top in terms of total entrepreneurial activity (behavior and attitude). In other words, people in these three countries tend to recognize business opportunities and choose an entrepreneurial occupation more and are evaluated higher on entrepreneurial social position than those in other countries.

Meanwhile, the overall entrepreneurial activity (behavior and attitude) in Japan was extremely negative among the seven countries (US, Japan, Germany, UK, France, Italy, and China). The result was not temporary, but it was applicable to a long-term period of over five years. This survey clearly shows that Japanese entrepreneurial activity is in a serious situation.

The Ministry of Education, Culture, Sports, Science and Technology has been promoting the EDGE-NEXT (Exploration and Development of Global Entrepreneurship for NEXT generation) project, which is aimed at fostering human resources to support entrepreneurship and new business creation based on research and development in higher education and establishing ventures and ecosystem by stakeholders or related organizations. Moreover, the Ministry of Economy, Trade and Industry has been involved with the Venture Challenge 2020 project, which leverages an ecosystem of universities, research centers, and big companies to foster venture businesses. The expectation of MBA entrepreneurship education in Japan is high. However, as of 2013, more than 85 per cent of higher education institutions in Japan did not have an entrepreneurship course (Deloitte Touche Tohmatsu, 2014). Entrepreneurship education in higher education in Japan remains under developed.

1.3 Collaborative learning and the outcomes of team performance

Collaborative learning is a learning method in which students interact in small groups or project-based teams. An advantage of collaborative learning is that it improves students' involvement, problem-solving, and communication skills (Yazici, 2005). Entrepreneurship programs are often structured to include team-based projects (Man and Farquharson, 2015). Glăveanu (2010) demonstrated that the trend of collaborative learning in entrepreneurship education should shift from a focus on 'I' to an emphasis on 'we'. Previous studies have found that successful teamwork in higher education courses includes collaboration (Riebe et al, 2010; Scott-Ladd and Chan, 2008; Teo et al, 2012; Yazici, 2005). However, teams might not be successful when individual team members' performance is low or where the gap between active members and free riders is large (Brooks and Ammons, 2003; Siciliano, 2001). Thus, to date, the findings on entrepreneurship education with collaborative learning are mixed. Moreover, although there is general agreement that entrepreneurship education in higher education is a key driver of economic and social growth and that collaborative learning is important, few studies have focused on entrepreneurship education that includes collaborative learning.

Therefore, this study examined attitudes towards collaborative learning in a diverse sample of students in entrepreneurial education and differences between international and Japanese students.

1.4 Research hypotheses

H1. Entrepreneurship education with collaborative learning improves students' entrepreneurial learning process.

H2. International students' and Japanese students' perceptions of entrepreneurship education with collaborative learning are different.

2. Methods

A Japanese business school launched the New Global Venture Creation (NGVC) course, which is an entrepreneurship course in an English-language MBA program in 2017. Table 1 presents the details of the 14-session course. The NGVC course has a practical focus on the global aspect of entrepreneurship in a course of Japanese and international students. Its goal is to develop students' entrepreneurial attitudes, behaviours, abilities to create and implement business plans, strengthen students' competitive presentation skills, and support international students' efforts to start businesses. During the course, students from various backgrounds collaborate on projects to identify tasks, create business ideas using human-centred design thinking, build teamwork skills, and devise effective solutions as global leaders for better societies. The course contains 60 per cent lectures and discussions and 40 per cent group work. From sessions 3 to 12, in each session, two or three students present an inspiring product or service to their classmates. Moreover, in session 11, we invited a German entrepreneur who had launched his business in Japan with a Japanese partner and received a prize in a business competition in Osaka, Japan.

The instructors provide conceptual frameworks and conduct class discussions and workshops to help students to create innovative ideas, business strategies, market analysis, and financial statements regarding complex global issues. Students have opportunities to launch new businesses, such as social service businesses or businesses specific to their home countries or Japan. The course identifies ways to improve students' business skills, not only as entrepreneurs but also as project managers. Students work in groups for more than half of the course: 60 per cent of the final grade is based on the students' created business plans, which are collaborative assignments during class with additional time spent outside class, and 40 per cent of the final grade is based on individual participation during class periods and a written report.

Table 1: The syllabus of the New Global Venture Creation course

Session	Type of content	Content
1	Lecture	Welcome, introductions, and course objectives and goals; presentations of trends in entrepreneurial activity in Japan and around the world
2	Group work	Business plan (brain storming)
3	Lecture	Design thinking and establishing a new business
4	Group work	Team building (marshmallow challenge)
5	Lecture	Business plans (creating innovative ideas, business concepts, company strategies, market analysis, financial statements) and business model canvas
6	Group work	Business model canvas
7	Lecture	Marketing plans (STP, SWOT, 4P) and Internet strategies
8	Group work	Idea presentation
9	Lecture	Prototype
10	Lecture/ Group work	Business competition and presentations
11	Lecture	Stories about entrepreneurs
12	Group work	Business plan
13	Competition	Business plan competition
14	Competition	Business plan competition, positive feedback activity, summary of the course

Semi-structured interviews were conducted with 21 students in an English MBA program at a Japanese business school to explore their attitudes towards collaborative learning. Participants were 5 Japanese students with more than 10 years of experience, and 17 international students (11 nationalities) who had never worked full-time or had fewer than 3 years of work experience. About 61 per cent of the sample was male. Regarding age, 68 per cent was 20–29 years old, 18 per cent was 30–39 years old, and 14 per cent was 40–49 years old. About 68 per cent of the sample was from Asia, 14 per cent was from North or South America, 9 per cent was from Europe, and 9 per cent was from Africa. Regarding nationality, 24 per cent was Japanese, 14 per cent was Chinese, 14 per cent was Thai, 9 per cent was Indonesian, and 5 per cent was Filipino. The United States contributed nine per cent, and five per cent was from the Commonwealth of Dominica. Denmark, France, Liberia, and Cameroon each comprised five per cent of the sample (Figure 1).

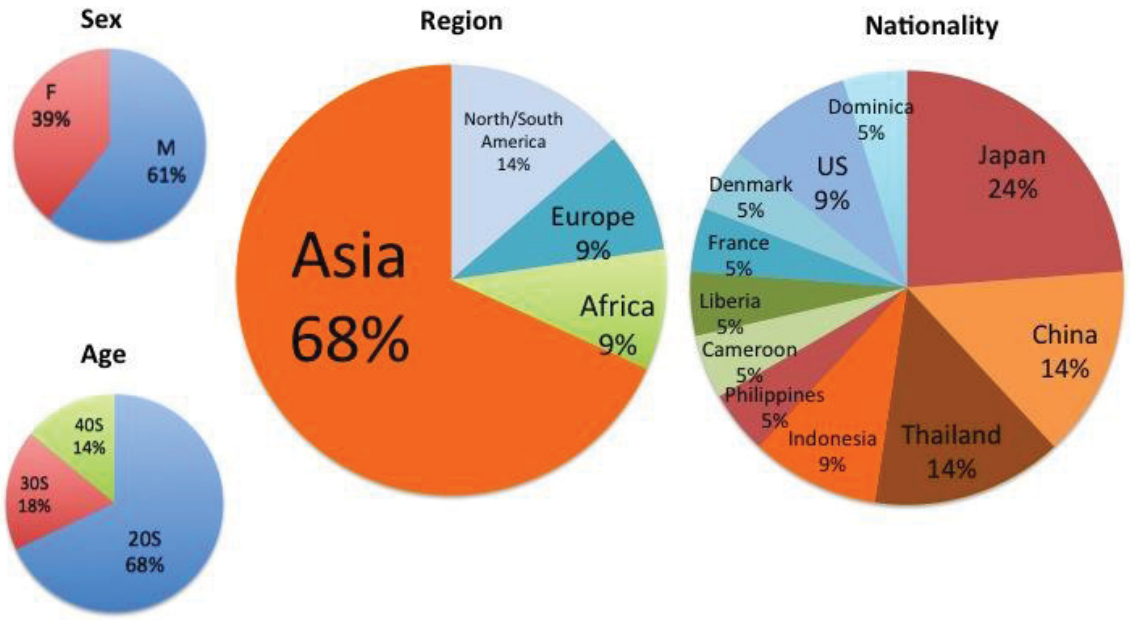

Figure 1: Sample characteristics as proportional distributions

The semi-structured interviews were conducted in English for international students and in Japanese for Japanese students in June and July 2017. The students were asked the following types of questions.

1. Personal background regarding education and career
2. Reasons for participating in the NGVC course
3. Learning during the NGVC course
4. Thoughts on the experience of collaborative learning

The interview data comprised 34,685 words in English and 17,433 words in Japanese. KH Coder was the text-mining method used to qualitatively analyse the content. KH Coder enables visualization of concepts embedded in huge text datasets. The tool extracts apparently related terms, organizes them in circular patterns, and draws collocation networks connected by lines. Large numbers of related words have big circles, and thick lines indicate strong connections (Higuchi, 2014). One advantage of KH Coder is that it avoids researcher bias that tends to arise during qualitative data analysis because it retrieves and analyses the precise word structures in the data (Higuchi, 2013). This study focused on the sizes of the circles, which indicated the number of words, and the thick lines that indicated strong co-occurrence relationships.

3. Results

KH Coder performed the co-occurrence network analysis, which found the number of occurrences of the terms and their similarities. The extracted and specialized terms of the Japanese students were categorized into nine groups of related terms (Figure 2). Group A included ‘business’, ‘plan’, ‘competition’, ‘canvas’, and ‘model’. Group B comprised ‘impression’, ‘entrepreneurship’, ‘design’, ‘website’, ‘story’, ‘remain’, ‘marshmallow’, ‘challenge’, ‘Number 1’, ‘last’, ‘reason’, and ’come up’. Group C was ‘input’, ‘output’, ‘think’, ‘feel’, ‘myself’, ‘opinion’, ‘present’, ‘lecture’, ‘theory’, and ‘practice’. Group D contained ‘presentation’, ‘skill’, ‘change’, ‘team’, ‘interaction’, and ‘interesting’. Group E included ‘Japan’, ‘Japanese’, ‘itself’, ‘culture’, ‘different’, and ‘search’. Group F comprised ‘young’, ‘foreign’, and ‘language’. Group G had the terms ‘English’, ‘class’, ‘understand’, ‘keyword’, ‘group’, ‘work’, ‘personal’, and ‘participation’. Group H had the terms ‘starting a business’ and ‘experience’. The last group (Group I) had the terms ‘fun’ and ‘speak’. The network that emerged suggested the following: (1) ‘students retain an impression of the sessions on business model canvas, business plan, business competition, Internet strategy, design thinking, entrepreneurship story, and marshmallow challenge in entrepreneurship’; (2) ‘students identify themselves to present their opinions and practice during lectures’; (3) ‘team interaction is interesting and presentation skills are developed’; and (4) ‘young international students encounter a different culture and need to search for information of Japan—understanding English is important in group work and individual participation in class’; (5) ‘starting a business is an experience’; and (6) speaking is fun.

The extracted and specialized terms of international students were categorized into eight groups (Figure 3). Group A included 'Japanese', 'work', 'company', 'school', 'Japan', and 'come'. Group B was 'entrepreneur', 'want', 'maybe', 'difficult', 'say', and 'really'. Group C comprised 'think', 'time', 'feel', 'know', 'people', 'idea', 'good', 'team', 'work', 'experience', 'learn', 'lot', 'talk', and 'different'. Group D included 'participation', 'class', 'input', 'output', 'lecture', 'presentation', 'per cent', 'plan', 'write', and 'evaluation'. Group E included 'entrepreneurship', 'challenge', 'remember', 'day', 'marketing', and 'model'. Group F comprised 'job' and 'look'. Group G comprised 'English' and 'speak'. The last group (Group H) had the terms 'try', 'understand', 'point', 'actually', 'thing', and 'like'. The network that emerged implied the following: (1) 'students retain an impression of the sessions on business model, entrepreneurship challenge, and marketing'; (2) 'maybe I want to be an entrepreneur, but it is difficult to make it happen'; (3) 'people are different—good teamwork is required to know ideas and think business, and a lot can be learnt by talking with different people'; (4) 'one of the reasons to come to Japan is to work at a Japanese company, and I will look for a job'; (5) 'class participation in lectures and presentations is required input and output related to my grade'; (6) 'I need to speak English'; and (7) 'I actually like to try, think, and understand the points'.

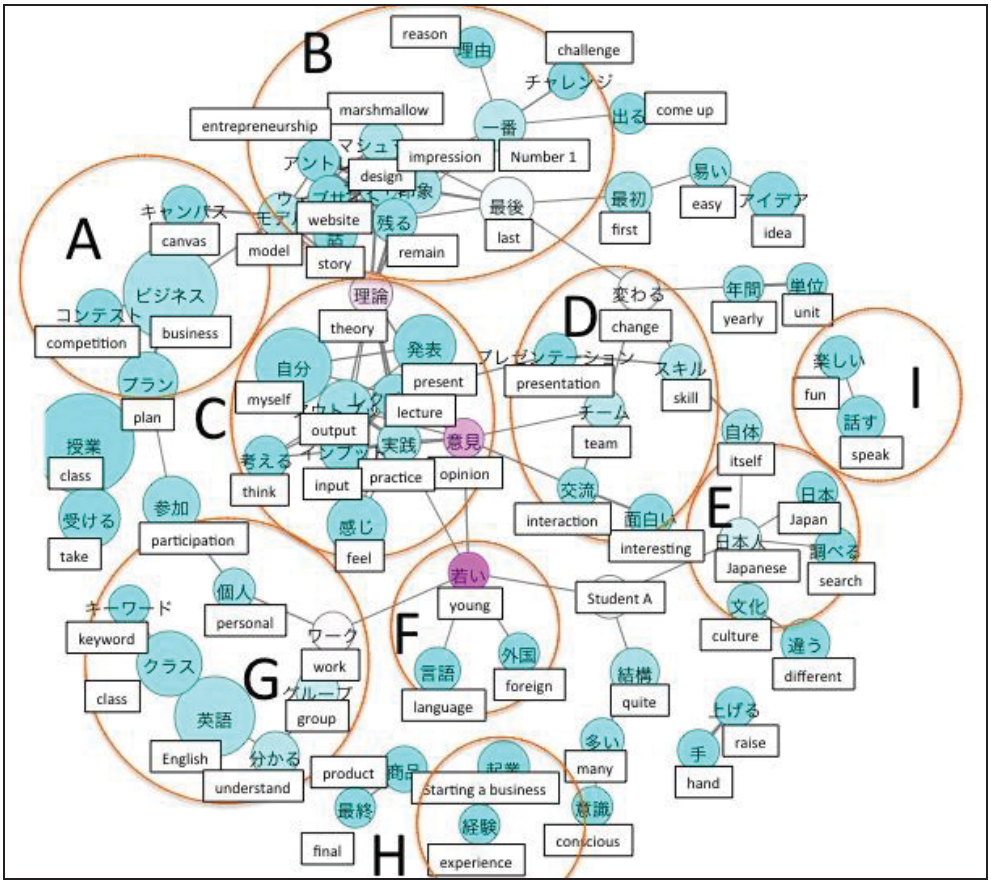

Figure 2: Japanese students' co-occurrence network analysis results

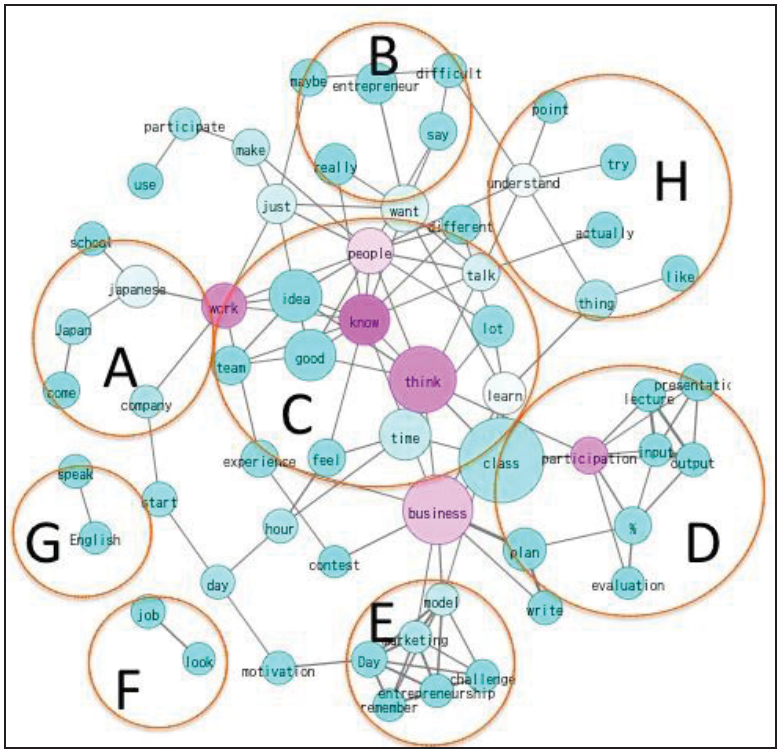

Figure 3: International students' co-occurrence network analysis results

4. Discussion

This study aimed to determine whether entrepreneurship education with collaborative learning improves students' entrepreneurial learning process, and whether international and Japanese students' perceptions of entrepreneurship education with collaborative learning are different.

The results revealed that it positively affects students' perceptions of entrepreneurship education with collaborative learning, in terms of 'speak fun', 'interesting', 'change', 'challenge', and 'understand English' as shown in Figure 2, and 'good team or idea', 'I like', and 'talk a lot' as shown in Figure 3. There are similarities and differences between Japanese and international students' co-occurrence network analysis results. In terms of similarities, both Japanese and international students stated the importance of class participation and teamwork. Japanese students reported that interacting in a team was interesting. They seemed to identify themselves as Japanese in an international collaborative learning experience based on the network circle in Figure 2 (Group B), content of 'Japan', 'Japanese', 'itself', 'culture', 'different', and 'search'. Comparing with a regular Japanese MBA course, international students were younger and had less work experience and a different culture. Japanese students might require a different strategy to explain their opinions during group work because their point of view in business discussions with international students could be different. Moreover, Japanese students require more explanation and presentation skills in English. As for international students, they stated that working with Japanese students had a positive effect in terms of finding good ideas on the process of making a business plan, because it was a good experience to have a rich conversation with their well-experienced Japanese classmates and have a different perspective during group work. The business plan could be developed practically from deep insights. Yazici (2005) states that collaborative learning improves students' involvement, problem-solving, and communication skills; the NGVC course especially affects their involvement and communication skills.

As for differences, there were three major ones. First, the impact of the sessions was different between Japanese and international students. Japanese students remembered the sessions on business model canvas, business plans, business plan competition, Internet strategy, design thinking, entrepreneurship story, and marshmallow challenge. On the other hand, international students remembered the ones on business models, marketing, and entrepreneurship. International students indicated that class participation during lectures and presentations was important to their grades. Japanese students thus remembered more sessions than international students. International students focused on a couple of sessions and grades.

Second, their awareness of being an entrepreneur was different. Japanese students remembered the session on entrepreneur story. They recognized that starting a business is an experience. They did not show any negative attitude. On the other hand, international students stated that entrepreneurship is challenging and becoming an entrepreneur might be difficult. In terms of barriers for becoming an entrepreneur, international students seemed to have more than Japanese students. One reason is that they have less work experience. Another reason is that, in the 11th session on stories about entrepreneurs, international students felt that becoming an entrepreneur in Japan is difficult. The guest speaker from Germany talked about the difficulties he faced in terms of legal and financial support without Japanese assistants when he launched his business in Japan.

Lastly, one particularly interesting finding was that Japanese and international students' objectives in the course differed. Japanese students apparently wanted to improve their English skills, according to the network circle in Figure 2 (Group G): 'English', 'class', 'understand', 'keyword', 'group', 'work', 'personal', and 'participation'. As for international students, most students are not native English speakers. They mentioned 'English' and 'speak' (Figure 3, Group G). However, they usually take an English MBA course. Their class objectives do not involve English. Japanese students emphasised more on speaking English as being one of the vital aspects in group work and class participation. On the other hand, international students were apparently interested in working in Japan. The network analysis found 'job' and 'look' (Figure 3, Group F), and 'Japanese', 'work', 'company', 'school', 'Japan', and 'come' (Figure 3, Group A). Therefore, it might be helpful to include activities in entrepreneurship courses in which Japanese students with 10 or more years of entrepreneurial experience share their work experiences with Japanese organizations to help international students generate ideas. Furthermore, it would be practical for students in the NGVC course to work with Japanese companies to make business plans together. This opportunity will enrich Japanese companies and help them discover business opportunities in different nations and learn how to work with diverse team members. As Janz, (1999), Mikkelsen and Gronhaug (2000), and Vos, Celik, and Vries (2016) mention that the demands of diverse markets and clients has increased, collaborating learning on projects is vital in the workplace.

5. Conclusion

This study explored entrepreneurship education with collaborative learning improves students' entrepreneurial learning process in a sample of diverse students and investigated the differences between international and Japanese students. The KH Coder methodology used in this study demonstrated the value of visualizing text in large text datasets, which made it possible to obtain these qualitative results. The results found that Japanese and international students identified class participation and teamwork as important aspects of the NGVC course. They seem to enjoy their interactions and show a positive reaction during the process of making a business plan. However, their perception of the sessions, awareness of becoming an entrepreneur, and goals in the NGVC course differed. Japanese students remembered almost all sessions and thought that starting a business is an experience. Further, they seemed to be seeking collaborative learning experiences with international students and opportunities to improve their English language skills. As a result, they identified themselves as Japanese in an international collaborative learning experience. On the other hand, international students remembered a couple of sessions such as business model, marketing, and entrepreneurship challenge. They felt that it would be difficult to be an entrepreneur in Japan. Furthermore, working in Japan could be one of the course objectives of international students. This study suggests that this course should be modified to accommodate Japanese students' ability to share their work experiences with international students in a collaborative learning environment. In addition, it would be a great experience for students in the NGVC course to work with Japanese companies to make business plans together. It is important that collaborative learning in entrepreneurship education comprises students of diverse cultural backgrounds from Asia, Africa, Europe, and the Americas because students tend to share ideas and participate in a course from their cultural perspectives.

5.1 Limitations

This study's results lack generalizability because of the limitations of its sample. Therefore, researchers are encouraged to analyse the student's entrepreneurial learning process of entrepreneurship education in larger and representative samples. Furthermore, this was the first time that a course on New Global Venture Creation (NGVC), which is a practical focus on the global aspect of entrepreneurship, was held with Japanese and international students in an English MBA program at a Japanese business school. Since this is only one course with both Japanese and international student enrollees, there could be wide disparities between first-year and second-year students in terms of entrepreneurial knowledge and skills. It could be interesting to

divide the entrepreneurship courses: one basic course and the advanced course. Also, this research shows only 14 sessions' worth of results. The longitudinal research on entrepreneurship education with collaborative learning will be need to be pursued in a future study.

References

Bacon, D., Stewart, K. and Silver, W. (1999) "Lessons From the Best and Worst Student Team Experiences: How a Teacher Can Make a Difference", Journal of Management Education, Vol 23, pp 467–488.

Brooks, C.M. and Ammons, J.L. (2003) "Free Riding in Group Projects and the Effects of Timing, Frequency, and Specificity of Criteria in Peer Assessments", Journal of Education for Business, Vol 77, No. 5, pp 268–272.

Caldwell, M., Weishar, J. and Glezen, G. (1996) "The Effect of Cooperative Learning on Student Perceptions of Accounting in the Principles Course", Journal of Accounting Education, Vol 14, No. 1, pp 17–36.

Deeter-Schmeltz, D. and Ramsey, R. (1998) "Student Team Performance: A Method for Classroom Assessment", Journal of Marketing Education, Vol 20, No. 2, pp 85–93.

Deloitte Touche Tohmatsu. (2014) Report on Foundation/Entrepreneurship Support Project in 2013 (Survey on an actual trend of entrepreneurship development and public notification and diffusion of venture support).

Deuchar, R. (2004) "Changing Paradigms: The Potential of Enterprise Education as an Adequate Vehicle for Promoting and Enhancing Education for Active and Responsible Citizenship: illustrations from a Scottish Perspective", Oxford Review of Education, Vol 30, No. 2, pp 223–239.

European Commission (2008). "Entrepreneurship in higher education, especially in non-business studies", [online], http://ec.europa.eu/DocsRoom/documents/8969/attachments/1/translations

Fayolle, A. & Gailly, B. (2008). From craft to science: Teaching models and learning process in entrepreneurship education. Journal of European Industrial Training, Vol 32, pp 569-593.

Glăveanu, V.P. (2010), "Principles for a cultural psychology of creativity", Culture & Psychology, Vol. 16

No. 2, pp 147-163.

Hampton, D. and Grudnitski, G. (1996) "Does Cooperative Learning Mean Equal Learning?", Journal of Education for Business, Vol 72, pp 5–7.

Higuchi, K. (2013) KH Coder http://khc.sourceforge.net

Higuchi, K. (2014) Quantitative Text Analysis for Social Research: Toward the Inheritance and Development of Content Analysis, Nakanishiya, Kyoto.

Honing, B. (2004). Entrepreneurship education: toward a model of contingency-based business planning. Academy of management learning and education, Vol 3, No.3, pp 258-273.

Janz, B.D. (1999) "Self-directed Teams in IS: Correlates for Improved Systems Development Work Outcomes", Information and Management, Vol 35, No. 3, pp 171–192.

Jones, C. & English, J. (2004). A contemporary approach to entrepreneurship education. Education + Training, Vol 46, No. 8/9, pp 416-423.

Keogh, W. and Galloway, L. (2004) "Teaching Enterprise in Vocational Disciplines: Reflecting on Positive Experience", Management Decision, Vol 42, No. 3/4, pp 531–541.

Koning, L. (2016) "Integrating entrepreneurial Self-efficacy Into Education at Universities", Ekonomski Vjesnik, Vol 2, pp 311–321.

Lackéus, M. (2015). Entrepreneurship in Education: what, why, when, how. Entrepreneurship360. Background Paper. OECD.

Mahieu, R. (2006). Agents of change and policies of scale: a policy study of entrepreneurship and enterprise in education. Doctoral Thesis, Umea Universitet.

Man, W.Y.T. and Farquharson, M. (2015) "Psychological Ownership in Team-based Entrepreneurship Education Activities", International Journal of Entrepreneurial Behavior & Research, Vol 21, No. 4, pp 600–621.

Miglietti, C. (2002) "Using Cooperative Small Groups in Introductory Accounting Classes: A Practical Approach", Journal of Education for Business, Vol 78, No. 2, pp 111–115.

Mikkelsen, A. and Gronhaug, K. (2000) "Measuring Organizational Learning Climate: A Cross-national Replication and Instrument Validation Study Among Public Sector Employees", Review of Public Personnel Administration, Vol 19, No. 4, pp 31–44.

Ministry of Economy, Trade and Industry. (2018) "Venture Challenge 2020", [online],
https://www.kantei.go.jp/jp/singi/keizaisaisei/venture_challenge2020/index.html

Ministry of Education, Culture, Sports, Science and Technology. (2017) "EDGE-NEXT (Exploration and Development of Global Entrepreneurship for NEXT generation)", [online], http://www.mext.go.jp/a_menu/jinzai/edge/1346947.htm

Mizuho Information & Research Institute. (2017). "2016 Industrial Economic Research Consignment Project (Investigation project on entrepreneurship)", [online], http://www.meti.go.jp/meti_lib/report/H28FY/000259.pdf

Riebe, L., Roepen, D., Santarelli, B. and Marchioro, G. (2010) "Teamwork: Effectively Teaching an Employability Skill", Education + Training, Vol 52, No. 6, pp 528–539.

Scott-Ladd, B. and Chan, C.C.A. (2008) "Using Action Research to Teach Students to Manage Team Learning and Improve Teamwork Satisfaction", Active Learning in Higher Education, Vol 9, No. 3, pp 231–248.

Shane, S. and Venkataraman, S. (2000) "The Promise of Entrepreneurship as a Field of Research", Academy of Management Review, Vol 25, No. 1, pp 217–226.

Siciliano, J. (2001) “How to Incorporate Cooperative Learning Principles in the Classroom: It’s More Than Putting Students in Teams”, Journal of Management Education, Vol 25, pp 8–20.
Solomon.G. (2007). An examination of entrepreneurship education in the United States. Journal of small business and Enterprise Development, Vol 14, No.2, pp168-182.
QAA. (2012). Enterprise and entrepreneurship education: Guidance for UK higher education providers. Gloucester, UK: The Quality Assurance Agency for Higher Education.
Tan, S. and Ng, F. (2006) “A Problem-based Learning Approach to Entrepreneurship Education”, Education and Training, Vol 48, No. 6, pp 416–428.
Teo, S.T.T., Segal, N., Morgan, A.C., Kandlbinder, P., Wang, K.Y. and Hingorani, A. (2012) “Generic Skills Development and Satisfaction with Group Work Among Business Students: Effect of Country of Permanent Residency”, Education + Training, Vol 54, No. 6, pp 472–487.
Vos, M., Celik, G., and De Vries, S. (2016) “Making cultural differences matter? Diversity perspectives in higher education”, Equality, Diversity and Inclusion: An International Journal, Vol 35, No. 4, pp 254-266.
Yazici, J.H. (2005) "A Study of Collaborative Learning Style and Team Learning Performance", Education + Training, Vol 47, No. 3, pp 216–229.

Commonalities and Differences among Different Forms of Entrepreneurship Education

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Abstract: Entrepreneurship education undergoes a continuously expanding phase for the last twenty years. Emanated from Business Schools in both US and Europe in 90s, fostering the entrepreneurial mindset penetrates now the curricula of the vast majority of academic institutes across the globe. It also tends to exceed the academic milieu leaking into informal learning settings. Nonetheless, the rapid evolution of entrepreneurship education has differentiated its nature by, at least, three different forms: the 'about', 'for' and 'through' ones. The 'about' mode focuses on information and knowledge transfer relevant to entrepreneurial phenomena in the economy and the society, the 'for' mode focuses, beyond knowledge, to entrepreneurial skills and capacities in order to produce graduate entrepreneurs while the 'through' mode aims at transforming traditional disciplines of all kinds into entrepreneurial ones. Further to the previous classification, 'critical' entrepreneurship education can be added as a distinct form for which there is published description and relevant research. The impetus of the present article is to briefly present the distinct forms of entrepreneurship education, as they appear in literature, and to connect them with entrepreneurial learning. Adopting the Bloomian framework of knowledge, skills and attitudes as fundamental components of learning, the article seeks to reveal which of them are in the spotlight in each distinct form of entrepreneurship education. The present conceptual analysis offers insights regarding the teaching models that could be expected in each of the different forms of entrepreneurship education, relevant assessments and outcomes. Excluding the 'through' mode that is visionary at present, evidence and examples of the rest forms abound in literature due to the many implementations of entrepreneurial courses worldwide. The article concludes that entrepreneurship education evolves rapidly in accordance with modern socioeconomic demands, but it also exhibits internal dynamics and differentiation coherent to the nature of the phenomenon of entrepreneurship that need to be further examined and understood in order to analyse the wider role of entrepreneurship education and the expectations from it.

Keywords: Entrepreneurship education, Entrepreneurial learning, Bloom classification

1. Introduction

What have the expectations from entrepreneurship education been during its evolution from the nineties until now? And how are these expectations confronted by several teaching models that build upon knowledge, skills and attitudes as principal elements of learning? Educational research in the field indicates fragmentation in content and methods (Fayolle 2013, Mwasalwiba 2010, Kakouris and Georgiadis 2016) urging for deeper understandings and typologies (Berglund and Johansson 2007, Kyrö 2000, 2015, Fayolle, 2013, Winkel 2013) for a further deployment of entrepreneurial courses in both formal and informal learning settings (e.g. Kakouris 2017, Preedy 2018). Complementary to the typical cognitive classes of knowledge, skills and attitudes, emotions and values attract recent research in order to holistically discuss the entrepreneurial instruction within the education doctrine (Kyrö 2000, 2015, Lackéus 2014). These perspectives have led to the discussion of multidimensional learning environments in entrepreneurship (Kakouris 2016a).

Tracking the bibliometrics of entrepreneurship education (e,g, Hermann and Bossle 2018, Kakouris and Georgiadis 2016) it emerges that entrepreneurial learning is mostly considered as cognitive or organisational and has also been loosely connected with the outcome of education. Experiential learning appears third, compared to the previous two forms, but also more efficient in inspiring entrepreneurial intentions (Piperopoulos and Dimov 2015). Another finding reveals that research bridging entrepreneurial learning and education with career planning of learners has been scarce (Kakouris and Georgiadis 2016). For sustainability education, as a subset of entrepreneurship education, common issues appear in literature: e.g. a demand for active pedagogies and experiential learning (Hermann and Bossle 2018). The underlying question is whether entrepreneurship education exhibits different forms and if so, what kind of pedagogies might facilitate the different educational perspectives?

The distinction among different forms of entrepreneurship education has been hinted from the very beginning of its various implementations (e.g. Johnson, 1988; Hannon, 2005; Heinonen, & Hytti, 2010). For example, Gibb (2002), based on Chia (1996) and Kyrö (2000), remarks: "*In an educationalist context this challenges the notion (see below), that one can separate 'for' entrepreneurship from 'about' entrepreneurship in an academic sense.*"

After a long period of relevant discussions, three forms of entrepreneurship education have been overriding, namely the 'about', 'for' and 'through' modes of entrepreneurship education (Lackéus 2015). Hannon (2005) has discussed different epistemological assumptions in pedagogy that can be associated to entrepreneurial teaching while Gibb and Price (2014) have summarised a wide set of instructional tools associated to different pedagogies. The aim of the present article is to compare the three distinct modes of entrepreneurship education and more specifically to address which learning components each of them focuses on. In this way, the objectives of entrepreneurship education, whenever implied in either formal or non-formal settings, can be further discussed in a coherent educational frame. Furthermore, scholars have argued that critical aspects of entrepreneurship should be considered in content and methods (Berglund and Johansson 2007, Kakouris 2015, 2017). To include critical entrepreneurship education as a distinct instructional state, the penetration of learning components framework by critical aspects is addressed.

In the rest of the article the three forms of entrepreneurship education are introduced whilst the customary Bloomian framework (Bloom et al. 1956) of knowledge, skills and attitudes is connected with these forms. Under the present interpretation, commonalities and differences among the distinct forms of entrepreneurship education are summarised. Criticality is also discussed in regard to the Bloomian framework.

The consequences and further educational implications of the present analysis are presented in the last section of the article.

2. Differentiating entrepreneurship education

For the needs of an OECD report, Lackéus (2015) summarised the types of entrepreneurship education as they have been developed over time. Three forms appear distinct in objectives and methods. These forms are briefly presented in the sequel, and then, they are analysed towards the Bloomian framework that consists the base for any instructional design.

2.1 Addressing the three forms of entrepreneurship education

According to the relevant literature, the different forms of entrepreneurship education, summarised in Table 1, can be described as follows.

The '*about*' mode aims at educating trainees in regard to business venturing phenomena generally. This has been the oldest form that pre-existed the observed expansion of entrepreneurship after 00s and has offered the paradigm for the development of courses dedicated to business venturing. Depend on the adopted perspective, i.e. management, economics, sociology, etc., the entity of analysis can vary among the firm, an economic region or state, the society, or more rarely, the individual whilst contingent knowledge (Fiet 2001) may come from the aforementioned fields. The learning objective mostly refers to knowledge transfer based on traditional lectures and analyses of case studies (i.e. cognitive approach). Knowledge acquisition is examined by the end of the courses through formal exams. Apparently, this form of courses dominates in formal settings of economics and business faculties often entitled as "Theory of Entrepreneurship". Under such circumstances, there is no given or clear evidence for the entrepreneurial propensity of graduates. The only goal that is examined is knowledge accumulation independently whether this knowledge will be used in new business formation by the graduates. For instance, graduates of such courses may be able to evaluate a business plan (or parts of a business plan) without developing their own business plan ever.

When aiming at inducing new business formation by the graduates, i.e. graduate entrepreneurship, entrepreneurship education entails its '*for*' mode. Therefore, the entity of analysis refers solely to the individual and her/his own capacities. The individual is considered motivated towards starting a new business whilst motivation can exist before her/his enrolment in the course or can be empowered during the course.

Experiential learning pedagogy is followed in the majority of relevant courses where various tools (e.g. business model CANVAS, PEST or SWOT analyses, marketing tools, elevator pitch, financial statements, business plan, etc.) are practiced in the classroom. Mentoring is also used as a supporting supplement to students' work (usually performed in teams). Contingent knowledge is retrieved from management, marketing or psychology fields. The expected outcome is auspicious business plans from student teams that might go further to possible competitions or find a way to funding and lead to new business formation.

Table 1: Three different forms of entrepreneurship education.

	About	For	Through
Objectives	Educate trainees about business venturing phenomena	Inspirit entrepreneurial capacities to become entrepreneur	Fostering the entrepreneurial way of thinking
Entity of analysis	Firm, individual, society	Individual	Individual
Knowledge domains	Economics, Management, Sociology	Management, Psychology	Psychology, Sociology, Economics, Philosophy
Main focus	Knowledge	Skills / Capacities	Attitudes
Trainees	Business and Economics students	Motivated students from all disciplines	All disciplines
Teaching tools	Lectures, Case studies	Practical tools, Exercises, "How to"s, Mentoring	Underdeveloped
Assessment	Typical examinations	Promising Business Plans	Discovering opportunities
Entrepreneurial propensity	Uncertain	Starting new businesses	Likely to become entrepreneurs
Learning effect	Knowledge accumulation	Knowledge exploitation	Knowledge transformation
Expected occurrence	Formal settings	Informal / Non-Formal / Formal settings	Formal settings

The '*through*' mode of entrepreneurship education refers to embedding the entrepreneurial way of thinking into any discipline. The entity of analysis is the individual who enters "an actual entrepreneurial learning process" (Lackéus 2015: 10) relevant to her/his core subject. An example of this type of education is given by Handscombe et al. (2008) for teaching entrepreneurship to science and engineering students at Sheffield University. Lackéus (2015: 8, Fig. 1) categorises the 'through' mode as highly practice oriented, focusing on skills and attitudes, and usually adopted in primary education and in work life and vocational training settings.

Experiential learning offers the base of the pedagogy where knowledge is derived through experience. Any type of knowledge may be considered relevant (psychological, economic, sociological, philosophical, etc.) as far as it concerns the evolving entrepreneurial learning. There are no pre-given and specific objectives for the learners who may be considered as likely to become entrepreneurs since they possess a positive attitude towards business venturing. Since this type of education is new, many of the adopted instructional tools are underdeveloped and created by educators *in situ* for the needs of the specific course. In higher education settings the 'through' mode aims to convert knowledge obtained in each core discipline into entrepreneurial knowledge where uses of this discipline-specific knowledge with market value are conceived. The willingness of the learners to pursue entrepreneurial opportunities typifies the success of this mode of education. In sum, the 'through' mode of entrepreneurship education is visionary, at the moment, leading some scholars (e.g. Kyrö 2015) to promote entrepreneurship education as a new paradigm of pedagogy with transformational potential in the modern uncertain society.

2.2 Associating the Bloomian perspective to the entrepreneurship education forms

Bloom's et al. (1956) taxonomy of learning domains has been the most used framework for instructional design and evaluation. According to the 1956 educational psychology committee, led by Benjamin Bloom, the cognitive, psychomotor and affective domains are distinct in the human learning process. The cognitive domain deals with the acquisition of knowledge, the psychomotor with the cultivation of skills (hard or soft), and the affective one with the development (or moderation) of attitudes. Therefore, within the education field of study it has been widely accepted that participating in any kind of education simultaneously affects the previous learning domains: knowledge, skills and attitudes (hereafter KSA). The embracement of the KSA triptych for the content and outcomes introduces a simple and 'common' understanding for entrepreneurship education and for building teaching models and assessments associated to it. Nonetheless, the entrepreneurial KSA framework has not been fully discussed and theoretically deployed yet. Many scholars define entrepreneurship education as a 'delivery of knowledge and skills' underestimating attitudes and their role despite 'fostering the entrepreneurial mindset' purely refers to an attitude. These three learning domains are closely discussed in the sequel.

It is argued here that there are inherent difficulties in each one of the incorporated learning categories. Beyond the classical debate and criticism about the systemicity of Bloom's learning domains, i.e. KSA are interrelated and evolve together so as changes in one of them affects the other two and the whole of learning, intrinsic questions for entrepreneurship education in academic settings concern entrepreneurial knowledge and skills themselves. Let us suppose that each KSA category can be understood as separate, as the vast

majority of educators and educational designers tacitly accept. What constrains the entrepreneurial knowledge and how many entrepreneurial skills exist? Despite the efforts to answer such questions (e.g. Johannisson, 2016), knowledge encounters the shortage of a genuine theory for entrepreneurship (e.g. Bygrave 1993, Bygrave and Hofer 1991, Fiet 2001) while entrepreneurial skills remain inadequately explored and discussed in a rigorous framework (e.g. Bird 1995). Attitudes are possibly the least explored learning domain and have been predominantly and systematically confronted through the Theory of Planned Behaviour (e.g. Ajzen 1991, Krueger and Carsrud 1993, Krueger and Brazeal 1994), or sporadically elsewhere (e.g. Kakouris 2016b), appearing crucial for the formation of the entrepreneurial intention. They are also recognised as the most affected learning domain from the local culture and other external influences (e.g. Nicholson and Anderson 2005). Remarkably, Shane (2008) has addressed a series of existent 'illusions' for entrepreneurship that can obviously play a significant role in the formulation of entrepreneurial attitudes. Even the massive fostering of the entrepreneurial mindset during the last decades has led to a tremendous increase in the youth population who declare a positive attitude toward becoming entrepreneurs, an issue that may need a more critical approach and analysis (see next section). In sum, the KSA triptych that is widely, and sometimes 'uncritically', adopted in instructional design for entrepreneurship consists the underpinning for the development of pedagogy, teaching models or teaching philosophy, and educational assessment. Any insight that advances each of the three Bloomian learning domains strengthens the theoretical foundation of entrepreneurship education as a distinct form of pedagogy (Kyrö, 2015). The relevant question is how each form of entrepreneurship education builds upon KSA?

To address this question we have first to consider that knowledge is more than skills that are more than attitudes. Contingent knowledge, relevant to entrepreneurship, is abundant and it can be purely entrepreneurial or domain-specific. Skills pertain to what one could do with her/his knowledge, depend on her/his innate abilities, and how much of it could be exploited and in which way; whilst (general) attitudes are fewer and concern how positive or negative is one towards certain actions, motives or needs (e.g. risk-taking, contributing, sharing, well-being, morality, responsibility, achievement, etc.). It emerges from the discussion in section 2.1 (Table 1) that the 'about' mode of entrepreneurship education follows the traditional academic perspective that builds upon knowledge (Figure 1a). As far as enough knowledge is acquired, skills are developed accordingly and depend on knowledge and skills relevant attitudes are formulated or modified.

Thus, the 'about' courses apply to everyone, extend the knowledge base of the individual and assume that entrepreneurial skills and attitudes will appear. The outermost objective is knowledge acquisition (especially business knowledge) and therefore it dominates entrepreneurship education in Business and Economics Schools (Table 1).

Conversely, the 'for' mode of entrepreneurship education builds upon skills (Figure 2b). Starting from what students can do and through experiential learning pedagogies relevant knowledge is acquired through practice. Depend on skills and knowledge acquired, the relevant attitudes are affected. This mode is highly dependent on the skills and capacities of the students since they are asked to take initiatives in order to engage in the experiential learning process. Knowledge is still a learning objective but it is path-dependent and can be different amongst learners or groups of learners by the end of the process. The outermost learning objective is what the students will be able to do by the end of the course that suits to their own skills which will have been enhanced through the process. Learning to learn, for example, is a certain capacity that can be cultivated during this type of courses. The 'for' mode of entrepreneurship education has been spread around in both formal and informal settings aiming at producing graduate entrepreneurs.

The 'through' mode of entrepreneurship education copes with attitudes. It actually starts from attitudes (Figure 1c) and proceeds with skills and knowledge. It needs everyday observations that concern the socioeconomic environment and certain human behaviours to discuss the attitudes of the participants towards these observations. It refers to anyone as a member of the society and exhibits an inclusive character. Rapid changes in the environment and induced uncertainty can trigger the process aiming at encouraging the participants to consider their own skills in order to respond to future situations. Any insights from psychological, sociological, economical or philosophical perspectives are relevant to the examination of the emerging attitudes. The willingness to perceive and pursue opportunities created by the turbulence indicates the outermost objective of the 'through' mode. These opportunities will meet the personal skills of the students that are expected to acquire the relevant knowledge at a later phase. Because attitude is the underpinning of this mode in its very beginning, critical examination of the various facts and arguments is

needed to avoid any external 'false' influences or biases (cf. Shane 2008). Instructional tools to cope with attitudes are known to be scarce and need to be developed (e.g. Kakouris 2015). There are not many examples of the 'through' mode up to now but it apparently possesses a transformational potential.

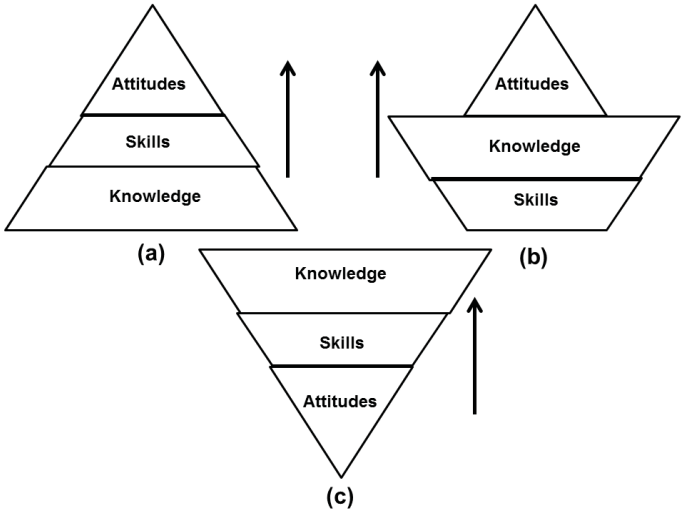

Figure 1: Three different structurations of the Bloomian framework.

In sum, three different hierarchies (structures) and the interplay among the Bloom's learning domains were discussed in this section (Figure 1). The three forms of entrepreneurship education confront the KSA triptych but in different ways and priorities. The present discussion contributes the development of instructional models efficient for each one of them.

3. Critical entrepreneurship education

Within the education field of study, critical education occupies a distinct domain. Critical pedagogy has been originated by Paulo Freire in 1970 and has been differentiated through the time (see Freire 2018).This type of pedagogy applies in cases and subjects where critical questions appear crucial for the learning process. Long-standing unanswered critical questions may cause disorienting dilemmas and disturb entrepreneurial learning (e.g. Kakouris 2015). Critical questions emerge from deep beliefs and assumptions of the individuals revealing the underlying stereotypic considerations.

Entrepreneurship, especially in the individual unit of analysis, appears a-theoretical (Bygrave 1993, Bygrave and Hofer 1991, Fiet 2001) with strong ties and influences from the socioeconomic environment that may induce a series of underlying critical questions. These questions are crucial in the 'for' mode of entrepreneurship education where students are expected to take initiatives and actions to become entrepreneurs. They do not affect the skills and the capacities of the individuals but the type (the relevance and the validity) of the knowledge they have to look for. Remarkably, Shane (2008) reveals various aspects of entrepreneurship that can be 'illusionary' when entrepreneurship is taught. For the 'about' mode similar cases can appear, in a less extent, through unjustified case studies, politically biased theories (e.g. Lackéus 2017) or stereotypic influences from other disciplines and fields. Therefore, critical and thorough examination of the adopted knowledge, case studies and contingent theories are needed to be adopted when entrepreneurship is taught in academic settings.

Criticality affects crucially the 'through' mode of entrepreneurship education. Critical aspects of entrepreneurship that interact with the beliefs and the attitudes of the participants may cause unpredictable situations in the classroom. Critical pedagogy mostly refers to such cases tending to be emancipatory. For example, education that aims to empower female entrepreneurship has to be critical. The same holds for immigrant entrepreneurship. Berglund and Johansson (2007) adopted the Freirean perspective to entrepreneurship and regional development. They analysed a project (DiE) to inspire entrepreneurship in a 'vulnerable' Swedish region where people do not view themselves as entrepreneurs. Kakouris (2017) adopted the constructivist approach to develop informal learning in entrepreneurship based on critical thinking. The latter implementation revealed that various assumptions and beliefs, associated with attitudes, underlie teaching and appear through typical instructional incidents during the process. This kind of teaching has to be

recognised as different and proponent to critical entrepreneurship education that needs to utilise its own pedagogy and methods (e.g. communicative learning, critical discourse).

Critical entrepreneurship education is also expected to confront more efficiently the axiological base of entrepreneurship (Kyrö 2015) – a more central issue in Continental education compared to the Anglo-Saxon one. In this way it will be able to discuss values beyond knowledge, skills and attitudes. Therefore, entrepreneurship education will be better connected with social needs, social cohesion, sustainability and employability. For instance, the last GEM survey in Greece showed that after a continuous increase in the number of young entrepreneurs there is decay during the last year. Such findings indicate that entrepreneurship education has to reflect on its operation and to encompass the social phenomena and needs in a critical manner.

4. Conclusions

The present conceptual article discussed the learning components of the different forms of entrepreneurship education. The 'about', 'for' and 'through' modes have appeared distinct in objectives and methods. These forms have followed the dynamics of entrepreneurship as a phenomenon and a field of research. The 'about' mode is the oldest one, stemmed from Business Schools. The 'for' mode follows the modern demand for an increase of start-ups from graduates; whilst the 'through' mode is visionary for the future of entrepreneurship education. Concerning the Bloomian domains of learning, the 'about' mode builds on knowledge and progresses to skills and attitudes in order to educate students in regard to entrepreneurial phenomena. It follows the traditional academic teaching 'pyramid' shown in Figure1a. The 'for' mode starts from skills and proceeds to knowledge and attitudes. It mostly aims to produce graduate entrepreneurs. The 'through' mode builds on attitudes and progresses to skills and knowledge as shown in the 'reversed pyramid' of Figure 1c. It aims at transforming all disciplines into entrepreneurial ones. Implications of the present discussion concern the teaching models for each entrepreneurship education mode. The 'about' mode follows knowledge transfer and the 'for' one follows experiential learning. Efficient methods and models for the 'through' mode need to be developed further. Apart from the three previous modes, critical entrepreneurship education has to be considered as distinct. Critical aspects of entrepreneurship have to be included in the curricula confronted through critical pedagogies and methods. In this way, entrepreneurship education will be integrated and able to facilitate the emerging social needs.

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References

Ajzen, I. (1991). "The theory of planned behavior", Organizational Behavior and Human Decision Processes, Vol 50, No 2, pp 179-211.

Berglund K. and Johansson A.W., (2007) "Entrepreneurship, discourses and conscientization in processes of regional development", Entrepreneurship and Regional Development, Vol 19, No 6, pp 499–525

Bird, B. (1995) "Towards a theory of entrepreneurial competency. Advances in Entrepreneurship", Firm Emergence and Growth, Vol 2, pp 51–72.

Bloom B.S, (Ed.) (1956) Taxonomy of educational objectives: Vol 1. Cognitive domain. Longmans, Green, New York.

Bygrave, W.D. (1993). "Theory building in the entrepreneur paradigm", Journal of Business Venturing, Vol 8, No 3, pp 255-280.

Bygrave, W.D. & Hofer, C.W. (1991). "Theorizing About Entrepreneurship", Entrepreneurship Theory and Practice, Vol 16, No 2, pp 13-22.

Chia, R., (1996) "Teaching paradigm shifting in management education: University business schools and the entrepreneurial imagination", Journal of management studies, Vol 33, No 7, pp 409-428.

Fayolle, A. (2013) "Personal views on the future of entrepreneurship education", Entrepreneurship and Regional Development, Vol 25, No (7-8), pp 692-701.

Fiet, J. O. (2001) "The theoretical side of teaching entrepreneurship", Journal of business venturing, Vol 16, No 1, pp 1-24.

Freire, P. (2018) Pedagogy of the oppressed (50th anniversary edition). Bloomsbury Publishing, NY, USA.

Gibb, A. A. (2002) "In pursuit of a new enterprise and entrepreneurship paradigm for learning: Creative destruction, new values, new ways of doing things and new combinations of knowledge", International Journal of Management Reviews, Vol 4, No 3, pp 213–232.

Gibb, A.A. & Price, A. (2014) "A Compendium of Pedagogies for Teaching Entrepreneurship", [online] 2nd Edition. NCEE, Coventry, UK. [online] http://ncee.org.uk/wp-

content/uploads/2013/12/Compendium-of-Pedagogies.pdf
Handscombe, R. D., Rodriguez-Falcon, E., & Patterson, E. A. (2008) "Embedding enterprise in science and engineering departments", Education + Training, Vol 50, No 7, pp 615-625.
Hannon, P.D. (2005) "Philosophies of enterprise and entrepreneurship education and challenges for higher education in the UK", The International Journal of Entrepreneurship and Innovation, Vol 6, No 2, pp 105-114.
Heinonen, J., & Hytti, U. (2010). "Back to basics: the role of teaching in developing the entrepreneurial university", The International Journal of Entrepreneurship and Innovation, Vol 11, No 4, pp 283-292.
Hermann, R.R. and Bossle, M.B. (2018) "Conceptualizing "Entrepreneurial-Oriented Sustainability Education", through Bibliometric Methods ECSB Entrepreneurship Education Conference 2018, Enschede, May 16-18.
Johannisson, B. (2016). "Limits to and prospects of entrepreneurship education in the academic context", Entrepreneurship & Regional Development, Vol 28, No (5-6), pp 403-423.
Johnson, C. 1988. "Enterprise education and training", British Journal of Education and Work, Vol 2, No 1, pp 61-65.
Kakouris, A., (2015) "Entrepreneurship pedagogies in lifelong learning: emergence of criticality?", Learning, Culture and Social Interaction, Vol 6, pp 87 – 97.
Kakouris, A., (2016a) "Multidimensional learning environments for entrepreneurship education.", Paper read at 10th European Conference on Innovation and Entrepreneurship, edited by I. Aaltio and M. Tunkkari Eskelinen, Academic Conferences Limited, Reading, UK, pp 344 – 349.
Kakouris, A., (2016b) "Exploring entrepreneurial conceptions, beliefs and intentions of Greek graduates", International Journal of Entrepreneurial Behavior & Research, Vol 22, No 1, pp 109 – 132.
Kakouris, A. (2017) "Constructivist entrepreneurial teaching: The TeleCC online approach in Greece", in P. Jones, G. Maas and L. Pittaway (Eds.) "Entrepreneurship Education: New perspectives on research, policy & practice", Emerald, Contemporary Issues in Entrepreneurship Research, Vol 7, pp 229–252.
Kakouris, A., & Georgiadis, P. (2016) "Analysing entrepreneurship education: a bibliometric survey pattern", Journal of global entrepreneurship research, Vol 6, No 1, pp 6.
Krueger, N.F. & Carsrud, A.L. (1993). "Entrepreneurial intentions: Applying the theory of planned behaviour", Entrepreneurship and Regional Development, Vol 5, pp 315–330.
Krueger, N.F., & Brazeal, D.V. (1994). "Entrepreneurship potential and potential entrepreneurs", Entrepreneurship Theory and Practice, Vol 19, No 3, pp 91–104.
Kyrö, P. (2000) "Is there a pedagogical basis for entrepreneurship education?", In P. Mankinen (Ed.), Perspectives on the development of entrepreneurship and technical education in Finland Oulu: University of Oulu.
Kyrö, P. (2015) "The conceptual contribution of education to research on entrepreneurship education", Entrepreneurship & Regional Development, Vol 27, No (9-10), pp 599-618.
Lackéus, M. (2014) "An emotion based approach to assessing entrepreneurial education", The International Journal of Management Education, Vol 12, No 3, pp 374-396.
Lackéus, M. (2015) "Entrepreneurship in education: What, why, when, how", OECD Background Paper, [online], https://www.oecd.org/cfe/leed/BGP_Entrepreneurship-in-Education.pdf
Lackéus, M. (2017) "Does entrepreneurial education trigger more or less neoliberalism in education?", Education+ Training, Vol 59, No 6, pp 635-650.
Mwasalwiba, E. S. (2010) "Entrepreneurship education: A review of its objectives, teaching Methods, and impact indicators", Education + Training, Vol 52, No 1, pp 20–47.
Nicholson, L., & Anderson, A. R. (2005). "News and nuances of the entrepreneurial myth and metaphor: Linguistic games in entrepreneurial sense-making and sense-giving", Entrepreneurship Theory and Practice, Vol 29, No 2, pp 153-172.
Piperopoulos, P., & Dimov, D. (2015) "Burst bubbles or build steam? Entrepreneurship education, entrepreneurial self-efficacy, and entrepreneurial intentions", Journal of Small Business Management, Vol 53, No 4, pp 970-985.
Preedy, S., (2018) "An Examination of Students' Entrepreneurial Learning through Extracurricular Enterprise Activities", (Doctoral dissertation, University of Plymouth).
Shane, S. A. (2008). The illusions of entrepreneurship: The costly myths that entrepreneurs, investors, and policy makers live by. Yale University Press.
Winkel, D. (2013) "The changing face of entrepreneurship education", Journal of Small
Business Management, Special Issue: Measuring the Impact of Entrepreneurship Education, Vol 51, No 3, pp 313–314.

How French Enterprises Cultivate a Culture of Innovation in their Workplaces

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Abstract: Every firm strives to be among the most innovative in its industry, but only a very few succeed. According to a report published by BCG (2016), the top 50 most innovative companies share one thing in common: the ability to create a culture that makes them more innovative than their peers. However, an innovation culture is an intangible resource that cannot be explicitly measured (Godfrey and Hill, 1995), and therefore, altering a company's culture is not a straightforward process. To study this, grounded research was used to identify the major themes associated with the innovation culture phenomenon. These were then verified through semi-structured interviews conducted with senior professionals selected from several French enterprises. We found that firms cultivate an innovation culture by introducing new capabilities on top of existing ones and by opening more to the outside. We also found that It is difficult to cultivate an innovation culture if a classical leadership style predominates the organization. The findings concur with the dynamic capability and the transformational leadership theoretical perspectives. They also show that innovation culture is altered through initiatives towards the actors (leadership), the activities (new capabilities) and the environment (openness), building on the anthropological perspective of culture. These findings deepen our understanding of the innovation culture phenomenon, which can provide senior managers in French firms a set of actions to incorporate into initiatives to develop the right ecosystem and capabilities to innovate and sustain their competitive advantages.

Keywords: innovation culture, innovation performance, capabilities, openness, transformational leadership

1. Introduction

Present thinking regarding organisational theory and strategy is shifting from the sustainability of competitive advantage to the capacity to manage innovation and change (Brown and Eisenhardt, 1997; O'Reilly and Tushman, 2008). Most factors affecting innovation performance are beyond the firm's control, including the firm's intangible innovation culture, which can be viewed as the invisible hand that affects the firm's entire innovation performance.

This paper focuses on the cultivation of innovation culture by exploring themes derived mainly from the dynamic capability perspective. A multiple-case analysis across different industry sectors in France was conducted using semi-structured interview techniques. The findings and the limitations of the research and its contribution to practice and theory are then discussed.

2. Literature Review

Two definitions of culture, based in anthropology and management, seem to have gained general acceptance (Wines and Napier, 1992). Anthropologists view culture as an intangible phenomenon specific to the very nature of individuals, nations, and organisations. Jones (2006) referred to it as "invisible baggage" that crosses oceans, national borders, and language communities. Singh (2004) noted culture is internalized at the most basic level in the form he calls "Habitus", which is formed by learnings from the extra-personal world of everyday practices and experiences. According to Schwartz (1992), culture consists of the derivatives of experience learned or created by the individual and is transmitted from past generations. Leung *et al.* (2005) described culture as a fuzzy set of basic assumptions and values, orientations to life, beliefs, policies, and behavioural conventions shared by a group of people. The management perspective considers how to build, develop, and put into practice the innovation culture phenomenon (Angel, 2006; Coffman, 2006). We intend to answer this question through four propositions derived from the literature that are subsequently discussed.

2.1 Innovation culture and innovation performance

The relationship between specific explanatory variables and innovation performance has received much attention. Denison, Hooijberg, and Quinn (1995) explored the relationship between leadership and innovation performance, and Kanter (2008) associated culture with innovation performance. Further exploration of the

innovation culture (IC) phenomenon shows IC combines factors related to leadership, strategy, organisational structure, and people's capabilities and their mindsets.

Most authors agree that innovation culture can either drive or hamper organisational performance (Christensen and Raynor, 2003). Ahmed's (1998) study of 21 cross-industry cases showed a positive relationship between innovation culture and innovation performance. Similarly, Le Bas and Laužikas's (2010) study of Lithuania's information technology sector and Padilha and Gomes's (2016) focus on 16 textile firms in the state of Santa Catarina in Brazil concurred.

This association shows innovation culture should not be treated as an abstract phenomenon or an invisible hand that has an unclear effect on innovation performance. Instead, it should be viewed as a management entity (McCormick, 2008) influencing incremental and disruptive innovation performance. Incremental innovation performance focuses on minor improvements or simple adjustments in current technology (Munson and Pelz, 1979). It represents the firm's capability to adapt its products and services to market trends without changing the rules of the game. In incremental innovation, the element of risk is contained.

Conversely, disruptive, or radical, innovation performance involving new product creation undermines the capabilities on which conventional players have built their success (Markides, 2006). Disruptive innovation performance is not achieved in the classical way; it requires an independent system of thinking along with a dynamic learning process (Markides, 2006). Disruptive innovation is accordingly concerned with a different set of behaviours, skills, and organisational habits; thus, it requires a different innovation culture. The relationship between innovation culture and innovation performance is consequently positive.

- **P1:** There is a positive relationship between innovation culture and innovation performance.

2.2 Innovation culture and dynamic capabilities

The foundations of the innovation phenomenon are built on change. Innovation culture literature pairs a static phenomenon, like culture, with a dynamic phenomenon, like innovation. Therefore, to analyse "innovation culture", one must consider the stability-change dilemma (Jucevicius, 2007).

The dynamic capability perspective has been linked with the innovation phenomenon to address how to effectively execute innovation activities and influence a firm's innovation performance. A firm's dynamic capabilities take the form of organisational structures, processes, infrastructures, and other mechanisms that enable the firm to enhance its innovation performance. They also govern how it integrates, builds, and reconfigures internal and external competences to address changing business environments (Teece, Pisano, and Shuen, 1997). Dynamic capabilities enable firms to create new products and processes to respond to shifting market dynamics (Teece *et al.*, 1997). According to Daher (2016), the fundamental elements of most definitions of innovation are based on an organisation's dynamic capability to initiate, develop, or implement new ideas, products, or technologies.

Zollo and Winter (2002) distinguished between operating routines and dynamic capabilities (the patterns of generating and modifying routines). A firm can deconstruct and eliminate the capabilities, routines, competences, and skills that block its adaptability to a changing environment (Hall and Andriani, 2002). Identifying the hierarchal organisation of dynamic capabilities helps in understanding how they influence the firm's innovation culture. Collis (1994) defined the first hierarchical capability category as the firm's ability to perform basic activities; the second and third categories as its ability to improve on these activities; and the fourth category as a high-order meta-learning capability. Danneels (2002) differentiated between first-level and zero-level capabilities, which illustrate the firm's ability to learn new domains. However, Winter (2003) viewed zero-level capability as ordinary operating capability that incorporates the core functions firms use to earn its current living.

First-order capability addresses how firms build basic capabilities, competences, or routines to sustain present performance. However, innovation culture is influenced by higher-level capabilities that drive incremental and disruptive innovation performance. New, more flexible organisational forms (Ahmed, 1998; Martins and Terblanche, 2003), simplified decision-making processes (Jiménez and Sanz-Valle, 2012), cross-functional project teams (Crossan and Apaydin, 2010), and innovation champions are examples of capabilities that stimulate and support the firm's innovation culture's operating framework. Drivers of an innovation culture

fall into three primary clusters: 1) identification, development, co-development, and assessment of technological opportunities and threats related to customer needs (sensing); 2) resource mobilisation to address needs and opportunities and capture value (seizing); and 3) continued renewal (transforming) (Teece, Peteraf, and Leih, 2016).

Innovative organisations are agile and dynamic by default and can make timely, effective, and sustained changes when required (Winby and Worley; 2014) by acquiring new skills and knowledge and new organisational structures to execute their innovation strategy. A key feature of an agile innovative organisation is its ability to accelerate its innovative activities to respond quickly and successfully to change, thus building a time-based competitive advantage (Kumar and Jaideep Motwani, 1995). These organisations introduce novel working practices to avoid wasting resources (Winby and Worley, 2014), and they build routines, capabilities, or behaviours on top of existing ones to adapt faster to changing environments (incremental innovation) or to create new environments and markets (disruptive innovation).

In this paper, we simply refer to these capabilities as "new capabilities" that influence the firm's capacity to change, continuously renew itself, and innovate. French companies that are challenging their current capabilities and are building higher level of capabilities to innovate are seriously working on their innovation culture. By default, new capabilities challenge the classical habits and influence the firm's innovation culture.

- **P2:** There is a positive relationship between new capabilities and innovation culture.

2.3 Innovation culture and firm's openness

The continuous renewal and transformation of a firm's capabilities is a cornerstone of the dynamic capability perspective. Higher-level capabilities today are not only built from inside the firm but also sourced from outside their boundaries.

The innovation process has become collective and combinatorial (Coombs and Metcalfe, 2000). Open innovation uses purposive sourced knowledge inflows to accelerate internal innovation and facilitate outflows to expand the markets for external use of the innovation (Chesbrough, 2003). The main difference between an open and closed innovation is a cultural one. With open innovation, firms accept not only to externally source ideas from but also to learn and co-create with the outside. By building learning networks with other members of their value chains, firms establish high-value relationships and access to a wide range of company-to-company linkages that enable the free flow of information to continuously renew and update their knowledge.

The innovation game today has become a multi-player one, and companies like Amazon, Airbnb, and Uber have disrupted the overall value chains of the trading, services, and public transport sectors. Progressing from the classical linear innovation models (Chapman and Corso, 2005) to network or collaboration-focussed innovation (Chesbrough, 2003) is viewed as an evolution in the firm's innovation culture. Innovative enterprises are now oriented to their customers, wherever they may be (Martins and Terblanche, 2003). Thus, innovative companies include suppliers, customers, start-ups, and innovation clusters in their strategy and co-create ideas with them. For instance, France is considered to have a mature start-up ecosystem, but the deal flows between start-ups and traditional corporations are still limited. Co-creation is enabled by open working spaces in which employees collaborate with each other and their customers and suppliers, which is a model shown to enhance innovation performance. A recent study on a large South Korean e-commerce company showed bringing individuals' workspaces closer led to more individual-level exploration resulting in higher organisational performance (Lee, 2017). In Europe, France is the fourth largest country in number of co-working spaces (Deskwanted.com, 2013), which mostly consist of start-ups and young entrepreneurs, but the linkages with traditional French organisations are still weak. Innovative companies leverage diversity, seeing multi-cultural project teams as an opportunity to expand their knowledge base (Wenger and Snyder, 2000) and stimulate innovation behaviour.

Co-opetition is an open innovation model that drives firms to collaborate and share knowledge with their competitors (Bengtsson and Kock, 2000), and this openness phenomenon can influence the entire innovation culture of the firm.

- **P3:** There is a positive relationship between openness and innovation culture.

2.4 Innovation culture and leadership

Innovation ability rests in the skills of the workers, but it also depends on how motivated the workers are to try something new and challenge the status quo. The organisation's leadership style is the starting point in building a disruptive innovation culture. Transformational leadership theory provides an understanding of how leaders can stimulate innovation: transformational leaders tap into followers' intrinsic motivations and drive them to think bigger, serve the organisation's collective interests beyond the ordinary limits (Bass, 1985), and challenge the prevailing culture. According to Bass (1985), transformational leaders are distinguished by four behavioural "I's": idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, and each of these either directly or indirectly influence the firm's innovation culture.

Leaders who use various motivational techniques to provoke and push their teams to innovate are the engineers of an innovation culture. Employees who are intrinsically motivated are inner directed and do not expect a financial reward in executing the task; they are interested and engage in a task because of its nature (Utman, 1997). Moreover, intrinsic motivation is a well-established predictor of creativity (Shalley, Gilson and Blum, 2000).

Transformational leaders empower their teams by putting the innovation task at the centre of the way their teams should work, and this empowerment is assumed to be a cause of intrinsic task motivation and satisfaction (Spreitzer, 1995). It may cause workers to accept tasks in addition to their daily routines because they enjoy inventing something new or challenging something that exists. Thus, a positive relationship is established between meaningfulness, self-determination, and intrinsic task motivation (Gagne, Senecal and Koestner, 1997).

In intrinsically motivating their teams by extending the opportunity to engage in entrepreneurial tasks, transformational leaders recognize risk-taking behaviour is perceived as an opportunity to disrupt, create, and succeed or to try, fail, and learn. The importance of promoting entrepreneurial behaviour at work is gaining increasing attention in the literature. Sicotte, Delerue and Drouin (2015) emphasized entrepreneurship appears to contribute the most to performance and innovation portfolio management. Daher (2016) discussed the values that promote innovation, such as value novelty, breaking traditions, autonomy, results oriented, mistake tolerance, adaptability, empowerment, and others. Thus, employees must act more like entrepreneurs and intrapreneurs (Leybourne, 2010), and by intrinsically motivating teams to engage in entrepreneurial behaviour, transformational leaders build an innovation culture that can enable incremental and disruptive innovation performance. Good managers think creatively, act entrepreneurially, and, if necessary, override routines. However, the dynamic capability perspective has paid little attention to the role of leaders in driving change, which is addressed in the fourth proposition.

- **P4**: There is a positive relationship between leadership and innovation culture.

3. Research Method

Our initial exploration is qualitative and relies on the five features of qualitative research proposed by Yin (2011, p 7). It is subjectivist and exploratory and follows a constructivist and problem-oriented research theory (Lawrence, 1992). It combines an EMIC–ETIC perspective (Pike, 1967) via a semi-structured questionnaire.

Eleven cases of leading French enterprises across different sectors, including telecommunications, banking, leading retail chain, pharmaceuticals, construction, real estate, travel, insurance, media, service to individuals, and organisations, were analysed. The interviewees are all French leaders with local and/or international responsibilities.

The data generated was reviewed borrowing coding techniques in the grounded theory approach to empirical research (Glaser and Strauss, 1967; Hernandez, 2009). Saturation was addressed in terms of content and process through the 7+/-2 Miller model (1956). The combined business experience of the two authors made them comfortable sharing the initial findings and acknowledging that further cases are planned to address reliability and validity.

For ethical and confidentiality reasons, we have chosen not to present the names of the organisations we have explored. However, four are in the CAC 40, and seven employ from 100 to 10,000 employees.

4. Data Analysis

We will review our initial findings towards the four propositions and discuss the limitations and the further research needed.

- **P1:** There is a positive relationship between innovation culture and innovation performance.

As proposed by the literature, the relationship between innovation culture and innovation performance is not questioned: most of the leaders interviewed agreed that innovation culture is positively related to innovation performance. Some interviewees even positioned culture as a prerequisite to innovation performance:

"If you have the means and conditions, but not the culture, innovation will not happen. But a culture and limited means will generate innovation." (pharma enterprise interviewee)

Most of the interviewees were dissatisfied with their firms' overall innovation performances, seeing their companies as neither disruptive nor fast moving due to cultural reasons. One of the interviewees explained French enterprises do not tolerate failure; moreover, they are afraid to fail, and therefore do not recruit employees based on their capacity to create and change. Consequently, they are stuck with conventional generations, making it difficult to establish a culture in which innovative behaviours are dominant.

Interviewees from companies agreed innovation culture should touch all domains and functions (not only exclusive to marketing). They recommended following a 360° approach treating acceptance of mistakes as a core organisational value that defines the firm's innovation.

"When you create and you are not afraid to fail, you have a culture of innovation." (online travel agency interviewee)

In the cases observed, licensing failure was a core theme that can alter firm's innovation culture. However, this transformation is not simple because it touches on the "perfectionist culture" of French enterprise. It may not mean lowering the standards but making them more adaptable to market needs in the present and the future.

The interviews conducted pave the way to deeper explorations around the "Perfectionist-Success" dilemma that may be hindering French enterprises from building an innovation culture. The notions of "Perfection" and "Speed" must be explored in line with the notion of market orientation.

- **P2**: There is a positive relationship between new capabilities and innovation culture.

The qualitative and intangible nature of the innovation culture phenomenon makes it difficult to quantitatively measure its impact on innovation performance. However, the positive relationship between innovation culture and innovation performance has steered the discussion towards how to build an innovation culture. Some interviewees viewed it as a question of process and stressed the need for French enterprises to enhance the practice of processes like Six Sigma. Others highlighted the importance of collaboration and information exchange and the need to encourage diverse team building to connect people with different jobs in various geographical locations. This would combat the silo effect and French enterprises' monocultures. Examples from the UK, where diversity is considered a competitive advantage, were given that demonstrated how classical capabilities and maintaining old ways are serious barriers to innovation. However, a leading French brick-and-mortar retailer does not feel threatened by the e-commerce disruption, especially if employees are neither equipped with innovation capabilities nor feel any urgency to become so.

"The organisation culture does not allow to work in project mode, to go fast and move forward." (leading brick-and-mortar retail chain interviewee)

These types of enterprises should be the first to be disrupted because they are neither proactive nor able to quickly react to external threats.

The themes "we are very late" and we "fear to fail" were serious concerns voiced by most of the interviewees.

One can conclude French companies like to take their time (we are very late) in perfecting capabilities that reduce the risk factor (fear of failure). In today's context, failure to anticipate future capabilities is considered a dangerous behaviour that exposes the firm and its industry to disruption. Of the companies we explored, only one, a leading telecom operator, is earnestly working on future capabilities. Building future capabilities should however be the concern of every company across all industries. One of the interviewees noted some of the major multinational French firms, from the smallest SMEs, start-ups, and scale-ups and whether local or regional, are experiencing disruption today. For instance, innovative financial technology (FinTech) is already competing with and disrupting the banking industry. The French banking industry has a choice: it can take a leading stance on FinTech innovation or it can be disrupted by it. The former is only an option if banking enterprises dynamically transform themselves as expressed during the interview with a regional banking firm in France:

"Innovation is incremental on an ongoing basis, and we prepare for disruption in the future." (regional bank interviewee).

In the past, being big was an advantage. However, one interviewee noted, today, big companies that fail to transform and renew themselves, which they can only achieve through rethinking their existing organisational structures and moving to be more flexible and agile, can be at risk. But, agile structures are only achieved by breaking individual and functional silos and working collaboratively. Many interviewees stressed the need to somehow democratize the innovation process, with innovation carried out by all managerial functions and levels. This consequently requires building innovation capabilities within various functions and teams led by innovation champions who carry out the innovation process by helping teams think differently. As an example, an interviewee recommended designing temporary structures that can operate in a "commando project mode" either to react to a challenge or to initiate and drive a new idea.

A new structure deployed without an innovation-enabled infrastructure could be a failure. Therefore, establishing a digital infrastructure to connect various teams and encourage sharing best practices and new ideas is important. One company we explored, for instance, has addressed this and developed internal technology labs to explore potential technologies and anticipate future trends, and another company is reviewing the interior design of its workplace. A question raised, however, is how the new knowledge created can be activated.

"French are very innovative; they have many ideas, [but] our problem is the ability to implement." (leading retailer interviewee)

Following the dynamic capability approach and examining the interviews conducted, it is apparent only by building new capabilities will French enterprises succeed in effectively implementing innovation activities. An innovation culture can act as a safety net in times of digital and technological disruption if firms succeed in renewing themselves. The positive relationship between new capabilities and innovation culture is thus confirmed.

- **P3**: There is a positive relationship between openness and innovation culture.

The dynamic capability perspective also looks at how firms leverage external capabilities. Although France is one of the most mature of start-up countries, little evidence on serious external collaboration initiatives with the corporate sector has been collected. Interviewees acknowledged the importance of collaborating with the outside and stressed the need to co-create with customers and suppliers. Building relationships with universities and scientific research centres is a common practice of pharmaceutical companies and can be more effective than developments in internal R&D, stressed the interviewee from a leading French pharma company. Corporate social responsibility program co-innovation is greatly practiced by the telecom company interviewed, but collaboration with its competitors is not a common practice.

This raises a question about French firms' willingness to open up and engage in co-opetition activities; although, the added value of collaboration may not yet be justified. However, in the grocery retail business, major French retailers' buying alliances are effective in exercising buying power over suppliers. One of the interviewees suggested these alliances may go beyond negotiation to the exploration of innovation initiatives that drive growth.

Although few practices were shared, interviewees agreed that by opening up, companies build new learning capabilities for quicker and better innovation. As one interviewee noted, companies must have the right internal capabilities to manage an open model; for example, the telecom company successfully established a dedicated structure to drive external collaboration initiatives.

- **P4**: There is a positive relationship between leadership and innovation culture.

The interview results confirmed the literature review conclusion of the usefulness of the leadership theory in understanding the dynamic capability perspective. All the interviewees identified leadership behaviour and style as a barrier to innovation culture development, which suggests the leadership qualities inherent in the transformational leadership theory (e.g., competence in engaging and intrinsically motivating employees) are important to driving a culture of innovation. Entrepreneurship cannot succeed if it is not endorsed by management and does not cascade across the organisation, remarked an interviewee.

Another dominant theme that emerged in interviews but was not discussed in the literature review was leaders encouraging employees' "curiosity at work". Curiosity drives learning and exploration, and the propensity to change will be accordingly affected. Likewise, leaders must manage and animate diverse teams, and the leadership quality determines how diversity can be turned into an asset that influences innovation culture. The inspirational trait of the transformational leadership theory seemed to be missing in most of the cases explored. Many sub-themes associated with who should drive an innovation culture were grouped under the theme of Transformational Leadership Community, which includes innovation and initiative sponsors, innovation champions, agents of change, and any organisational member who exhibits the mind-set to positively influence transformation and innovation. This community also creates "transformational movements" to influence the firm's overall innovation culture. The larger this community, the higher the propensity to change and innovate. However, having or committing to the means to transform and innovate may moderate the influence of transformational leadership on innovation culture as expressed here:

"*Giving the space, freedom and means to people is key to innovate.*" (media enterprise interviewee)

Innovation cannot be managed in conventional and classical ways. People's well-being and having fun at work are important, commented a director from a major travel agency firm in France. Leadership in the technology sector seems more attuned to innovation practices, and an interviewee from a leading French telecom company emphasized training people in design thinking and giving them the space to speak and explore are all important enablers. The pharmaceutical director focused on the importance of a sponsor at a senior level developing ideas.

Individuals' daily activities and basic routines also influence the organisation's innovation culture: innovation must be anchored in human realities, and people must be supported across the organisation.

The interviewees identified transformational leaders' qualities and habits as influencers of the firm's innovation culture and proved to be positive. The influence of other leadership styles, like transactional and autocratic, on innovation culture will be investigated in the future.

5. Discussion

The innovation cultural of French enterprises seem paradoxical. France has, as one of the interviewees stated, the most advanced start-up ecosystem in the world; however, not many unicorns have originated in France. Innovative corporate companies are indeed found in France, but the traditional enterprise model with companies governed by bureaucracies remains nationally dominant, and although there is a high concentration of academic institutions and high R&D spending, France still lags other countries in innovation.

The qualitative approach helped in exploring the key themes associated to innovation culture. However, a quantitative research is required as a next step, to more reliably frame the innovation culture of French enterprises in association to the four propositions defined by this paper. A sample of the questionnaire that the authors intend to apply in future research is presented in the appendix. Another investigative avenue is how innovation cultures differ among small, regional, or international enterprises. Other European countries

may be facing similar challenges, and French enterprises' stand on innovation culture might be compared to them.

For managers who would like to influence their firms' innovation cultures, this paper discusses areas on which to focus. Two important drivers for this include the introduction of new capabilities and a focus on transformational leaders. French firms must learn to be more tolerant of mistakes and understand how to strike a compromise between perfection and speed. Lastly, this paper shows that today, opening up may be an option, but tomorrow, the ability to learn from capabilities the outside world has mastered will be a necessity.

References

Ahmed, P.K. (1998) "Culture and Climate for Innovation", *European Journal of Innovation Management*, Vol 1 No. 1, pp 30-43.

Angel, R. (2006) "Putting an Innovation Culture into Practice", *Ivey Business Journal*, January/ February, pp 1-5.

Bass, B.M. (1985) *Leadership and Performance Beyond Expectation*. Free Press, New York.

BCG. (2016) "The Most Innovative Companies", (Accessed online February 2018), Available at *https://www.bcg.com/publications/collections/most-innovative-companies-2016.aspx*.

Bengtsson, M. and Kock, S. (2000) "Coopetition in Business−To Cooperate and Compete Simultaneously", *Industrial Marketing Management*, Vol 29, No. 5, pp 411-426.

Brown, S.L. and Eisenhardt, K. (1997) "The Art of Continuous Change: Linking Complexity Theory and Time-Paced Evolution in Relentlessly Shifting Organizations", *Administrative Science Quarterly*, Vol 42, No. 1, pp 1-34.

Chao, G.T. and Moon, H. (2005) "The Cultural Mosaic: A Metatheory for Understanding the Complexity of Culture", *Journal of Applied Psychology*, Vol 90, No. 6, pp 1128-1140.

Chapman, R.L. and Corso, M. (2005) "From Continuous Improvement to Collaborative Innovation: The Next Challenge in Supply Chain Management", *Production Planning and Control*, Vol 16, No. 4, pp 339-344.

Chesbrough, H. (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business Press, New York.

Christensen, M. and Raynor, M.E. (2003) *The Innovator's Solution: Creating and Sustaining Successful Growth.* Harvard Business School, Boston.

Coffman, B. (2006) "Building the Innovation Culture. Some Notes on Adaptation and Change in Network-Centric Organizations", (Accessed Online in February 2018), Available at http://www.innovationmanagement.se/wp-content/uploads/pdf/Building_the_Innovation_Culture.pdf

Collis, D. (1994) "Research Note: How Valuable are Organizational Capabilities", *Strategic Management Journal,* Vol 15, No. 2, pp 143-152.

Coombs, R. and Metcalfe, S. (2000) "Organizing for Innovation: Co-Ordinating Distributed Innovation Capabilities" in N.J. Foss and V. Mahnke (Eds.) *Competence, Governance, and Entrepreneurship: Advances in Economic Strategy Research*. Oxford University Press, Oxford.

Crossan, M. and Apaydin, M. (2010) "A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature", *Journal of Management Studies,* Vol 47, No. 6, pp 1154-1191.

Daher, N. (2016) "The Relationships Between Organizational Culture and Organizational Innovation", *International Journal of Business and Public Administration*, Vol 13, No. 2, pp 1-15.

Danneels, E. (2002), "The dynamics of product innovation and firm competences', *Strategic Management Journal*, Vol 23, No. 12, pp 1095-1121.

Denison, D.R., Hooijberg, R. and Quinn, R.E. (1995) "Paradox and Performance: Toward a Theory of Behavioral Complexity in Managerial Leadership", *Organization Science*, Vol 6, No. 5, pp 524-540.

Deskwanted.com (2013) "The Global Coworking Census 2013", (online) www.deskwanted.com/coworking/Global-Coworking-Census-2013.pdf

Gagne, M., Senecal, C. and Koestner, R. (1997) "Proximal Job Characteristics, Feelings of Empowerment, and Intrinsic Motivation: A Multidimensional Model", *Journal of Applied Psychology,* Vol 27, No. 14, pp 1222-1240.

Glaser, B.G. and Strauss, A.L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Aldine, New York.

Godfrey, P.C. and Hill, C.W.L. (1995) "The Problem of Unobservables in Strategic Management Research", *Strategic Management Journal*, Vol 16, No. Special Issue, pp 519-533.

Hall, R. and Andriani, P. (2002) "Managing Knowledge Associated with Innovation", *Journal of Business Research,* Vol 56, No. 2, pp 145-152.

Hernandez, C.A. (2009) "Theoretical Coding in Grounded Theory Methodology", *The Grounded Theory Review*, Vol 8, No. 3, pp 51–60.

Jiménez-Jiménez, D. and Sanz-Valle, R. (2011) "Innovation, Organizational Learning, and Performance", *Journal of Business Research*, Vol 64, No. 4, 408-417.

Jones, E.L. (2006) *Cultures Merging: A Historical and Economic Critique of Culture*, Princeton University Press, Princeton, NJ.

Jucevicius, G. (2007) "Innovation Culture: The Contestable Universality of the Concept", *Social Sciences*, Vol 4, No. 58, 7-19.

Kanter, R.M. (2008) "Transforming Giants", *Harvard Business Review*, Vol 86, No. 1, pp 43-52.

Kumar, A. and Motwani, J. (1995) "A Methodology for Assessing Time-Based Competitive Advantage of Manufacturing Firms", *International Journal of Operations & Production Management*, Vol 15, No. 2, pp 36-53.

Lawrence, P.R. (1992) "The Challenge of Problem-Oriented Research", *Journal of Management Inquiry*, Vol 1, No. 2, pp 139-142.

Le Bas, C. and Laužikas, M. (2010) "Determinants of innovation culture and major impacts on the innovation strategy: The case of the information technology sector in Lithuania", *Social Sciences Studies*, Vol 4, No. 8, pp 125-139.

Lee, K.-Y. (2017) "Ecommerce and Firm Performance: Evidence from Korea", KIEP Research Paper, Working Paper 17-06.

Leung, K., Bhagat, R.S., Buchan, N.R., Erez, M. and Gibson, C.B. (2005) "Culture and International Business: Recent Advances and their Implications for Future Research", *Journal of International Business Studies*, Vol 36, No. 4, pp 357-378.

Leybourne, S.A. (2010) "Improvisation as a Way of Dealing with Ambiguity and Complexity", *Graziadio Business Report* Vol 13, No. 3, pp 1-7.

Markides, C. 2006 "Disruptive Innovation: In Need of Better Theory", *Journal of Product Innovation Management*, Vol 23, No. 1, pp 19-25.

Martins, E.C. and Terblanche, F. (2003) "Building Organisational Culture that Stimulates Creativity and Innovation", *European Journal of Innovation Management*, Vol 6, No. 1, pp 64-74.

McCormick, B.A. 2008. What's Responsible for Business Success or Failure? Its … the Organization's Culture. HRD, Amherst.

Miller, G.A. (1956) "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information", *The Psychological Review*, Vol 63, No. 2, Winter 1999, 81-97.

Munson, F.C. and Pelz, D.C. (1979) "The Innovating Process: A Conceptual Framework", Working Paper, University of Michigan.

O'Reilly, C.A. and Tushman, M.L. (2008) "Ambidexterity as a Dynamic Capability: Resolving the Innovator's Dilemma", *Research in Organizational Behavior*, Vol 28, pp 185-206.

Padilha, C.K. and Gomes, G. (2016) "Innovation Culture and Performance in Innovation of Products and Processes: A Study in Companies of Textile Industry", *RAI Revista de Administração e Inovação*, Vol 13, No. 4, October–December, pp 285-294.

Pike, K.L. (1967) *Language in Relation to a Unified Theory of Structure of Human Behavior* (2nd revised ed.), Mouton, The Hague, NL.

Schwartz, S.H. (1992) "Universals in the Content and Structure of Values: Theory and Empirical Tests in 20 Countries", in M. Zanna (Ed.), *Advances in Experimental Social Psychology*, pp 1-65. Academic Press, New York.

Shalley, C.E., Gilson, L.L. and Blum, T.C. (2000) "Matching Creativity Requirements and the Work Environment: Effects on Satisfaction and Intention to Leave", *Academy of Management Journal,* Vol 43, No. 2, 215-223.

Sicotte, H., Delerue, H. and Drouin, N. (2015) "Performance of NPD Projects: Measures from Different Sources", Paper presented at 15th EURAM Annual Conference, Warsaw, Poland, June 17-20.

Singh, N. (2004) "From Cultural Models to Cultural Categories: A Framework for Cultural Analysis", *Journal of American Academy of Business*, Vol 5, No. 1 and 2, pp 95-101.

Spreitzer, G.M. (1995) "Psychological Empowerment in the Workplace: Dimensions, Measurement, and Validation", *The Academy of Management Journal,* Vol 38, No. 5, pp 1442-1465.

Teece, D., Peteraf, M. and Leih, S. (2016) "Dynamic Capabilities and Organizational Agility", *California Management Review*, Vol 58, No. 4, pp 13-35.

Teece, D., Pisano, G. and Shuen, A. (1997) "Dynamic Capabilities and Strategic Management", *Strategic Management Journal*, Vol 18, No. 7, pp 509-533.

Utman, C. (1997) "Performance Effects of Motivational State: A Meta-Analysis", *Personality and Social Psychology Review,* Vol 1, No. 2, pp 170-182.

Wenger, E. and Snyder, W. (2000) "Communities of Practice: The Organizational Frontier", *Harvard Business Review*, Vol 78, No. 1, pp 139-145.

Winby, S. and Worley, C. (2014) "Management Processes for Agility, Speed, and Innovation", *Organizational Dynamics*, Vol 43, No. 3, pp 225-234.

Wines, W.A. and Napier, N.K. (1992) "Toward an Understanding of Cross-Cultural Ethics: A Tentative Model", *Journal of Business Ethics,* Vol 11, No. 11, pp 831-841.

Winter, S. (2003) "Understanding Dynamic Capabilities", *Strategic Management Journal*, Vol 24, No. 10, pp 991-995.

Yin, R. (2011) *Qualitative Research from Start to Finish* (pp 7, 50, and 77), The Guilford Press, New York.

Zollo, M. and Winter, S.G. (2002) "Deliberate Learning and the Evolution of Dynamic Capabilities", *Organization Science*, Vol 13, No. 3, pp 339-351.

Appendix

Questionnaire

Name: Optional: -----

Company Name:
Work context:

- Industry
- Transports/Communication
- Commerce/Retail/Wholesale
- Finance/Insurance/Banking
- Services
- Health
- Education
- Public services
- Others

Position

- Farmer
- Shop owner, small entrepreneur
- Manager and knowledge worker
- Trader
- Employee
- Worker
- Retired
- Others

Geography:

- France Only
- Europe
- International

Company size:

- Less than 10 employees
- Less than 100
- 100 to 999
- 1,000 to 9,999
- More than 10,000

Professional experience:

- Less than 5 years
- 5 to 9 years
- 10 to 19 years
- 20 to 30 years
- more than 30 years

Impact of Innovation Culture on Innovation Performance

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Innovation plays an important role in our industry.					
I am satisfied with the innovation performance of our firm.					
Our firm is able to launch breakthrough Innovation.					
Our firm is able to react fast on innovation.					
Our firm has built the right innovation culture.					
In general, there is a strong relationship between innovation culture and innovation performance.					

Innovation Culture & New Capabilities

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
We have a flexible organization structure.					
We motivate creative people.					
We have incentivized people for innovation.					
We have a budget that motivates people to test new ideas.					
All functions are involved in innovation.					
Only marketing and R&D are involved in innovation.					
We challenge the classical way of doing things.					
We explore new ways of doing things.					
Innovation culture is enabled by new capabilities.					

Innovation Culture & Openness

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
We have strong networks within our ecosystem.					
We have an innovation program with universities.					
We have an innovation program with accelerators and startups.					
We co-create with customers and suppliers.					
We collaborate with our competitors.					
We learn from external sources.					
We constantly challenge what we know.					
We motivate our teams to collaborate with external parties.					
Innovation culture is enabled by opening up to the outside.					

Innovation Culture & Leadership

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
We are constantly stimulated by top management to innovate.					
Our management inspires us to think big.					
We are allowed to take risks.					
We encourage our teams to take risks.					
We are encouraged to learn new things.					
We motivate and support our teams to learn new things.					
We encourage our teams to think for the future.					
We separate between short-term and long-term results.					
We are encouraged our teams to act like entrepreneurs					
Our management gives us support & means so we act like entrepreneurs.					
We are encouraged to change and explore new ways.					
We have prospective transformation projects.					
We feel empowered to innovate.					
We are curious to explore how others do things.					
We feel constantly intellectually stimulated.					
We accept delivering products that are not perfect.					
We accept compromise between product quality and speed.					
We encourage our teams to think creatively.					
We feel more confident with classical ways.					
We focus our energy on delivering the yearly results .					
Leaders play a role in cultivating an innovation culture.					

Perceived Importance of Innovation, Knowledge Management Maturity, Returns Management Knowledge and Internal Integration

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Abstract: The aim of this paper is to determine relationships between the perceived importance of innovation (PII) by managers, knowledge management maturity (KMM), returns management knowledge (RMK) and internal cross-functional integration and coordination (CFIC) among Czech firms. Returns management (RM) used to be the most neglected process in business (Norek, 2002) due to the dominance of forward-based thinking in value creation processes (de Brito, 2004). Innovative practices are highly recommended for managing returns and reverse logistics (RL) especially owing to many specific features of RM and limited space for making foresights (Richey et al, 2005; Bernon, Rossi and Cullen, 2011). High variability and complexity of tasks and, more difficult coordination of processes inside and across the firms related to manage returns requires increased information management needs, proper knowledge sharing and adequate KM (Meade and Sarkis, 2007). Schoenherr and Swink (2012) proved that CFIC is positively associated with the ability to transform and exploit knowledge obtained from the external partners (what is extremely important in the case of RM). In our model we test relationships between the PII, existed RMK, KMM and the level of the internal CFI. Based on a survey of 232 managers from the same number of firms from various industries and sectors in the Czech Republic, this study applies the structural equation modelling (SEM) to investigate proposed research model. Results show that the perceived importance of innovation has a positive link with KMM, RMK positively influences KMM, KMM has a positive link to the CFIC and the CFIC has a positive link to the PII.

Keywords: perceived importance of innovation, knowledge management maturity, internal cross-functional integration, returns management knowledge

1. Introduction

For many decades innovation has been acknowledged as one of the most important factors influencing substantially the sustainable economic and market success and competitivness of firms (Deshpande et al, 1993). Innovation as an item is the result or output of both the innovation as a process (innovation as a process is itself a type of innovation) and innovation as an organizational attribute. The latter connotes specific characteristic, feature or quality which may distinguish between the organizations. Ability, capability, capacity to innovate, technological capacity and willingness and commitment to change, (cultural) readiness to follow new ways and to be creative, tendency to engage in, support and realize new ideas or simply organizational creativity and open-mindedness or openness to new ideas belong to the descriptions of understanding what innovativeness, resp. innovation orientation might be in the organizational practice (Hult, Hurley and Knight, 2004).

There is very close relationship and interdependence between innovation, innovativeness and another factor from the list of the antedecents of business success and growth, namely knowledge and specifically KM (Hung et al, 2010). The prevalent view on this relationship is represented in the cause and effect mechanism where innovation and innovativeness are the consequences of KM (Alavi and Leidner, 2001; Darroch, 2005).

However, there are several identical conditioning factors affecting both organizational issues – innovativeness and effective KM, among which organizational culture or climate, leadership, managers´ commitment and organizational structure pertain to (Janz and Prasarnphanich, 2003; Chen et al, 2010). Research also emphasizes that sharing and integrating and coordinating knowledge and knowledge flows (KF) is extremely necessary for the both effective innovation endeavour and KM and its maturity (Ettlie and Reza, 1992; Pagell, 2004). Internal integration fosters better intra-firm goal alignment, in particular if there is a shared understanding of its value and importance (Pagell, 2004). Individual percieved importance is one of the fundamental preconditions of behaviour in general (Ajzen, 1991). Analogy can be made to the collective perceived importance (PI) of some object or task that drives organizational processes (Kelly, 1993). PI and its impact on behaviour has been studied in several fields, but to the best knowledge of the authors of this paper, not in innovation-related studies yet.

There is one specific area of business life with many negative impacts on several stakeholders, which is RM. The volume of reverse flows (RF) of products, packaging and waste has been dramatically increasing over the last few decades globally (Shaharudin, Govindan and Zailani, 2015). Existing knowledge from the forward processes is seldom applicable to more complex problems and processes with high level of uncertainty regarding the time, the amount, the quality, the requests for settlement and with the extreme demand on maintaining the relationships inside and outside the business as RM can be assigned as the cross-functional domain spanning the boundaries of a firm through the relationships with customers, distributors and suppliers (Mollenkopf, Russo and Frankel, 2007). Handling of all these requirements expects creativity, flexibility and innovative solutions (Huang and Young, 2014). More and better knowledge and competencies as well as skills of RM are considered to be a distinct competitive advantage owing to the ability to create more value for interested parties (Jayraman and Luo, 2007). People dealing with RM in the environment where this area is demanding can have specific position and power and may push to manage knowledge across the organization to make KF in harmony with their needs and for the profit for the firm.

Although there is a number of arguments that confirm the above outlined reality, academic research shows extreme inattention to investigate the aforementioned areas. This paper tries to fill the gap and give the answers to several research questions indicated above. We want to find out if PII (as a specific construct) may have a positive effect on the level of KMM. If this is approved, implication for management in the sence of the communication improvement about the role of innovation exists. Another issue for our exploration is the effect of RMK on KMM. We also want to test if the KMM positively affects the CFIC. If the results confirm our assumption, we can claim that if knowledge is managed on the strategic level, infrastructure and space for knowledge sharing and learning environment is provided and if KM is the integral part of every organization process, the CFI yields better knowledge and KF and so it is supportive element for KM. Finally we want to explore if the level of the CFI is positively linked to the PII. Our argument for this expectation lies in the fact that sharing the knowledge about needed innovation of products, processes or even of organization across the functional units may increase pressure to view innovations as beeing more important.

2. Theoretical foundations

Unlike the general recognition of the importance of innovation for business success there is no concensus what innovation is due to the different perspectives of different disciplines which deal with innovation (Baregheh et al, 2009). Research shows that it is not the innovation itself but an organizational climate, spirit and energy which is grounded in deep understanding of the meaning, purpose, significance and value of beeing innovative and that stands behind the success and competitiveness of an organization which is able to develop and realize desirable innovation performance and outputs (Deshpandé, Farley and Webster, 1993).

Several terms and constructs try to grasp the purport of this factor. Innovativeness, innovation spirit, openness to innovation or innovation orientation are the few and concurrently the most frequent representatives. Based on the works of Manu (1992) and Siguaw, Simpson and Enz (2006) this characteristic feature strategic in its nature (and multiple construct for the researchers) of the organizational behaviour encompasses: already mentioned openness to the innovation and to new ideas – as a part of organizational culture; total innovation programmes; offensive strategy; research and development expenditures; energy to invent and refine products; capacity to innovate; strength of the emphasis on innovation; mix of entrepreneurial intent (strategic intent to innovate) and innovation climate (human resources practices related to the employee´s new ideas encouragement, support and sharing); recognition and appraisement of creativity and innovation and communication and reinforcement of the innovation-focused shared values. Siguaw, Simpson and Enz (2006, p. 559) conceptualize innovation orientation as *"an overarching, organization-wide knowledge structure".*

Not only Siguaw et al work but also many other studies confirm that innovation and innovative organizational behavior is positively related to KM (Choo, 1996; López-Nicolás and Meroño-Cerdán, 2011). Knowledge is to some extent and level managed in every organization (also unconsciously), however as it is the same with every aspect of management, knowing the level of maturity enables to improve, to avoid some harmful influences and to support positive factors (Pee, Teah and Kankanhalli, 2006). There are several models for measuring KMM but no unique agreed approach has been established yet (Khatibian et al, 2010). Among numerous factors which show the quality of KM, strategically managed and planned knowledge, KM implemented into the whole organization and its processes and provision and support of the infrastrucutre

and culture for sharing knowledge belong to the most emphasized ones (López-Nicolás and Meroño-Cerdán, 2011).

Leaders – through culture and climate - play critical role in shaping employees' values, guiding beliefs, understandings, ways of thinking, attitudes, perceptions and behaviour (Pagell, 2004). Especially attitudes and perceptions are forces that lead to some specific behaviour. In organizations, also attitudes and perceptions of individuals may be integrated into the unique entities (Elsbach, 2014). If all or most of employees have a positive attitude towards a concrete object and the object is perceived as important, the effort focused on achieving the goal related to the object will be more intensive in comparison with the situation if attitudes and perceptions are negative and disperse (Awey et al, 2008). Understanding the importance of innovation for organization and of the own personal well-being (for instance through the reward system linked to the innovation market success) may be connected to the higher willingness to share tacit knowledge of an individual and to actively participate on knowledge processing (Bock and Kim, 2002). Thus, we hypothesize that PII should serve as a stimulus for more intensive and more effective KM and results in KMM. In line with this idea we propose to test a new construct "perceived impotance of innovation"

RM is extremely demanding for knowledge integration not only in the internal environment but also with the external parties, in particular with customers, suppliers and distributors (Ramírez, 2012). "Knowing this knowledge", i.e. to have right information right time, of the right quantity and at the right place from the right people and using it to solve multiple problems and tasks (e.g. how to avoid product returns, how to deside about the disposition (Kokkinaki et al, 2004) is very complex issue for management and decision making.

Notwithstanding, in comparison with the amount of reseach on the information need and provision in RM (or RL) KM theory in this context is almost absent (Wadhwa and Madaan, 2007; Ramirez, 2012; and Ramirez and Girdauskiene, 2013). Muniz et al (2017) in the latest existng literature review on inteconnection of reverse logistics (so not specifically focused on product returns), knowledge management and strategic managementsupport this fact. There is no current research related to linkages with innovation management and the internal inegration which integrates also knowledge flows and thus promote innovativeness. Hovever, it is obvious from other - not product returns studies – that high level of such knowledge can be a proof of proactive approach and accepted role of RM in a firm and thus influence promotion and developemnt of KM. Such assumption has never been explored in RM theory.

Knowledge-driven environment enables knowledge capture, knowledge acquisition, knowledge creation, knowledge storage, knowledge sharing and diffusion and knowledge exploitation (Paarup Nielsen, 2006) and serves as the rudiments for innovativeness. If all these processes work well, there is the probably an urge to be more integrated – internally as well as externally. This presumptiom stems from the Hirunyawipada et al (2010, p. 657) who postulate CFIC to be tacit-to-collective knowledge transformation mechanism. Integration and coordination of people and processes and knowledge embedded in functional departments may open the shutters to the bigger flow of joint need to innovate and so to boost perceived importance to innovate. Our paper reacts to the call of the authors for future research in this issues and we examine KMM impact on the CFIC and potential impact of the CFIC on the PII.

Based on the above discussion the following hypotheses for the expected effects are proposed:

H1: The PII contributes positively to the KMM.
H2: The KMM positively affects the CFIC.
H3: Higher internal CFIC increases the PII.
H4: The RMK stimulates KMM.

3. Methods

3.1 Research design

Because the set of hypotheses H1 to H4 constitutes a model of complex relationships, the empirical validity of hypotheses was not tested separately, but the whole model was validated at once using structural equation modelling (SEM). The SEM gained intense popularity in empirical research due to its ability to test complex relationships and to include latent variables (Babin et al., 2008; Schreiber et al., 2006).

Our model combines three observed (PII, CFIC, RMK) and one latent variable (KMM - reflected in three items – directly observed variables). The items of KMM were adapted from Chang Lee et al. (2005) and McKeen et al. (2006). The PII was inspired by Bharadwaj (2000) and was measured using a single-item scale that rated innovation's importance to the organization on a seven-point scale. The remaining two observed variables are adapted from authors´ previous research (Klapalová et al., 2013). The wording of questions and variables names are in Table 1.

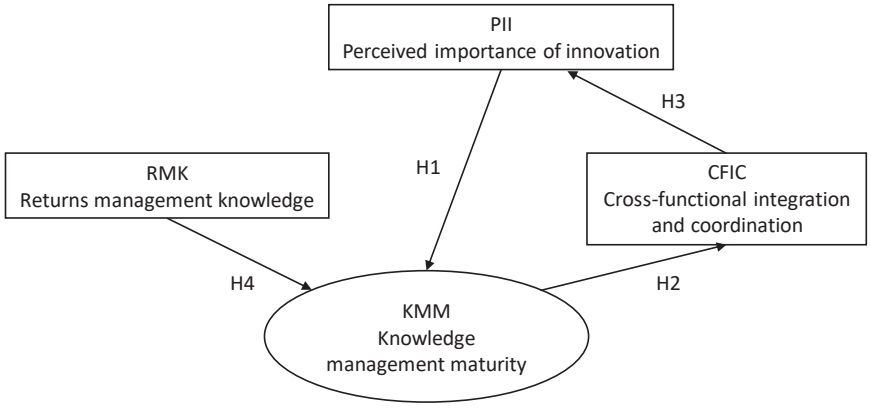

Figure 1: Structural model

Table 1: Description of variables and items (N = 217)

Variables	Items (scales)	Median	Mean	Std. Dev.
KMM	KMM1: Knowledge is managed as a strategic asset. *(strongly disagree – strongly agree)*	5	4.49	1.72
	KMM2: KM is planned and integrated into all corporate processes.	4	4.22	1.77
	KMM3: We have systems and venues for people to share knowledge and learn from each other in the company.	4	4.14	1.98
PII	What is the role of innovation in your firm? *(no need of innovation – an existential necessity)*	5	4.87	1.87
RMK	What is RM and/or RL related knowledge in your firm compared to forward logistics? *(substantially lower – subs.higher)*	3	3.31	1.39
CFIC	What is the level of internal CFIC in your firm? *(very low – extremely high)*	5	4.37	1.97

Note. Scale description in italics.

3.2 Data collection and the sample

The six variables employed in the paper come from a survey realized by authors in 2015/16. The survey explored ambitions, approaches, and practices of firms towards RM. In other words, the survey asked firms representatives (higher management, specialists in logistics/operations/after-sales) to find out some inormation about RM and RL on the one hand, and management system on the other (its characteristics, including the approach to knowledge and innovation).

Out of 232 collected questionnaires, the final sample shrank to 217 cases, because we removed the cases with missing values (casewise deletion). For SEM, a sample size above 200 is the minimum advised by literature (for further discussion see Wolf et al., 2013). If we take into consideration that the number of distinct parameters to be estimated in our model, is 13, then the sample size can be regarded as appropriate (based on the rule of thumb: 10 cases for one estimated parameter).

4. Analysis of results

The statistics of central tendency and variability for each of variable are presented in Table 1. The Kolmogorov–Smirnov test rejected the idea about normal distribution of data; however, the histograms did not show any cardinal difference from a normal distribution, so the further calculations were done on non-transformed data.

In the first step, the validity of the latent variable of KMM was checked in terms of its convergence by indices proposed by Hair et al. (2009): The standardized regression weights of three items (KMM1, KMM2, KMM3)

were higher than the recommended cut point of 0.5 and are of statistical significance ($p < .05$). Next, Cronbach alpha, Joreskog rho as well as AVE were above the thresholds of 0.7, 0.7 and 0.5 respectively (see Table2). All the three indices allow us to accept KMM as valid.

Table 2: Measures of convergence validity

Indicators` names	KM
Cronbach alpha	0.803
Joreskog rho	0.838
Average Variance Extracted	0.645

After ensuring convergence validity of KMM, the structural model was computed by applying maximum likelihood method in SPSS AMOS and assessed by indicators of χ^2, CFI, RMSEA. The graphical form of the model is depicted in Figure 2.

The value of χ^2 test (8, 217) = 9.845, p = .272 speaks in favor of the proposed model; in statistical terms, the model does not differ from the structure of empirical data. The more conservative model fit indices support the conclusion: their values (comparative index fit = .995 and RMSEA = .033) are in harmony with the recommended thresholds (Hair et al., 2009). Because the model as a whole can be accepted, it is reasonable to analyse the model's elements and relationships.

Table 4 summarizes the detailed results: The hypotheses H1 to H4 are statistically significant at $p < 0.05$ (H2, H3, and H4 at $p < 0.01$) and appropriate regression weight are positive, which corresponds to our expectation of positive relationships among variables (see Table 3). All in all, the findings allow us to accept the H1 to H4 (provisionally, of course). Despite ambiguity in the interpretation of regression weights, the higher regression weights are usually interpreted as an indicator of stronger links between variables. In this respect, the strongest relationship was found between KMM and CFIF (i.e., H2; $\beta = 0.369$); the remaining H1, H3, and H4 are of similar strength.

The quality of the statistical model is also assessed by its explanatory power, as measured by the explained variance of the dependent variable. Because the model works with three dependent variables that are independent at the same time (the model has a form of a loop), we can only report the explained variance (r^2) for each variable without implying further conclusion regarding the model (r^2 for PII, KMM, and CFIC equals 0.06, 0.1 and 0.16 respectively).

Table 3: Regression Weights

			Estimate	**S.E.**	**C.R.**	**P**	**St. regression weights**	**Hypothesis**
KMM	<---	PII	.106	.043	2.487	.013	.190	H1
CFIC	<---	KMM	.686	.148	4.643	***	.369	H2
PII	<---	CFIC	.185	.069	2.679	.007	.192	H3
KMM	<---	RMK	.160	.054	2.973	.003	.213	H4
KMM3	<---	KMM	1.000				.523	
KMM2	<---	KMM	1.597	.198	8.048	***	.935	
KMM1	<---	KMM	1.469	.181	8.114	***	.887	

5. Limitations, discussion and implications

The main methodological limitation of presented research relates to the single informant approach. The view of just one person on a complex system - the firm - can be distorted by diverse factors such as job position, knowledge, experience, etc. This issue is more relevant in the context of RM/RL because firms often lack precise monitoring/measuring systems in this field and the informants cannot rely on "hard" data.

Another limitation is with constructs and variables. Three of four construct are one-dimensional ones and so they cannot offer rich and more explanatory picture of the reality. Here is the space for the research implications and for a call to test different dimensions of PII, RKM and CFIC. Very common conclusion can be made with the KMM construct where only three dimensions were measured. Further only CFIC was measured and no interest was devoted to the external integration. Also, number of usable questionnaires limited analyses and does not enable to test more and mutual relations as well as involvement of other answers (and constructs or variables) to enlarge context of investgated situation.

Our research has several implications for managers and for research. First, it shows the linkage and effect between KMM and CFIC. This is challenging finding and should be explored into more depth. Simple and logical explanation could be that the integration and coordination element in KM is strong and KMM– at least if it is reached through those three practices as it is in case of our firms - requires also practices that lead to and enable proper integration and coordination. Second, results proved the expected effect of the PII on KMM. This finding recommends firms to promote innovation spirit. If there is a mutual understanding why to be innovative is important and a shared awareness exists of which specific innovation processes and factors result in successful innovation, proper decision making can be realized on the strategic, tactical and operational level throughout whole firm. Such mutual understanding creates shared beliefs, attitudes and perception of importance. In our research we pay attention especially to the perception construct relying on the study of Bahamonde-Birke et al (2015) which proves that perception strongly affect decision making. Third, this study shows that CFIC is an important determinant of the PII. It means that sharing, mutuality, interconnections serve as drivers for collective understanding. This might be powerful way to maintain common spirit. However, in our survey we did not separate integration and coordination. Thus, in the future research this variable can be manipulated and explored as two seperate measures. Forth, survey also shows another influence – of one area of specific KM on the more general one. From our survey it is not clear if this is so due to the integration and coordination effect, nevertheless, this point is worth of deeper interest.

6. Conclusions

This study, despite its limitations, tries to focus attention of academic to several areas of business practice, which stand in the shadows or even in the darkness of interest regardless the fact they they belong to those domains or fields where enormous concern for the exploration and investigation exists. Understanding also these relatively small pieces of mosaic and especially how they influence whole and more complex view may be important for further development of the "parent" fields. More questions and more answers can be raised, and answers and new or improved processes may be initiated through new knowledge about how important perceived importance is – both of individual employees and as a collective or group perception Which right stimuli should be developed and how to use them for sharing not only some pieces of knowledge but be really involved. So, domain of human resource management, organizational communication, innovation management and knowledge management can see some new ways. Also, power of some specific knowledge need and body of knowledge in this area should be studied in more depth, specifically how this power may be consciously managed and positively utilised for knowledge management and potentially even for other "managements as well as for strategic and organization and network level.

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References

Abdulrahman, M. D., Gunasekaran, A. and Subramanian, N. (2014) "Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors", International Journal of Production Economics, No. 147, pp. 460-471.

Ajzen, I. (1991) "The theory of planned behavior", Organizational Behavior and Human Decision Processes, Vol 50, No. 2, pp. 179-211.

Alavi, M. and Leidner, D.E. (2001) "Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues", MIS, Quarterly Review, Vol 25, No. 1, pp. 107-136.

Babin, B.J., Hair, J.F. and Boles, J.S. (2008) "Publishing Research in Marketing Journals Using Structural Equation Modeling", Journal of Marketing Theory and Practice, Vol 16, No. 4, pp 279–286.

Baregheh, A., Rowley, J., & Sambrook, S. (2009) "Towards a multidisciplinary definition of innovation", Management Decision, Vol 47, No. 8, pp. 1323-1339.

Bernon, M., Rossi, S., and Cullen, J. (2011) "Retail reverse logistics: a call and grounding framework for research", International Journal of Physical Distribution & Logistics Management, Vol 41, No. 5, pp. 484–510.

Bharadwaj, A.S. (2000) "A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation", MIS Quarterly, Vol 24, No. 1, pp 169–196.

Bock, G. W., & Kim, Y. G. (2002) "Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing", Information Resources Management Journal, Vol 15, No. 2, pp. 14-21.

Chang Lee, K., Lee, S. and Kang, I.W. (2005) "KMPI: measuring knowledge management performance", Information & Management, Vol 42, No. 3, pp 469–482.

Chen, C. J., Huang, J. W., & Hsiao, Y. C. (2010) "Knowledge management and innovativeness: The role of organizational climate and structure", International Journal of Manpower, Vol 31, No. 8, pp. 848-870.
Choo, C. W. (1996) "The knowing organization: How organizations use information to construct meaning, create knowledge and make decisions", International Journal of Information Management, Vol 16, No. 5, pp. 329-340.
Darroch, J. (2005) "Knowledge management, innovation and firm performance", Journal of Knowledge Management, Vol 9, No. 3, pp. 101-115.
De Brito, M. P. (2003) Managing reverse logistics or reversing logistics management, ERIM Ph.D. Series Research in Management, 35, [online], Erasmus University Rotterdam, Rotterdam. https://repub.eur.nl/pub/1132/
Deshpandé, R., Farley, J. U. and Webster Jr, F. E. (1993) "Corporate culture, customer orientation, and innovativeness in Japanese firms: a quadrad analysis", The Journal of Marketing, Vol 57, No 1 pp. 23-37.
Elsbach, K. D. (2014) Organizational perception management, Routledge, New York, NY.
Ettlie, J.E. and Reza, E.M. (1992) "Organizational integration and process innovation", Academy of Management Journal, Vol 35, No. 4, pp. 795-827.
Grant, R. M. (1999) Prospering in dynamically-competitive environments: Organizational capability as knowledge integration, In Knowledge and strategy (pp. 133-153), Butterworth-Heinemann, Oxford.
Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2009) Multivariate Data Analysis, 7 ed., Prentice Hall, Upper Saddle River, NJ.
Hirunyawipada, T., Beyerlein, M., & Blankson, C. (2010) "Cross-functional integration as a knowledge transformation mechanism: Implications for new product development", Industrial Marketing Management, Vol 39, No. 4, pp. 650-660.
Huang, Y. C., & Yang, M. L. (2014) "Reverse logistics innovation, institutional pressures and performance", Management Research Review, Vol 37, No. 7, pp. 615-641.
Hult, G. T., Hurley, R. F. and Knight, G. A. (2004) "Innovativeness: Its antecedents and impact on business performance", Industrial Marketing Management, No. 33, pp. 429 – 438.
Hung, R. Y. Y., Lien, B. Y. H., Fang, S. C. and McLean, G. N. (2010) "Knowledge as a facilitator for enhancing innovation performance through total quality management", Total Quality Management, Vol 21, No. 4, pp. 425-438.
Janz, B. D. and Prasarnphanich, P. (2003) "Understanding the antecedents of effective knowledge management: The importance of a knowledge-centered culture", Decision Sciences, Vol 34, No. 2, pp. 351-384.
Jayaraman, V. and Luo, Y. (2007) "Creating competitive advantages through new value creation: a reverse logistics perspective", The Academy of Management Perspectives, Vol 21, No. 2, pp. 56-73.
Kelly, C. (1993) "Group identification, intergroup perceptions and collective action", European Review of Social Psychology, Vol 4, No. 1, pp. 59-83.
Khatibian, N., Hasan gholoi pour, T. and Abedi Jafari, H. (2010) "Measurement of knowledge management maturity level within organizations", Business Strategy Series, Vol 11, No. 1, pp. 54-70.
Klapalová, A., Škapa, R. and Krčál, M. (2013) Specifika řízení zpětných toků, Masarykova univerzita, available at: https://www.muni.cz/vyzkum/publikace/1104772 (accessed 27 May 2018).
Kokkinaki, A., Zuidwijk, R. van Nunen, J. and Dekker, R. (2004) Information and Communication Technology enabling Reverse Logistics. In: Dekker, R. a kol. Reverse logistics: quantitative models for closed-loop supply chains, Springer, New York.
López-Nicolás, C. and Meroño-Cerdán, Á. L. (2011) "Strategic knowledge management, innovation and performance", International Journal of Information Management, Vol 31, No. 6, pp. 502-509.
Manu, F. A. (1992) "Innovation Orientation, Environment and Performance: A Comparison of U.S. and European Markets", Journal of International Business Studies, Vol 23, No. 2, pp. 333–59.
McKeen, J.D., Zack, M.H. and Singh, S. (2006) "Knowledge Management and Organizational Performance: An Exploratory Survey", Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06), pp 152b-152b , [online], https://pdfs.semanticscholar.org/fc1d/abb5b1719a9c1c6650bd0a446e6c498c927a.pdf.
Meade, L., Sarkis, J. and Presley, A. (2007) "The theory and practice of reverse logistics", International Journal of Logistics Systems and Management, Vol 3, No. 1, pp. 56-84.
Mollenkopf, D., Russo, I. and Frankel, R. (2007) "The returns management process in supply chain strategy", International Journal of Physical Distribution & Logistics Management, Vol 37, No. 7, pp. 568-592.
Muniz Jr, J., Cunha, J., Almeida, R., & Marins, F. (2017) "The Knowledge Management in Business Strategies and Reverse Logistics) ", Brazilian Journal of Operations & Production Management, Vol. 14, No. 1, pp. 28-36.
Norek, C. D. (2002) "Returns management: making order out of chaos", Supply Chain Management Review, Vol 6, No. 3, pp. 34-42.
Pagell, M. (2004) "Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. Journal of Operations Management, No. 22, 459-487.
Paarup Nielsen, A. (2006). Understanding dynamic capabilities through knowledge management", Journal of Knowledge Management, Vol 10, No. 4, pp. 59-71.
Ramirez, A. M. (2012) "Product return and logistics knowledge: Influence on performance of the firm", Transportation Research Part E: Logistics and Transportation Review, Vol 48, No. 6, pp. 1137-1151.
Ramirez, A. M. and Girdauskiene, L. (2013) "Creation of knowledge and reverse logistics. Empirical analysis from perspective of the resource based view theory", Inzinerine Ekonomika-Engineering Economics, Vol 24, No. 5, pp. 478–487.

Richey, R.G., Genchev, S.E. and Daugherty, P. J. (2005) "The role of resource commitment and innovation in reverse logistics performance", International Journal of Physical Distribution & Logistics Management, Vol. 35, No. 4, pp. 233-58.

Schoenherr, T. and Swink, M. (2015) "The Roles of Supply Chain Intelligence and Adaptability in New Product Launch Success", Decision Sciences, Vol 46, No. 5, pp. 901–936.

Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A. and King, J. (2006) "Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review", The Journal of Educational Research, Vol 99, No. 6, pp 323–338.

Shaharudin, M. R., Govindan, K., Zailani, S. and Tan, K. C. (2015) "Managing product returns to achieve supply chain sustainability: an exploratory study and research propositions", Journal of Cleaner Production, No. 101, pp. 1-15.

Siguaw, J. A., Simpson, P. M. and Enz, C. A. (2006) "Conceptualizing innovation orientation: A framework for study and integration of innovation research", Journal of Product Innovation Management, Vol 23, No. 6, pp. 556–574.

Teah, H. Y., Pee, L. G. and Kankanhalli, A. (2006) Development and application of a general knowledge management maturity model, PACIS 2006 Proceedings, 12, , [online], http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.111.1581&rep=rep1&type=pdf.

Wadhwa, S. and Madaan, J. (2007) "Conceptual framework for knowledge management in reverse enterprise system", Journal of Knowledge Management Practice, Vol 8, No. 2, pp. 1-22.

Wolf, E.J., Harrington, K.M., Clark, S.L. and Miller, M.W. (2013) "Sample Size Requirements for Structural Equation Models: An Evaluation of Power, Bias, and Solution Propriety", Educational and Psychological Measurement, Vol 73, No. 6, pp 913–934.

Multichannel Distribution in the Process of Delivering Value for Banks' Customers

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Abstract: The Polish banking market if thought to be one of the most dynamic developing in Europe. Its characteristic features are high competitiveness and innovativeness. Concurrently, banks and credit institutions dealing on this market are assessed as stable and, in general, have no problem with fulfilling new regulatory requirements. Polish customers' openness for novelties and their usage of new technologies in various fields result in the change of their expectations concerning banks and other financial products' suppliers. Contemporary, delivering value for customers means not only understanding customers' needs but also following their preferences on a place and time when they use them. The purpose of the paper is to present the changes in the way of delivering value for banks' customers. The paper describes the importance of the value creation ability for building and maintaining competitive advantage, characterises distribution channels used today for delivering those values, presents prerequisites and forecasts of multichannel distribution's development on banking market.

Keywords: multichannel distribution, value for customers, banks' business models, banks' distribution channels

1. Introduction

The banking sectors play the crucial role in the economy. They respond to different kind of external factors. Economic, political, social, technological and legal environment influences banks' market policy and behaviour.

There is no common agreement what kind of factors are the most significant ones. Undoubtedly, the increased number of new acts, directives and supervisory recommendations let many authors state that the regulatory pressure is the most important factor influencing not only the retail banking market but the whole economy (Marcinkowska et al., 2014; Kasiewicz and Kurkliński, 2012). For others, the most important are those that allow banks to create sustainable competitive advantage. Today building and maintaining market position is impossible without long-term relations with customers resulting from the ability to match the offer with their clients' needs and expectations. Creating, delivering and capturing value for customers is mostly influenced by social and technological factors (Sullivan, 2008; Świtalski, 2005, Ernst & Young, 2016).

For last few decades, different kind of technological innovations has a profound effect on retail banking services in Poland and all over the world. As a result of systematically increasing the complexity of new technology, development of information and communication's techniques, economy's networking, social revolution have already happened and changed customer behaviour and expectations concerning banking services.

The primary motivation for using modern technology has been to reduce costs (Delafrooz et al., 2013, Persson 2013), increase efficiency, speed, and control the customer-bank interactions (Honebein and Cammarono, 2006). The unlimited access to financial services and their remote management have delighted both customers and banks. The benefits of technology centre around the fact that the clients can access services whenever and wherever they want without the necessity of interpersonal contact and the technology potential to add value to the overall customer experience (Blount, 2010). After the first period of technology admiration, retail banks have realised that there still a large group of clients who prefers face-to-face interactions. Balancing the need concerning service functionality and individual approach to customers focused on relation remains a challenge for banks (Davis, 2013). In recent years, the development of social media has enriched technological landscape and has influenced markets, companies, institutions and customers' behaviour and expectations (Mayfield, 2008, Ahlqvist et al., 2008, Kaplan and Heinlein, 2010, Weinberg and Pehlivan, 2011, Hanna et al., 2011, Papagiannidis and Bourlakis, 2015, Durkin et al., 2015). As a result, banks have attempted to deploy new technology in their market strategies to be more communicative, more customer-centric and innovative.

This paper argues that following customer expectations in the field of creation, delivering and enhancing value for customers as a core part of the business model will require implementing new solutions concerning banks' distribution channels.

The purpose of the paper is to present the changes in the way of delivering value for banks' customers. The paper begins with an analysis of the value creation process as a part of banks' market activity. It further discusses the values delivered by selected kinds of banks' business models and banks' distribution channels used for delivering those values to their customers. Finally, it concludes with the prerequisites and forecasts concerning the multichannel distribution's development on banking market.

2. Creating value for customers as a part of banks' market activity

The primary objective of banks' market activity is to gain a competitive advantage over their rivals and maintain their market position. The successful market strategy combines all bank's internal tangible and intangible resources that are the source of its strengths and weaknesses with all threats and opportunities that have arisen on the banking market. It must allow creating value for all stakeholders. Since the 1950s, when the first attempts to describe the value creation process have appeared (Casadesus-Masanell and Ricart, 2007; Magretta, 2002), a long-term method of using disposable and potential resources in the process of value creation for customers or other stakeholders is called a business model. According to many authors, a business model is just a simplified way that explains the relation between internal and external factors influencing reaching organisation's objectives and value creation (Saebi and Foss, 2014, Zoot and Amit, 2010, Santos et al., 2009, Zott and Amit 2008, Magretta, 2002). Others focus on the philosophy of organisation's market activity and state that it is a conceptual tool that enables to express business logic of an organisation (Nosowski, 2012) and to determine precisely the strategic assumptions in the area of value creation (Pyka, 2013). The business model is also defined by describing its particular components. The review of business model's definitions and components allow to state that the ability to create and deliver the original value proposition for customers is its core foundation. This component reflects firms' ability to fulfil customers' needs and expectations and match firm's product and services with these requirements. Among other elements, authors usually indicate the importance of defined market segments of customers, tangible and strategic resources, and strategic processes including the way of communicating and delivering value to customers (see Table 1).

Table 1: The business models' definition and components in selected concepts

Author	Definition	Business Model's Components
Zott, Amit (2001)	The content, structure, and governance of transactions designed to create value through the exploitation of business opportunities.	Transaction content, transaction structure, transaction governance
Magretta (2002)	Stories that explain how enterprises work; a good business model answers Peter Drucker's age-old questions: Who is the customer? Moreover, what does the customer value? It also answers the fundamental questions every manager must ask: How do we make money in this business?, What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?	Customer definition, value to customer, revenue and economic logic
Dubosson-Torbay et al. (2002)	The architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers to generate profitable and sustainable revenue streams.	Products, customer relationship, infrastructure and network of partners, and financial aspects
Morris et al., 2005	A concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets.	Value proposition, customer, internal processes/ competencies, external positioning, economic model, and personal/investor factors
Shafer et al. (2005)	A representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network.	Strategic choices, create value, capture value, value network
Osterwalder et al. (2005)	The blueprint of how a company does business.	Value proposition, target customer, distribution channel, relationship, value configuration, core competency, partner network, cost structure, revenue model
Johnson et al. (2008)	The business model consists of four interlocking elements, that, taken together, create and deliver value.	Customer value proposition, profit formula, key resources, key processes

Source: Own work based on Zott et al. (2011).

All business models' components can be grouped into four core areas (Ballon, 2007, Osterwalder and Pigneur, 2005): creating value for customer, building relations with customer influencing customers' satisfaction, loyalty, and engagement, delivering value by proper infrastructure, managing costs and revenues of areas mentioned above. The fields of the business model and their components should be considered as a potential

means through which banks can fulfil their objectives and gain outcomes such as financial performance, risk profile, and contribution to financial stability as well as the economy, which can change over time. Searching for competitive advantage requires analysing these components from the perspective of their potential to create value for customers (Deloitte, 2012). The process of business model creation should thus be based on the knowledge concerning customers' market behaviour, habits, needs and expectations.

Today the dominant generations active on the banking market are Generation X, Generation Y, and Generation Z. They are the leading retail banks' market segments. Each of these generation has different, unique expectations, experiences, generational history, lifestyles, values, and demographics that influence their buying behaviours (Klimontowicz and Harasim, 2017). Thus preparing the adequate value proposition should incorporate knowledge on their core value, technology usage, preferred way of communication and financial needs and expectations (see Table 2).

Table 2: The characteristics of selected generations

Criterion	Generation X	Generation Y	Generation Z
Core values	Time	Individuality	Connectivity
Technology	Assimilated	Integral	Digital natives
Preferred way of communication	Prefer personal interactions and communication.	Commonly use telephone communication and the Internet, active on social networking sites.	Communication via smartphones, active on social networking sites, create own documents and databases, use the web to research and network.
Communication media	Cellar phones	The Internet, picture phones, e-mails	Smartphones, tablets and other mobile devices
Financial needs and expectations	· cautious and conservative, · looking for mortgages, investment insurance, saving programs · money is means to and the end, · used to ingrained status quo banking · some find their bank's existing mobile interface difficult to work with · display some willingness to adopt mobile banking, but they lack the enthusiasm · security concerns about new technology · declare the openness to the idea of mobile banking	· earn to spend, · money is today's payoff, · looking for first car loans, first mortgages, credit cards, student loan · a half of them would switch banks to mobile payments capability from their primary bank	· looking for savings and payment accounts, first credit cards, student loan, · more conservative, more money-oriented, more entrepreneurial and pragmatic about money compared to Millennials, · elusive to traditional financial services providers, · use mostly mobile devices like smartphones, tablets, and laptops for communication · expect everything to be digital · expect seamless cross-channel customer service

Source: Own work base on Williams and Page, 2011, BMO Wealth Institute, 2014, First Data Corporation, 2010

Concurrently, the business model should allow creating value for a bank. The traditional business models that divided banks into universal and specialised ones do not correspond to generations value directly. They represent product orientation and focus on banks' objectives. The contemporary business models have already tried to combine both an ability to create value for customers with an ability to create value for banks (see Table 3), but their value propositions still correspond only with financial needs and expectation excluding behavioural characteristics of generations. They deliver some general values but have not implemented the strategy allowing to deliver specific values to particular customer segments (Deloitte, 2012).

Table 3: The value proposition and creation in banks' business models (Capgemini, 2008)

Model	Value proposition for customers	Value creation for banks
financial advisor for mass affluent customers	Niche positioning leveraged by delegated marketing promotion Main strength is the confidence relationship with the brand, and with a strong belonging feeling.	Intensifying client's relationship by upgrading the value of service. Eventually collecting a greater volume of financial flows and assets.
community bank model	Specialised service provider to a specific community (travellers, military, migrants). Closest to personal affinity, recognised by "buzz" network.	Niche positioning leveraged by delegated marketing promotion. Main strength is the confidence relationship with the brand, and with a strong belonging feeling.
discount bank model	The most economic without minimising security or quality. The lowest prices on the market.	Marginal revenues without additional fixed costs (provided existing systems and back offices may be shared). Acquisition or retention of self-directed new customers who have little interest in advisory or proximity services.
trust operator model	One-stop shopping for customers, including all kinds of personal or family services: domestic chores, bills management, employment research, real estate, mobile phones, journeys, sports and other tickets	Capturing additional business flow Increasing cross-selling opportunities Optimising the return on assets (physical network)

Regardless of the particular value proposition selected by a bank for gaining competitive advantage and the market success, it requires developing channels serving delivery of that value to bank's customers.

3. Banks' contemporary distribution channels

Today delivering value for customers in a better way than competitors has become one of the most significant factors of competitive advantage and a crucial element of bank's market strategy. Banks' distribution is a profit-oriented activity that includes planning, realisation and control of value flow from a supplier to a final purchaser. The primary condition for managing the efficient distribution system is maintaining the equivalence between the needs and interests of a bank, customers, and intermediaries (see Table 4).

Table 4: The needs of banks' distribution system participants.

Customers	Banks	Intermediaries
· product satisfaction · procedures satisfaction · service quality satisfaction · fee and charges satisfaction	· sale increase · development of market position · customers' loyalty · intermediaries loyalty · the control over distribution system · all distribution channels penetration	· satisfactory conditions of cooperation · high level of margins and commissions · independence · bank's loyalty and respect

The starting point for planning a distribution policy is answering the question what customers' expectations are and what competitors offer in this field. Deciding on the number and sorts of the distribution channels must also consider the range of banking products and bank's financial and human resources. Distribution channels are the pipelines that deliver products and services to consumers, and revenue to banks and credit institutions. The assessment of distribution channels concerning the adequacy of time, place and costs should be made from customers perspective because any distribution system concurrently allows both to maximise the level of service quality and minimise costs.

Distribution channels have been developed mainly in response to changing markets and technologies. Today banks usually use direct and indirect distribution channels that offer personal, face to face contact (referred by customers as branches) as well as remote channel including Automatic Teller Machines (ATM), payment cards, the Internet access to banking products and mobile solutions.

During the last decade, the number of banks' branches operating in Poland has exceeded the level of 7000. It has been increasing till 2012. Since then it has been slightly decreasing but it is still quite large in comparison with other European countries. Analysing the number of other points of sales the similar tendency can be observed. At the same time, the number of banks' employees per branch and another point of sales has decreased from 18,2 in 2007 to 8,2 in 2017 (see Figure 1 and 2). To a large extent, it is the result of mergers and acquisitions. However, the trend reflects retail branch revolution that has been underway for several years. The tradition branches are evolving in response to migration to new distribution channels. The universal or relationship banker (also called a "universal agent" or "relationship agent") model is shaping up to be the dominant type for a branch. Relationship bankers are expected to have a different skill-set to the traditional

employees, with versatility, a personable sales-orientation, and confidence in educating customers how to use modern banking technology. Universal bankers working in dialogue towers with cash recyclers constitutes an Assisted Full-Service option. Additionally, the rise of the so-called "micro-branch" has occurred in response to consumer demand for convenience and expanded services. Frequently located in shopping centres, micro-branches transform from full-service branches. They usually have 24-hour Automatic Teller Machines (ATM) lobbies, secured behind an airlock or security grill for the night, where customers can perform transactions.

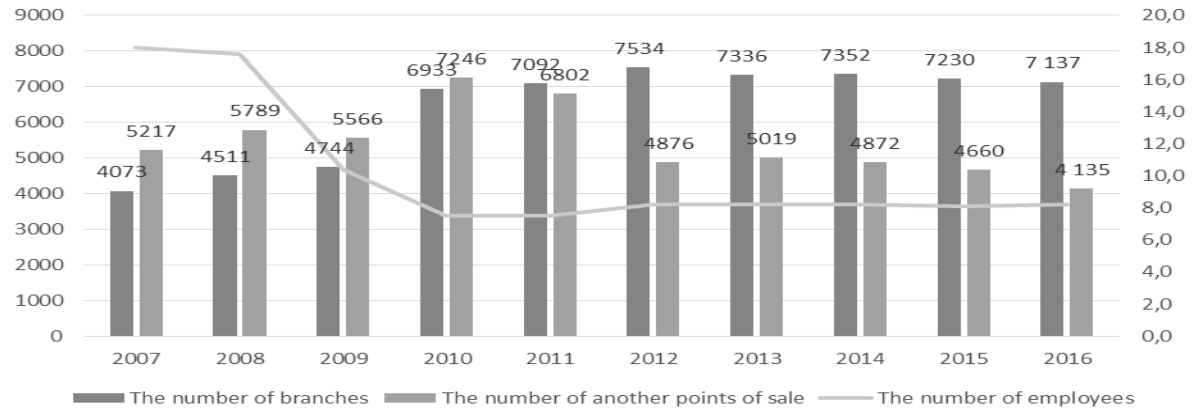

Figure 1: The number of branches, another points of sale and employees per an point of sale in 2007-2016

Source: Own work base on KNF data.

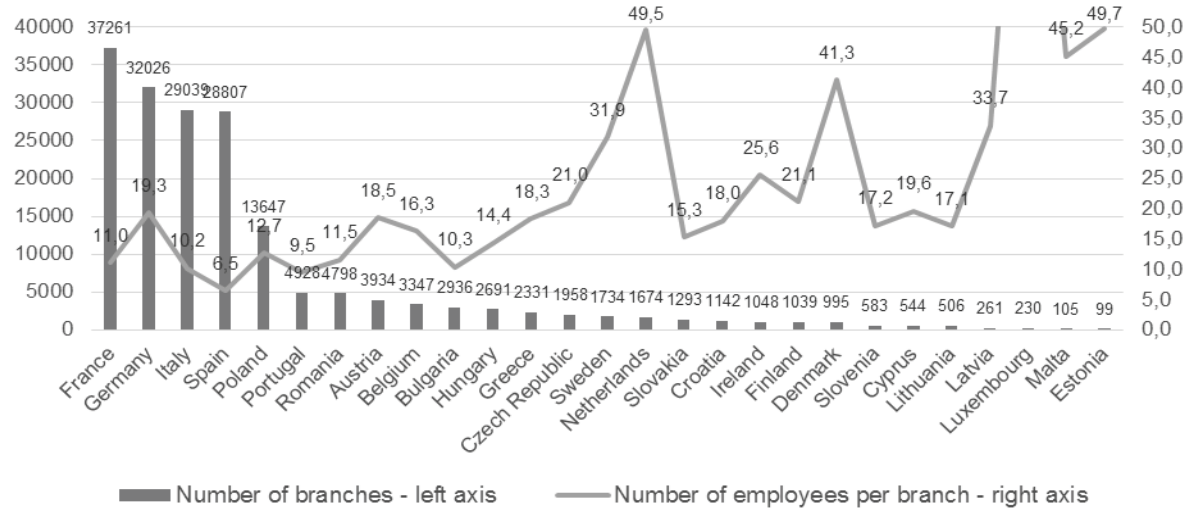

Figure 2: The number of branches and employees per branch in 2016

Source: Own work base on ECB data.

The ATM channel is still maintaining its central role as a core banking touchpoint with the consumers. ATMs are essential for access to cash and bank experience. In some markets, their role has evolved to be a channel complementary to branch, mobile and Internet banking (Accenture, 2016). In Poland, they still play a traditional role. During the period considered, the ATM's number in Poland had been systematically increasing. The same tendency is observed in Europe (see Figure 3).

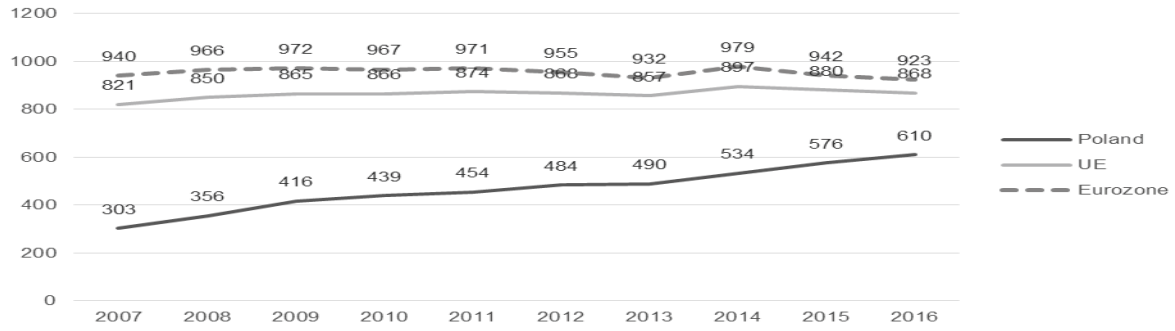

Figure 3: The number ATM's in 2007-2016

Source: Own work base on NBP and ECB data.

The next becoming more and more popular distribution channel is Internet banking. The number of customers who has access to Internet banking and uses this distribution channel at least ones a month has almost doubled since 2012 (see Table 5). At the end of 2016, almost 31 million clients have access to e-banking. The first position of PKO BP concerning the number of customers and dynamics remains stable (PR News, 2017).

Table 5: The number of customers who has the access to and use internet banking in 2012-2016.

Bank	The number of customers (in thousands)									
	who signed the Internet banking agreement					who used Internet banking at least ones a month				
	2012	**2013**	**2014**	**2015**	**2016**	**2012**	**2013**	**2014**	**2015**	**2016**
PKO BP i Inteligo	5 045,68	6 128,41	6 978,24	7 884,29	8 805,00	2 821,00	3 005,78	3 095,25	3408,165	3 579,00
mBank	3 098,10	3 251,61	3 419,34	3 655,64	3 960,71	n/a	n/a	1 790,26	1 850,90	1 982,58
ING Bank Śląski	2 204,41	2 416,21	2 661,76	2 971,40	3 172,80	1 073,00	1 192,00	1 668,00	1 735,60	1 836,13
Bank Pekao	2 205,00	2 446,81	2 661,19	2 899,42	3 176,91	1 148,23	1 261,97	1 346,69	1 576,75	1 708,57
BZ WBK	2 004,96	2 627,00	2 729,00	2 813,41	2 875,36	1 541,00	1 554,00	1 594,00	1 674,43	1 770,34
Alior Bank	1 022,00	1 173,95	2 327,60	2 688,00	1 771,43	n/a	n/a	534,91	707,61	734,39
Bank Millennium	1 363,79	1 437,99	1 471,82	1 625,60	1 798,73	n/a	n/a	n/a	n/a	n/a
Getin Noble Bank	n/a	1 208,00	1 330,00	1 490,00	1 500,00	n/a	n/a	793,00	681,00	321,20
BGŻ BNP Paribas	501,25	591,19	652,74	733,59	928,83	297,47	347,06	383,96	297,98	451,07
Credit Agricole	597,82	651,53	663,32	703,87	761,72	n/a	n/a	n/a	n/a	382,09
Raiffeisen Polbank	545,16	564,20	354,32	631,03	680,45	336,40	196,50	187,36	236,05	232,07
Citi Handlowy	838,00	767,27	712,34	662,20	669,93	170,62	223,97	230,29	335,63	322,00
T-Mobile UB	n/a	247,67	420,96	534,00	698,77	n/a	n/a	n/a	n/a	n/a
Bank Pocztowy	140,39	191,30	272,45	407,39	510,87	80,73	98,02	112,10	148,34	161,91
Eurobank	n/a	n/a	n/a	369,00	446,87	n/a	n/a	n/a	178,00	197,06
Deutsche Bank	258,00	279,00	295,20	296,69	296,64	152,00	175,50	183,00	186,82	186,82
BOŚ	n/a	118,00	119,30	124,00	133,10	n/a	n/a	n/a	n/a	54,64
Plus Bank	n/a	n/a	n/a	100,25	122,98	n/a	n/a	n/a	43,73	58,97
Total:	18 824,56	24 100,12	27 069,56	30 589,77	32 456,48	7 620,45	8 054,80	11 918,81	13 106,99	13 554,27

Source: Own work base on PRNews Reports, www.prnews.pl/raporty

The increasing number of smartphones and tablets and the broad spectrum of their possible usage have caused the dynamic development of mobile banking. The ING International Survey on Mobile Banking 2016 revealed that almost 47% of the global population use such a devices for banking and the next 15% is going to use mobile banking during the next 12 month. In Poland, 43% responders have declared using mobile banking and next 20% plan to use mobile banking in the nearest future. The number of m-banking active users is growing very fast. The data gathered by PR News shows that during the last five years has reached the level of 7,6 million users. Similarly to e-banking, PKO BP holds the leader position (see Table 6).

Table 6: The number of customers use mobile banking in 2012-2016.

Bank	The number of customers who use mobile banking at least ones a month (in thousands)				
	2012	2013	2014	2015	2016*
PKO BP i Inteligo	236,62	427,54	625,22	1 328,91	1 652,46
mBank	300,00	724,10	892,00	1 092,44	1 327,56
ING Bank Śląski	98,00	244,00	420,15	500,00	1 048,49
Bank Pekao SA	201,00	373,06	595,93	1 014,65	1 495,68
BZ WBK	124,82	239,00	483,47	666,28	974,34
Alior Bank	n/a	107,51	41,75	115,05	128,81
Bank Millennium	51,40	70,06	145,00	402,69	595,76
Getin Noble Bank	n/a	n/a	n/a	190,30	n/a
BGŻ BNP Paribas	n/a	n/a	77,97	118,62	35,59
Credit Agricole	n/a	n/a	n/a	n/a	45,03
Raiffeisen Polbank	52,60	57,78	27,50	52,50	68,21
Citi Handlowy	111,13	170,00	66,00	74,96	86,20
T-Mobile UB	n/a	n/a	50,90	60,00	60,88
Eurobank	n/a	n/a	49,80	90,00	111,70
Plus Bank	n/a	5,80	n/a	13,95	27,75

Source: Own work base on PRNews Reports, www.prnews.pl/raporty [3.05.2017]

Almost a half of internet users has already installed a banking application. For them making a money transfer is the second most commonly managed activity (the first is sending and receiving e-mail). Over 80% transactions is done using internet and mobile. This channels are also used for sending loan, credit, account and deposit applications (Kurowski, 2017). The popularity of mobile banking is growing all over Europe and additional customer expect to join mobile banking (see Figure 4).

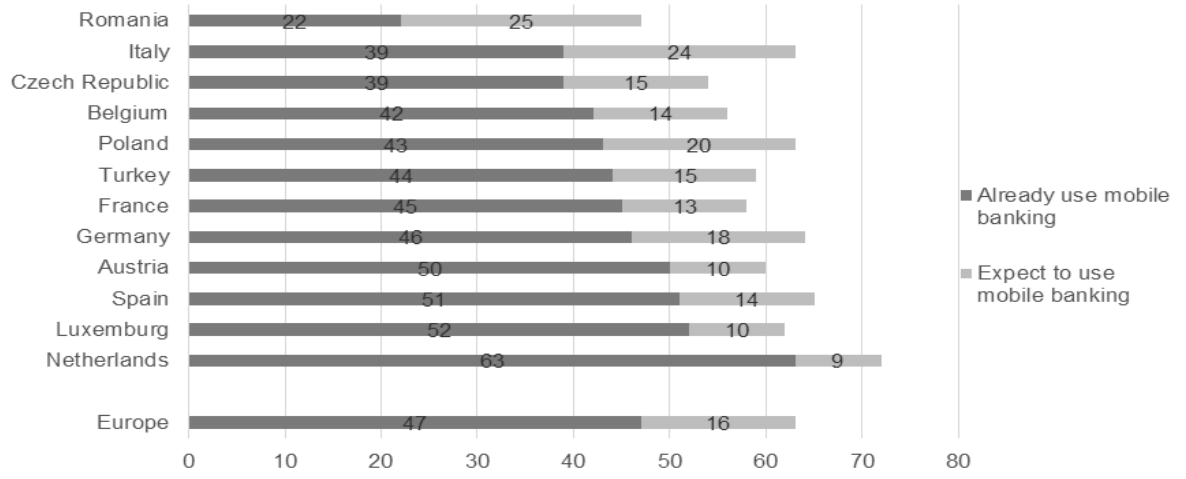

Figure 4: The mobile banking usage in 2016

Source: ING International Survey (2016).

The further development of mobile channels will make bank to search for new solutions. Traditionally they treat other banks' distribution policy as a benchmark for the market decisions. However, in this case, the leading innovative market players have been established outside the banking system. They consist of mobile operators, virtual payment services, and FinTechs (Solarz, 2005, Wawrzyniak, 2012). As a result, in the nearest future, the competition concerning the internet and mobile banking will be pervasive.

4. Prerequisites for the further development of multichannel distribution on banking market

The last few decades brought significant changes on banking market. Due to increasing complexity of new technology, a massive development of information and communication's techniques, economy's networking, globalisation and growth of customers' expectations combined with regulatory requirements banks face new challenges. Among them the crucial for delivering value for customers are (Kumar et al., 2016):

- the threat of new entrants resulting in increased competition from Fintechs and neo-banks - non-banking service providers in the form of Fintech players are causing disruption and disintermediation, often targeting discrete highly profitable segments of the banking value chain,
- changing customer demographics and expectation that are driving the need for innovation to meet customers' demand,
- the increasing risk of cyber threats –facing the unprecedented challenge of data breaches banks are forced to strengthen their security and authentication systems,
- development of cloud services for core business activities as a key enabler of increased agility and improved cost efficiency to support banks' business strategy,
- the need for the transformation of banks' legacy systems enabling to drive agility, achieve better time to market, and develop competitive differentiation,
- the development of distributed ledger technology that is expected to eliminate banks' need for managing multiple databases and reconciliation structure and enhance the transpiration of transaction into the future,
- the necessity of full integration of banks' risk management and compliance,
- the implementation of advanced analytics to deliver insights about customers focused on detection and mitigation of risks associated with frauds,
- financial inclusion and financial awareness.

Today's banking customers want more transparency, more simplicity and easy access. Above all, they seek a seamless experience as they move from one channel to another. Customers are interacting with multiple channels, both physical and digital. More and more, they rate banks according to the experience they have working across those channels. Banks that communicate effectively with customers across multiple channels not only enhance the customer experience but also improve the efficiency of bank distribution networks. Effective multichannel sales and servicing are achieved through:

- multichannel integration, especially creating and optimising a seamless experience that bridges physical and digital channels,
- next-generation branch networks that include 'cookie-cutter' branches and differentiated branches that are specialised for a particular territory,
- innovative relationship management, with a particular focus on customer experience and customer feedback management.

The integrated multichannel architecture must be powered by analytics as a real-time event management, advanced digital advisory and need-based offerings optimised by channels. Additionally, banks will base building long-term relations with customers on their engagement where they spend their time (e.g. on social media), following their interests, leveraging influencers, and co-creation based on increased customer intimacy. The future success depends on the ability to create a digital ecosystem. In such ecosystem, banks will serve as trust centre with an extended proposition (financial and non-financial) wherever the customers leverage the power of mobile and offer m-payment services (Accenture, 2012). Successful banks will concurrently leverage direct channels to generate sales and high-value traffic in branches.

Implementing those changes will result in redefinition the term of the multichannel distribution. It should not be understood just as using many different distribution channels (van Bommel and Edelman, 2015). Today multichannel distribution means synchronisation of all technological solution and information available in various channels and offering integrated communication and sales platforms that look similar regardless the device and technology. Taking into account the dynamic development of social media and their impact on society and enterprises new distribution policy should incorporate those media into strategy not only as a communication channel but also as a channel enabling the usage of banking products.

Most of the banks operating in Polish banking market offer their customers only selected products and functionalities using the Internet and mobile technology. New solutions should not only match all features to a platform but also be ergonomic and well-designed. Concurrently, banks should develop new products and services designed for particular sales platforms. In this process, the key success indicator is understanding the context and using additional technology such as geolocation by beacons (Kurowski, 2017).

Focusing on particular segment requires designing the right propositions for the right customers. This task involves identifying target segments of the market and crafting propositions and experiences to delight them what means designing products and services that offer a genuinely captivating value proposition and generate genuine customer enthusiasm. That ability requires understanding bank's target customer segments in detail and focus on them with precision (Symons et al., 2007). It is of particular importance because some clients' needs are not evident. For example, the higher income, the lower interest in functionality enabling arranging advisory meetings by Internet or mobiles what is frequently the only one offer differentiator for affluent customers (Kurowski, 2017).

The entire bank, from a boardroom to the front line, should focus on delivering value proposition with an early and ongoing emphasis on cross-functional and multichannel collaboration. Through a carefully crafted after-sale process, banks will capitalise on the new customers' enthusiasm by arranging an initial welcoming call in the first week and initiating a month-by-month follow-up program to help customers better understand offer features. They should monitor customers' activity to determine how customers are using the bank's services and systematically track any potential problems. Managing the client's relationship needs following the experience of the customer day by day and delighting customers again and again (Symons et al., 2007). Real customer-focused solutions do not just take the pulse of consumer opinion. They use the findings to correct shortcomings, fine-tune product and service offerings, and, by tying improvements to compensation, motivate employees. By delivering a seamless, personalised customer experience across all channels, banks can achieve competitive differentiation.

Banks remain the most trusted provider of Internet and mobile payment applications, but third-party offerings such as Apple Pay and Google Wallet are gaining ground. Across Europe, 84% of respondents in 2015 choose their bank as the most trustworthy provider. That share shrinks to 75% in 2016. While "other banks", "other suppliers" and "social media" have all garnered a more significant share of support this year, trust is increasing faster for Apple Pay, Google Wallet and other named groups. These third-party mobile app brands add six percentage points to their share in 2016. (ING International Survey, 2016). The competition of non-bank providers is going to be one of the most threats in the nearest future.

Maintaining bank's market position seems to be impossible without implementing multichannel distribution model. Despite advantages for customers, there are also many benefits for banks. Accenture experience shows that, in comparison with other distribution models, offering multichannel distribution brings better results regarding cross-selling, retention index, cost reduction and efficiency improvement (Wolanin, 2013).

The establishment of Internet commerce, smartphone technology, and improved marketing communications has created new possibilities for the banking distribution channel model. The Polish customers adapt new solutions quite quickly, but still, most of them are willing to have access to traditional branches if needed. The attempts to shift all distribution channels to digital world have failed. Banks have already understood that they have to offer both possibilities. The next challenge is to integrate all distribution channels and provide the same functionality regardless of the place, time, device and platform.

5. Conclusion

The remarkable development of technology, a new generation of customers entering the banking market and the threat of non-bank financial service suppliers catching customers interest and money are the key market challenges for banks and credit institutions. Today's distribution models seem to be insufficient to follow all contemporary needs and expectation of customers. Multichannel distribution model, understood as synchronisation of all technological solution and information available in various channels, offering integrated communication and sales platforms that look similar regardless the device and technology and enabling the analysis of all customers activity, seems to be banks' future. Such a model allow delivering value proposition in any place and time required by customers. Maintaining the market position on banking market will be impossible without matching banks' market behaviour with customers' expectation in this field. Banks should design the personalised proposition to each client, deliver those proposition in the right place and at the right time using preferred communication channels, develop those proposition by everyday analysis of customers behaviour and activity for delighting him and building long-term relationships.

References

Accenture (2012) Banking 2016. Accelerating growth and optimising costs in distribution and marketing, Distribution and Marketing Services, https://www.accenture.com/tw-en/~/media/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_3/Accenture-Banking-2016.pdf

Accenture (2016) ATM Benchmarking Study 2016 and Industry Report, https://www.accenture.com/_acnmedia/PDF-10/Accenture-Banking-ATM-Benchmarking-2016.pdf

Ahlqvist T., Bäck A., Halonen M. and Heinonen S. (2008). Social media road maps exploring the futures triggered by social media, VTT Tiedotteita -Valtion Teknillinen Tutkimuskeskus, pp 2454.

Ballon P. (2007) "Business modelling revisited: the configuration of control and value", The Journal of Policy, Regulation and Strategy for Telecommunications, Information and Media, 9 (5), pp 6–19.

Blount Y. (2010) "Employee management and service provision: a conceptual framework", Information Technology and People, Vol. 24 No2, pp 134-157.

BMO Wealth Institute (2014) Wealth Generation. The Financial Challenges for Generations X & Y, BMP Wealth Institute Report, Canadian Edition, www.bmo.com/wealthinstitute, pp 3-7.

Van Bommel E. and Edelman D. (2015) Adapting to digital consumer decision journeys in banking, McKinsey &Company

Capgemini (2008) World retail banking report, pp 45-46.

Casadesus-Masanell, R. and Ricart, J. E. (2007) "Competing Through Business Models", IESE Business School Working Paper, No. 713. http://ssrn.com/abstract=1115201

Davis P. (2013) "Balancing technology and service is banking's greatest challenge", American Banker, Vol. 178 No. 35, pp 11.

Delafrooz N., Taleghani M. and Taghineghad M. (2013) "The impact of service innovation on customer satisfaction", International Journal of Marketing and Technology, Vol. 3 No. 5, pp 127-144.

Deloitte (2012) Kurs na zmiany. Doświadczenie klienta w relacji z bankami w Polsce, Warszawa, https://bs.net.pl/upload/File/Raporty/pl_doswiadczenia_klienta_w_relacjach_z_bankami_Deloitte_2012.pdf

Dubosson-Torbay, M., Osterwalder, A. and Pigneur, Y. (2002) "E-business model design, classification, and measurements", Thunderbird International Business Review, Vol. 44 No. 1, pp 5–23.

Durkin M., Mulholland G. and McCartan A., (2015) "A socio-technical perspective on social media adoption: a case from retail banking", International Journal of Bank Marketing, Vol. 33 Iss 7, pp 944 – 962.

Ernst & Young (2016) Building the bank of 2030 and beyond The themes that will shape it, www.ey.com, pp 21-32.

First Data Corporation (2010) Tapping Into Generation Y: Nine Ways Community Financial Institutions Can Use Technology to Capture Young Customers, A First Data White Paper, pp 2-7.

Hanna, R., Rohm, A. and Crittenden, V. L., (2011) "We're all connected: The power of the social media ecosystem", Business Horizons, 54, pp 265-273.

Honebein P. C. and Cammarano R. F. (2006) "Customers at work", Marketing Management, Vol. 15 No. 8, pp 26-31.

ING International Survey (2016) World on the move for mobile banking. empowering personal finance everywhere, anytime. Mobile Banking July 2016

Kaplan A.M. and Haenlein M. (2010) Users of the world, unite! The challenges and opportunities of Social Media. Business horizons, 53 (1), pp 59-68.

Kasiewicz S. and Kurkliński L. (2012) Szok regulacyjny a konkurencyjność i rozwój sektora bankowego, Warszawski Instytut Bankowości, Warszawa

Klimontowicz M. and Harasim J. (2017) Socio-demographic factors influencing bank's business model development, [in:] Challenges, research and Perspectives 2016: Europe in a Changing World, G. Hofbauer, M. Klimontowicz (ed.), Germany, pp 24-36.

Kumar A., Saxena A., Suvarna V. K. and Ravat V. (2016) Top 10 Trends in Banking in 2016, Capgemini, www.capgemini.com/banking [15.04.2017]

Kurowski M. (2017) "Gdzie będą banki za 10 lat?" Rzeczpospolita, http://www.rp.pl/Opinie/304309978-Gdzie-beda-banki-za-10-lat.html#ap-1 [30.04.2017]

Magretta, J. (2002) "Why business models matter", Harvard Business Review, Vol. 80 No. 5, pp 86–92, 133.

Marcinkowska M., Wdowiński P., Flejterski S., Bukowski S. and Zygierewicz M. (2014). "Wpływ regulacji sektora bankowego na wzrost gospodarczy – wnioski dla Polski", Materiały i Studia NBP, Nr 305, Warszawa, pp 35-52.

Mayfield A. (2008) What is Social Media?, e-book from iCrossing

Nosowski A. (2012) Modele, strategie i metody zarządzania w instytucjach kredytowych, [in:] Zarządzanie instytucjami kredytowymi, Gospodarowicz A., Nosowski A. (red.), Wydawnictwo C.H. Beck, Warszawa 2012, pp 43-44.

Osterwalder A. and Pigneur Y. (2005) Clarifying business models: origins, present, and future of the concept", Communications of AIS 2005(16), pp 1–25.

Papagiannidis, S. and Bourlakis, M. (2015) "Social Media: A revolution in communication", Technological Forecasting and Social Change, 95, pp 1-2.

Persson A. (2013) "Profitable customer management: reducing costs by influencing customer behavior", European Journal of Marketing, Vol. 47 No. 5/6, pp 857-876.

PRNews (2017) Rynek bankowości internetowej - IV kw. 2016, Raport PRNews, www.prnews.pl, [1.12.2017]

Pyka I. (2013) Bankowość komercyjna, (red.), Wydawnictwo UE w Katowicach, Katowice, pp 20.

Saebi, T. and Foss, N.J. (2014) "Business models for open innovation: Matching heterogenous open innovation strategies with business model dimensions", European Management Journal, pp 2.

Santos, J., Spector, B. and van der Heyden, L. (2009) "Toward a theory of business model innovation with incumbent firms". Working paper no. 2009/16/ EFE/ST/TOM, INSEAD, Fontainebleau, France, pp 5-13.

Solarz M. (2005) Wielokanałowość w bankowej obsłudze klienta, [in:] Bankowość, red. Zaleska M., Monografie i Opracowania Naukowe SGH w Warszawie, Oficyna Wydawnicza, Warszawa 2005, pp 257-264.

Sullivan M. B. (2009) "Post Crisis, Innovation Will Rule", ABA Banking Journal, pp 30-32.

Świtalski W. (2005) Innowacje i konkurencyjność, Wydawnictwo Uniwersytetu Warszawskiego, Warszawa, pp 78-81.

Symons M., Wright T. and Ott J. (2007). "The customer-led bank: how to retain customers and boost top-line growth", Journal of Business Strategy, Vol. 28, No. 6

Wawrzyniak D. (2012) Technologie informatyczne w instytucjach kredytowych, [w:] Zarządzanie instytucjami kredytowymi, red. Gospodarowicz A., Nosowski A., Wydawnictwo C.H. Beck, Warszawa, pp 415.

Weinberg, B.D. and Pehlivan, E. (2011) Social spending: Managing the social media mix, ELSEVIER, Business Horizons, 54, pp 275-282.

Williams, K. C. and Page A. R. (2011) "Marketing to Generations", Journal of Behavioral Studies in Business, Volume 3, April 2011, http://www.aabri.com/jbsb.html

Wolanin T. (2013) "Multichannel – przyszłośc polskiej bankowości", Miesięcznik Finansowy Bank, www.aleBank.pl,

Zott C, Amit R. and Massa L. (2011) "The business model: recent developments and future research", Journal of Management, 37(4), pp 1019–1042.

Zott, C. and Amit, R. (2008) "The fit between product market strategy and business model: Implications for firm performance", Strategic Management Journal, Vol. 29 No. 1, pp 1–26.

Zott, C. and Amit, R. (2010) "Business Model Design: An Activity System Perspective", Long Range Planning, Business Models, Vol. 43 No. 2–3, pp 216–226.

Technology Entrepreneurship Attributes on Enterprises from Aviation Valley in Poland: Fuzzy Sets Approach

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Abstract: hitherto accumulated research output within the area of entrepreneurship confirms the great significance of entrepreneurial processes, in particular entrepreneurial orientation, for the effective development of high-technology enterprises. At the same time, there are not many research reports concerning the category of technology entrepreneurship and the configurational approach to the development of an organization. The aim of this article is to fill this gap by describing the technology entrepreneurship attributes as behavioural indicators of high-technology enterprises in the light of a configurational approach.The goal of the paper is to characterize the influence of organizational attributes of technology entrepreneurship phenomenon on the development of high – technology enterprises. The qualitative comparative analysis with the use of pairwise comparison and fuzzy set methods was the methodological base of the research. Twenty enterprises from the Aviation Valley in Poland, divided symmetrically into two groups according to lifecycle (i.e. start - up and growth companies), were the subject of research. Companies in the Aviation Valley in Poland constitute a good laboratory for studying the phenomenon of technology entrepreneurship due to: (a) their affiliation to the industry called in accordance with the OECD nomenclature "high-tech industry" which means conducting directly or indirectly R&D works; (b) high development dynamics of the aviation industry in Poland, including establishment and development of new companies. Organizational attributes of technology entrepreneurship are measured by entrepreneurial orientation of high – tech enterprises and the perception of environmental uncertainty. Organizational development is measured using the multidimensional concept of high performance organization. The empirical research results indicates that organizational attributes of technology entrepreneurship of high performance enterprises are characterized by strong entrepreneurial orientation based on proactivity, innovativeness, risk taking and high environmental uncertainty based on dynamism. High performance enterprises on two following stages of development, i.e. start – up and growth, has specific profiles of organizational attributes of technology entrepreneurship. Both are based on three dimensional strong entrepreneurial orientation and perceiving the environment as very dynamic, but start-ups as opposed to growing firms ignore the env. complexity and negate the env. hostility.

Keywords: technology entrepreneurship, entrepreneurship organizational attributes, qualitative comparative analysis, fuzzy sets method, high – technology companies, avio-industry.

1. Introduction

On the one hand, the phenomenon of technology entrepreneurship that manifests itself in practice in the establishment and development of new technology companies, is crucial from the point of view of building economy based on know-how and it is more and more visible on the Polish market, but on the other hand, there is no clear and coherent theory of technology entrepreneurship as an workshop supporting an effective establishment and development of such companies.

Companies in the Aviation Valley in Poland constitute a good laboratory for studying the phenomenon of technology entrepreneurship due to: (a) their affiliation to the industry called in accordance with the OECD nomenclature "high-tech industry" which means conducting directly or indirectly R&D works (Hatzichronoglou, 1997); (b) high development dynamics of the aviation industry in Poland, including the establishment and development of new companies (Kordel & Machnik – Słomka, 2016).

The phenomenon of technology entrepreneurship has been described in the article in the form of an epistemological concept on effectiveness, attribute and a process levels. The structure of the paper is divided into three following parts: the first part describes technology entrepreneurship as a mechanism for development of high-tech enterprises; the second part details two basic categories, i.e. entrepreneurial orientation and environmental uncertainty, as attributes of technology entrepreneurship; the third part includes methodology and results of empirical studies.

2. Technology entrepreneurship as a mechanism for development of high-tech enterprises

Technology entrepreneurship is a type of entrepreneurial strategy, according to which the key element of development of an organization is the development of technology. In other words, an organization, as an

entity of technology entrepreneurship strategy, is a catalyst for technology ventures, ranging from a technological idea to the market product. A model of technology entrepreneurship is a mechanism for development of an organization and its environment, the main logic of which is a constant recognition and use of technological development opportunities (Bratnicki, 2004; Kordel, 2014; Stachowicz, 2016).

When analyzing technology entrepreneurship in the perspective of strategic organizational development, it should be considered as a motor mechanism and it can be understood in three ways: (a) at the functional level, as a process of technological entrepreneurship, (b) at the attribute level, as specific features of internal and external environment of technology entrepreneurship, (c) at the level of results, as various perspectives of technology entrepreneurship performance. Figure 1 displays the three levels concept of technology entrepreneurship.

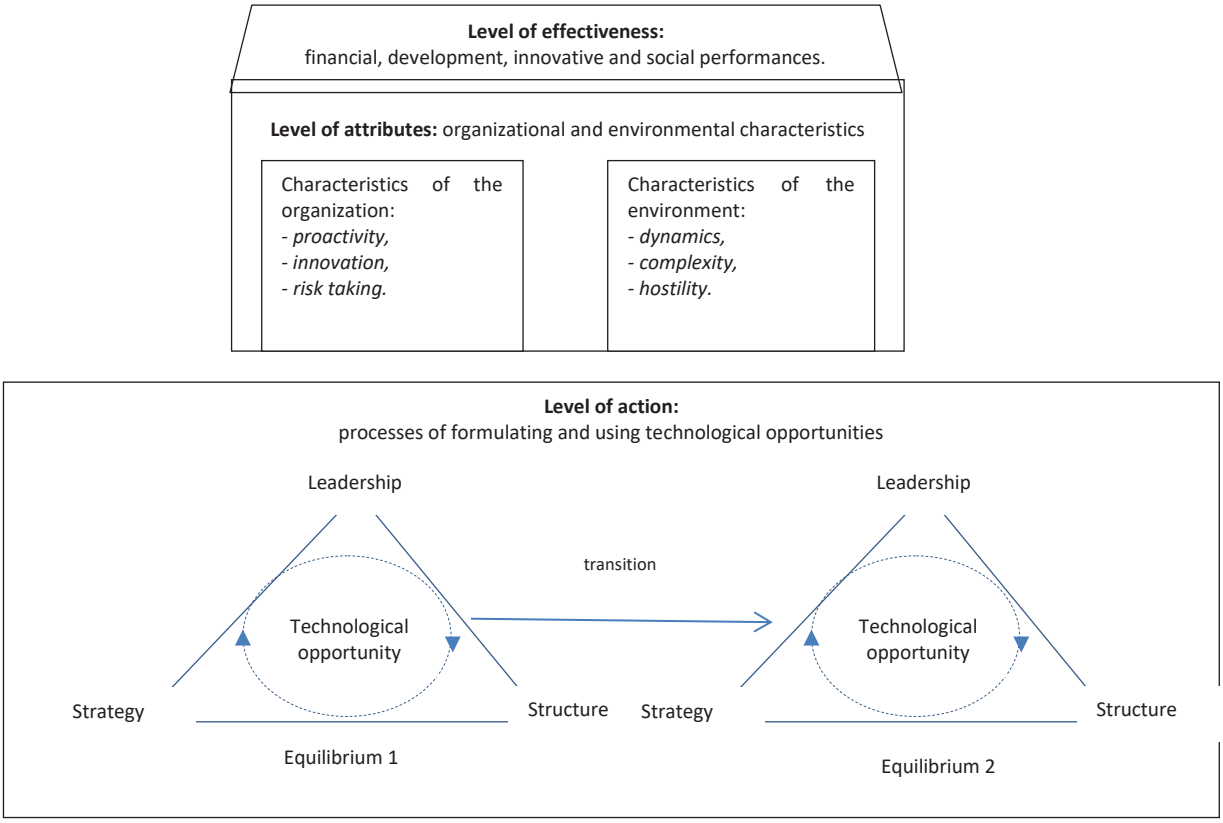

Figure 1: Results, attributes and processes of technology entrepreneurship

Source: Own study

At the process level, according to the configuration approach (Dess, Newport & Rasheed, 1993), technological entrepreneurship is understood as a configuration of elements of managerial leadership, organizational structure and development strategy. At the attribute level, in the light of the concept of entrepreneurial orientation of the organization (Jeffrey & Lumpkin, 2011), we can distinguish three characteristic features of an entrepreneurial organization, i.e.: proactivity, risk taking and innovation. The characteristics of organizational environment can be determined based on the following attributes (Dees & Beard, 1984): hostility, complexity and variability. At the level of results, according to the concept of high performance organization (de Wall, 2012), an entrepreneurial mechanism of the organization's development should reflect in its superior development within a given time perspective. Entrepreneurship in the context of organizational learning is the organization's ability to cope under conditions of uncertainty.

From the point of view of studies on entrepreneurship, two early stages in the development of technological undertakings are crucial, and they characterize with different configurations or development patterns, including (Kazanjian, 1998): (a) stage of early development at which the organizations aim to create an innovative product; (b) stage of sustainable development at which the organizations strive to increase sales and create a stable product portfolio. The stages of development of high-tech organizations are understood as

configurations of an organizational project that represent adjustment of an enterprise to a particular business context in a given time window.

3. Entrepreneurial orientation and environmental uncertainty as attributes of technology entrepreneurship

Technology entrepreneurship is inseparably associated with the process of managerial decision making, which means selection of one of many alternative actions under the conditions of uncertainty. Uncertainty of the technology entrepreneurship environment is related to spontaneously occurring events in the further environment of the enterprise, in particular its technological sphere and closer environment of the enterprise, in particular in the area of customer needs and behavior of competitors. Uncertainty, understood as unpredictability of environmental conditions, is a prerequisite for entrepreneurship strategy.

Since the reality is a mixture of uncertainty and determinism, making managerial decisions involves a subjective category of hesitation. All forms of uncertainty lead to discontinuation of actions due to the occurrence of hesitation. Uncertainty in the context of actions triggers a hesitation reaction, which in turn causes uncertainty of behaviors or even decision paralysis. Attributes of an entrepreneur as an identifying unit and using development opportunities through actions under the conditions of uncertainty are manifested in two perspectives, i.e. weaker and more positive perception of uncertainty areas (in particular the effects of uncertainty) and ability of constructive dealing with uncertainty, and even an ability to use it. Three uncertainty dimensions mentioned most often in the literature are: (Dess & Beard, 1984; Sharfman, 1991): variability, complexity and hostility of the environment. Variability refers to the rate of changes, innovation of the environment as well as to the degree of predictability of actions of competitors and customers. Complexity is defined as a level of knowledge required for understanding the organization's environment. In other words, complexity is related to the number of variables describing a given environment. Hostility describes the availability of resources at the disposal of entities in a particular environment. A high level of these three dimensions of uncertainty results in the unpredictability of the environment that is its uncertainty.

As the uncertainty of organization's environment increases, the importance of entrepreneurial managerial decisions that create a supporting structure for entrepreneurial behavior of the organization also grows. Entrepreneurial behavior of the organization can be characterized by the following three features (Lumpkin & Dess, 1996): innovations of behavior, proactivity of behavior and risk taking behavior. In other words, the main features of development ventures of high-tech entrepreneurship organizations are innovation, proactivity and risk taking. Organizational entrepreneurship is a consequence of the ability of the managerial staff to make decisions for the implementation of proactive, innovative and risky development projects (Rauch, Wiklund, Lumpkin & Frese, 2009; Sharfman & Dean, 1991). Innovation of development projects consists in experimenting and improvisation with the use of creative processes for introduction of new ideas to the market and improvement of processes. Specifically, organizational innovation means the predisposition of the managerial staff of the company to make decisions concerning the involvement of resources in creative processes of experimentation by introducing new products and services to the market and continuous improvement of value creation processes. Proactivity of development projects consists in creating development opportunities by creating technological development, anticipation of competitors' behavior and predicting client's expectations. In other words, proactivity is an attitude of managerial staff to the continuous identification of development opportunities and adoption of an anticipatory perspective consisting in introducing new products before the competitors as well as anticipation of future demand. Taking risk means the tendency to invest resources of the organization in activities that characterize with results uncertainty. In other words, taking risk means undertaking actions and investing resources in uncertain areas of business activity.

In the context of an uncertain environment, companies must be more entrepreneurial, which means greater innovation of products, services and processes as well as greater proactivity compared to competitors; additionally, the activities of entrepreneurial companies are characterized by risk orientation. In the context of technology entrepreneurship as a type of entrepreneurship (Lindelof & Lofsten, 2006), rapid technological development of the company's environment strengthens the competitive pressure and creates fields of technological opportunities that encourage companies to entrepreneurial behaviors. A positive impact of entrepreneurial behavior of organizations on the effectiveness under conditions of uncertainty is confirmed in the literature (Fauzul, Takenouchi & Yukiko, 2010; Hoq & Chauhan, 2011; Fauzul, Takenouchi & Yukiko, 2010).

4. Methodology and results of empirical studies

The aim of empirical studies was to develop attribute profiles of high-tech enterprises being on two successive stages of development as temporary equilibrium states, i.e. birth phase and phase of consolidated development, in the context of their impact on the effectiveness of the enterprise. The attribute profile of a company was described by its innovative and proactive behavior as well as risk taking. The attribute profile of a company was analyzed in the context of uncertainty of the environment described by dynamism, hostility and complexity. The effectiveness of a company was described by multidimensional construct of a high performance organization.

Empirical studies were carried out on the group of companies from the Aviation Valley in Poland. The Aviation Valley is an excellent laboratory for studying the effectiveness of processes of technology entrepreneurship. It concentrates companies characterized by high intensification of R&D works (Khilji, Mroczkowski & Bernstein, 2006) mainly belonging to the so-called group of high-tech companies according to the OECD classification.

Implementation of the assumed research aim has been divided into two stages. The first stage of the research process consisted in a multidimensional analysis of effectiveness of two groups of organizations, the first group of companies at the stage of entering the market and the second group of companies at the next level, i.e. stage of consolidated growth. The criterion distinguishing these two groups of companies was the level of stabilization of income from sales of the product portfolio. The companies at the stage of entering the market focused on the development of a product and strengthening its position on the market. The companies at the stage of sustainable growth focused on the intensification of sales of the existing products and introduction of new products. The second stage of the research process consisted in the analysis of attribute profiles of two groups of companies subject to the study, in the context of their impact on obtaining an extraordinary performance. The attribute profiles referred to the entrepreneurial behavior of the companies and uncertainty of the environment.

The empirical studies were carried out at the turn of 2015 and 2016 on a group of companies from the Aviation Valley in Poland. The studies were of a qualitative nature, based on the methodology of comparative case study (Rialp, Urbano & Vaillant, 2005). The selection of companies for the study was deliberate, the main criterion for the selection of cases was the occurrence of technology entrepreneurship processes, understood more or less through the prism of using the latest technologies as the development core of a company. The group of companies at the stage of entering the market belonged to the Pre-incubator of the “Podkarpackie Science and Technology Park”, and the group of companies at the stage of development belonged to the “Podkarpackie Science and Technology Park”. The size of the survey sample, after verification of obtained study results, eventually amounted to twenty companies divided equally into two study groups, i.e. ten companies at the stage of entering the market and ten companies at the stage of sustainable development.

The respondents in both surveyed groups of companies, due to the necessity of having strategic knowledge, included the highest level management staff, in the group of companies entering the market these were mostly the owners of the examined organizations.

The process of carrying out the empirical studies was a multi-stage process, composed of the phase of direct interviews with the management staff of pro-innovative structures, i.e. “Aviation Valley Association in Rzeszów, Poland”, “Pre-incubator of the Podkarpackie Science and Technology Park” and the “Podkarpackie Science and Technology Park” as well as the management staff of companies affiliated in the Aviation Valley.

The aim of this stage was to verify the assumptions and research model for its detailed operationalization in the form of a research tool. The next phase of the empirical studies was to conduct a questionnaire research with the use of a designed research tool on the selected group of companies. The research was carried out either directly in the companies or by a telephone interview, depending on the time capabilities of the management staff.

The research tool was composed of an introductory part concerning a short characteristics of the company under study and the main part describing the multidimensional construct of effectiveness, construct of entrepreneurial features of the organization’s behavior as well as the construct of uncertainty of the

environment. The introductory part contained open questions concerning the name of the company, its website, classification of business activity and the ownership structure of the company. The main part of the questionnaire consisted of eleven statements selected on the basis of a theoretical construct of four perspectives for measuring the organizations' performance (Audretsch, 2012), the construct of entrepreneurial orientation of organizations (Jeffrey & Lumpkin, 2011) and the construct of uncertainty of organizations' environment (Dees & Beard, 1984). All questions were evaluated in relation to the last three years of company's operation. The first five statements concerned a multidimensional measurement of performance, the next three - entrepreneurial orientation of the organization and the last three referred to the uncertainty of the organization's environment. The statements concerning the analysis of performance related to the following aspects: sales profitability in the perspective of financial performance of the company; increase in total income from sales of products and services as well as employment growth, both were describing the perspective of the performance of the organization's development; income from the sale of new or radically modernized products and services in the total sales income in the perspective of innovation; general engagement of employees in the activities of the organization in the perspective of social performance. The statements in the field of analysis of entrepreneurial orientation of the organization included the following characteristics of the organization's behavior: preferring research and development, technological leadership and innovation as an innovative behavior; initiation of activities in the organization's environment as a proactive behavior; preferring high-risk activities and high return activities as risk taking. Statements in the field of analysis of features of the organization's environment concerned: high rate of changes describing the dynamics of the environment; expert knowledge required for understanding the external environment of the organization as the comprehensiveness of the environment; mutual reluctance of external entities of the organization's environment as hostility of the environment. All questions were evaluated based on the seven-point Likert scale.

The structure of the studied group of companies by ownership criterion is presented in Table 1.

Table 1: Ownership structure of researched companies

Group of companies	Owner - inventor	Owner - tradesman	Owner - VC
Start -up	10 (100%)	10 (100%)	0 (0%)
Mature growth	6 (60%)	10 (100%)	0 (0%)

Source: Own study

The analysis of the ownership structure proves that the companies at the entry phase are managed by the authors of technological ideas, and the companies at the mature growth phase are managed together by the authors of technological ideas and marketers. The effectiveness of the surveyed companies at the stage of entering the market is entrenched with the technological competencies of owners, and the effectiveness of the surveyed companies at the sustainable development phase is grounded in technological and marketing competencies. There were no high risk funds among the owners of both groups of surveyed companies.

The method of pairwise comparisons was used for the analysis of obtained statistical data from the main part of the questionnaire in the area of multidimensional analysis of performance (Shields, 2015; Bernardin & Wiatrowski, 2013; Ragin, 2014). In order to evaluate the differences between the examined cases according to particular performance criteria, the predominance function, defined according to the following logic formula:

F(x)= - 1, when-6 <= x <=- g
F(x)=(x+D)/(G-D), when –G<x<=-D
F(x)=0, when -D<=x<=D
F(x) = (x-D)/ (G-D), when D<=x<=G
F(x) =1, when G<x<=6
$R(i,k) = \sum_{j=1} f(P(i,k) - P(j,k))$; P(j,k) - evaluation of i-th company, acc. to k-th criterion.
$O(i)=\sum R(i,k)$ - a synthetic assessment of the effectiveness of the i-th company.

where: x is the difference of assessments of two compared companies, D is the threshold of indistinctness, G is the threshold of predominance. In the analyzes carried out, the indistinctness threshold was one and the threshold of total predominance was six.

Afterwards, to switch to the analysis according to the logic of fuzzy sets, the membership function for particular variables of the research model were defined. Synthetic assessments of the performance of surveyed companies were subject to calibration to obtain the function of membership of a company to the set of highly performance companies.

μ_E (i) – function of membership of the i-th company to the set of highly efficient companies - E.

Individual assessments concerning the entrepreneurial orientation of the organization and characteristics of the organization's environment were also subject to calibration.

μ_{Cj} (i) – function of membership of the i-th company to the set of companies with particular characteristics describing their entrepreneurial orientation and their environment - Cj.

Afterwards, on the basis of the functions μ_E (i) and μ_{Cj} (i) based on logic of fuzzy sets and Bool's algebra, the impact of belonging to particular sets C_j and to the set E was analyzed. These analyzes can be formalized in the following form:

$Y \Leftrightarrow F(x_1,x_2,...)$

where: Y means that a company belongs to the set of effective companies, and x_j means that a company belongs to the set of companies with the j-th feature (however, instead of x, its negation may occur). F means the logic formula which is the sum of products of logic simple sentences (each of which expresses the belonging of a company to one set C_j).

The Table 2. presents results of empirical studies on the impact of the feature of entrepreneurial orientation of a company and its environment on the performance in the group of companies entering the market.

Table 2: Attribute profiles and the effectiveness of high-tech companies at the stage of entering the market

Model	Row coverege	Unique coverage	Consistency
Construct: f_perform. = f_(innov., proactiv., risktak., dynam., complex., hostility)			
(M1):~f_hostility * f_dynam * f_risktak * f_proactiv * f_innov	0.71	0.05	0.85
(M2): f_ complex * f_dynam * f_ risktak * f_proactiv * f_innov	0.78	0.12	0.63
(M3): ~f_ hostility * f_ complex * ~f_dynam * f_ risktak * ~f_proactiv * ~f_innov	0.14	0.09	1.00
Solution coverage: 0.92; solution consistency: 0.67			
Frequency cutoff: 1.00 ; consistency cutoff: 0.60			

Statement	Model 1	Model 2
Entrepreneurship of the organization:		
Innovation: the organization prefers research and development, technological leadership and innovations	•	•
Proactivity: the organization initiates activities in the environment	•	•
Risk taking: the organization prefers high-risk activities and high return activities	•	•
Uncertainty of the environment		
Dynamics: there is a rapid pace of changes in the organization's environment	•	•
Comprehensiveness: understanding of the organization's environment requires an extensive expert knowledge.	*o*	•
Hostility: behavior of entities of the organization's environment is characterized by mutual reluctance	~	*o*
Explanation of symbols: • occurs, o does not occur, ~ negation.		

Source: own study with use of fs/QCA 2.5/

Both obtained attribute profiles of the companies at the phase of entering the market show an unambiguous entrepreneurial orientation of the high performance companies. This orientation finds its unequivocal basis in all three types of behavior indicating the entrepreneurial orientation of the organization, i.e. innovation, proactivity and risk taking. However, the obtained attribute profiles of examined organizations differ in terms of the uncertainty of environment perceived by the management staff. In the first model, the uncertainty of environment is perceived based on the dynamics of changes in the environment. In the second model, the uncertainty of environment is perceived based on the dynamics of changes in the environment and its complexity. In none of the obtained profiles there is hostility of entities as a carrier of uncertainty; in the first profile, hostility is negated, in the second profile, hostility does not occur.

In summary, the first attribute profile of high performance companies at the phase of entering the market is based on a strong entrepreneurial orientation and perception of the environment as dynamic and friendly. The second attribute profile of high performance companies at the phase of entering the market is based on a strong entrepreneurial orientation and perception of the environment as dynamic and comprehensive.

The Table 3 presents results of the empirical studies on the impact of the feature of entrepreneurial orientation of the organization and its environment on the performance in the group of companies with sustainable growth.

Table 3: Attribute profiles and the performance of high-tech companies at the stage of mature growth

Model	Row coverege	Unique coverage	Consistency
Construct: f_perform. = f_(innov., proactiv., risktak, dynam., complex., hostility)			
(M1):f_ complex ^{x} f_dynam ^{x} f_risktak ^{x} f_proactiv ^{x} f_innov	0.85	0.85	0.50
Solution coverage: 0.85; solution consistency: 0.50 *Frequency cutoff: 3.00 ; consistency cutoff: 0,56*			

Statement	Model 1
Entrepreneurship of the organization:	
Innovation: the organization prefers research and development, technological leadership and innovations	•
Proactivity: the organization initiates activities in the environment	•
Risk taking: the organization prefers high-risk activities and high return activities	•
Uncertainty of the environment	
Dynamics: there is a rapid pace of changes in the organization's environment	•
Comprehensiveness: understanding of the organization's environment requires an extensive expert knowledge.	•
Hostility: behavior of entities of the organization's environment is characterized by mutual reluctance	*o*
Explanation of symbols: • occurs, o does not occur, ~ negation.	

Source: own study own study with use of fs/QCA 2.5.

The obtained attribute profile of companies at the stage of sustainable development with high performance shows a clear entrepreneurial orientation. This orientation finds its unequivocal basis in all three types of entrepreneurial behavior, i.e. innovation, proactivity and risk taking. The profile of perception of environment uncertainty of companies with high performance is characterized by a rapid pace of changes and comprehensiveness, the feature of hostility does not occur.

The comparison of the obtained attribute profiles of high performance companies at various stages of development is presented in the Table 4.

Table 4: Profiles of high performance organization: start – up vs. mature growth

The attribute profile of high performance organization at the stage of entering the market	**The attribute profile of high performance organization at the stage of sustainable development**
P1: - highly entrepreneurial orientation: innovative, proactive as well as risk taking behavior; - perception of uncertainty of the environment: rapid pace of changes P2: - highly entrepreneurial orientation: innovative, proactive as well as risk taking behavior; - perception of uncertainty of the environment: rapid pace of changes and high complexity	P1: - highly entrepreneurial orientation: innovative, proactive as well as risk taking behavior; - perception of uncertainty of the environment: rapid pace of changes and high complexity

Source: own study.

All obtained profiles of high performance companies are based on highly entrepreneurial orientation. The differences occur with regard to the perception of uncertainty of the environment, in particular they concern the hostility of behavior of its entities. In all profiles, the environment is perceived as highly variable. In the first attribute profile of high performance companies at the stage of entering the market, there is a negation of the hostility of environmental entities, which is accompanied by lack of complexity of the environment. The

second profile of high performance companies at the stage of entering the market is similar to the profile of high performance companies at the stage of sustainable development. Both are based on the highly entrepreneurial orientation and perception of the environment as highly variable and complex while not recognizing any hostility of entities within the environment.

5. Conclusion

The attribute analysis of technology entrepreneurship confirms that high performance enterprises on early stages of development must behave very entrepreneurial taking into account all three entrepreneurial orientation attitudes. The perception of env. uncertinty by high performance enterprises is based mainly on perception of rapid pace of changes, high complexity and without environmental hostility. It means that high performance enterprises must be able both to manage env. changes and complexity by strong entrepreneurial orientation and to format environment as rather friendly then hostile. The start - up companies comparing with mature growth ones have more different configurations of technology entrepreneurship to succeed in uncertain environment. Concluding the results of empirical research, it should be emphasized that the research was of qualitative and exploratory nature and was carried out in the form of a comparative case study. In other words, they provide a good basis for formulating introductory theoretical assumptions of the category of entrepreneurship and they need to be complemented by representative research to create the basis of a comprehensive theoretical framework of the phenomenon.

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References

Audretsch, D. (2012) “Entrepreneurship Research”, Management Decision, No. 5, pp 755-764.

Bernardin, H., and Wiatrowski, M.J. (2013) “Performance Appraisal”, Psychology and Policing, No. 3, pp 257 – 267.

Bratnicki, M. (2004) “Organizational Entrepreneurship: Theoretical Background, Some Empirical Tests, and Directions for Future Research”, Human Factors and Ergonomics in Manufacturing & Service Industries, No. 15, pp 15–33.

De Waal, A.A. (2012) “Characteristics of High Performance Organizations”, Business Management and Strategy, No. 3, pp 28-45.

Dees, G.G. and Beard, D.W. (1984) “Dimensions of Organizational Tasks Environments”, Administrative Science Quarterly, No. 1, pp 52-73.

Dess G.G., Newport, S., and Rasheed, A.M.A. (1993) “Configuration Research in Strategic Management: Key Issues and Suggestions”, Journal of Management, No. 4, pp 775-795.

Fauzul, M.F., Takenouchi, H. and Yukiko, T. (2010) “Entrepreneurial Orientation and Business Performance of Small and Medium Scale Enterprises in Sri Lanka”, Asian Social Science, No 6, pp 34-46.

Hatzichronoglou, T. (1997) Revision of the High Technology Sector and Product Classification, OECD Science, Technology and Industry Working Papers, OECD Publishing, Paris.

Hatzichronoglou, T. and De Waal, A.A. (2012) “Characteristics of High Performance Organizations”, Business Management and Strategy, No. 3, pp 28-45.

Hoq, M.Z. and Chauhan, A.A. (2011) “Effects of Organizational Resources on Organizational Performance: an Empirical Study of SMEs”, Journal of Contemporary Research in Business No. 2, pp 373-385.

Jeffrey, C. and Lumpkin, G.T. (2011) “Entrepreneurial Orientation Theory and Research: Reflections on a Needed Construct”, Entrepreneurship: Theory & Practice, No. 35, pp 855–872.

Kazanjian, R.K. (1998) “Relation of Dominant Problems to Stages of Growth in Technology-Based New Ventures”, Academy of Management Journal, No. 2, pp 257-279

Khilji, S.K., Mroczkowski, T. and Bernstein, B. (2006) “From Invention to Innovation: Toward Developing an Integrated Innovation Model for Biotech Firms”, Journal of Product Innovation Management, No. 23, pp 528–40.

Kordel, P. (2014) “Technology Entrepreneurship: Configuration Approach to Strategic Development Mechanism of High Technology SME’s”, RENT 2014 Entrepreneurial Endeavours: A Profusion of Research, Policy and Practitioner Practices, European Institute For Advanced Studies in Management.

Kordel, P. and Machnik – Słomka, J. (2016) The Phenomenon of Technology Entrepreneurship in the Aviation Industry Companies in Poland, in the Light of Statistical Analyzes, [in:] Innovativeness of Contemporary Organizations, Towarzystwo Naukowe Organizacji i Kierownictwa, Toruń, pp 324-341.

Lindelöf, P. and Löfsten, H. (2006) “Environmental Hostility and Firm Behavior - An Empirical Examination of New Technology-based Firms on Science Parks”, Journal of Small Business Management, No. 44, pp 386-406.

Lumpkin, G.T., Dess, G.G. (1996) “Clarifying the Entrepreneurial Orientation Construct and Linking it to Performance”, Academy of Management Review, No. 1, pp 135-172.

Ragin, C.C. (2014) The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies, University of California Press.

Rauch, A., Wiklund, J., Lumpkin, G.T. and Frese, M. (2009): "Entrepreneurial Orientation and Business Performance: An Assessment of Past Research and Suggestions for the Future", Entrepreneurship Theory and Practice, No. 33, pp 761–787.

Rialp. J., Urbano, D. and Vaillant., Y. (2005) "The Born-Global Phenomenon: A Comparative Case Study Research", Business Research, No. 2, pp 133–171.

Romanelli. E. and Tushman, M.L. (1994) "Organizational Transformation as Puctuated Equilibrum: an Empirical Test", Academy of Management Journal, No. 5, pp 1141-1166.

Sharfman, M.P. and Dean, J.W. (1991) "Conceptualizing and Measuring Organizational Environment: A Multidimensional Approach", Journal of Management, No. 4, pp 681-700.

Shields, J. (2015) Managing Employee Performance & Reward: Concepts, Practices, Strategies, Cambridge University Press.

Smith, W.K. and Lewis, M.W. (2011) "Toward a Theory of Paradox: a Dynamic Equilibrum Model of Organizing", Academy of Management Review, No. 2. pp 381–403.

Stachowicz, J. (2016) "The Rationalization of Development Strategies in High Technology Enterprises", Organization and Management Scientific Quarterly, No. 3, pp 111-132.

A Case Study of the Extended Interactive Innovation Management Model in Insurance Company

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Abstract: Due to increasing competition, what companies need to do is as important as how they do business. For this reason, companies are focusing on getting better ideas ahead of their competitors and passing them on quickly. Models developed for innovation management, such as technology push, market pull, coupling, interactive and network are being applied and developed in different sectors with different add-ons. The aim of this study is to propose and apply the innovation management framework in an international insurance company and evaluate its results. This framework includes interactive model as the innovation management approach; brainstorming as the creative thinking method, and Delphi as group decision-making method. The volunteers selected from employees of the company among those who are more closely related to the customers. Although 37 of 510 employees are applied to the program, only 22 of them are approved. The volunteers were provided with detailed information on technological trends and trained in innovation management and creative thinking methods. Later, 328 innovation ideas were produced by using brainstorming method. These ideas were presented and consolidated into 62 different ideas, and then the participating volunteers were requested to score the ideas in terms of 5 criteria. The scored ideas were ultimately evaluated by a couple of joint meetings and the 6 ideas are decided by using Delphi method to be offered to the executive's of the company with the detailed feasibility reports and project proposals and those who find sponsors from the executives will be initiated in a program. In this study, the interactive innovation management model was extended to the insurance sector in a novel approach by combining a set of well known methods in an order for different steps. According to the literature, this study is the first in the insurance sector in Turkey, and a subject of study in the world is also increasing. The results obtained in this study are considered to be a guide for researchers working on this field. For further research, it is suggested to consider of granting individual mentorship to employees who are volunteers throughout the innovation management process.

Keywords: innovation management, interactive innovation model, insurance, digital transformation, brainstorming

1. Introduction

1.1 The Role of Innovation in Corporations

With the impact of globalization, the world quickly began to become a single market. The number of firms and consumers who produce and demand similar products is increasing. For this reason, the market is filled with similar and commodity products. Consumers, in this case, prefer price, quality, convenience and ease of payment and delivery, and choose the product that suits them best. For all these reasons, one of the most important factors in the preference of firms is that they constantly innovate and attract consumers with their unusual practices.

Innovation is seen as an important tool for companies that want to survive and grow in competitive conditions (The Boston Consulting Group, 2006). But for companies that want to gain a competitive edge, innovation is not a one-time tool. There is a need for managing the innovation so that innovation can be implemented continuously at every stage of the enterprise and an environment suitable for the realization of innovations. So that the sustainable competition and success depend on innovation management of an organization (Cooper, 1979; Rothwell, 1992; Benedetto and C.Anthony, 1999).

As an important requirement of innovation management, institutions should not expect innovation to come into being spontaneously, but should proactively plan an environment that will lay the groundwork for innovative thinking and work that reveals industry market trends, competition conditions, customer expectations and trends in order to create this environment (Preez and Louw, 2008).

Innovation can be realized in many different areas such as product, process, organization, marketing, etc. However, the innovations are seen very often product and technology-centric. This approach is most probably a result of defining innovation as "the ability to create new value at the intersection of business and

technology" (Davila, Epstein and Shelton, 2007). According to the Oslo Manual, innovation is *"a new or significantly modified product (goods or services) or process; a new marketing method; or a new organizational method in business practice, workplace organization or external relations"* (OECD, 2005). Although this definition includes organizational and marketing innovations, one of the most basic points in innovation is still focusing on new or improved ideas which can be sold and marketed. On the other hand, measuring and evaluation of innovation are as a complex issue as it is important for companies (Frenkel, Maital and Grupp, 2000).

1.2 The Innovation Management Models

There are many models of innovation management processes in the literature from idea creation to product commercialization (Rothwell, 1992; Trott, 2005; Ning, 2017). Six of them are widely accepted and used in innovation management field such as technology push, market pull, coupling model, interactive model, network model and open innovation.

Technology Push Model usually provides research and product development without making market research, using newly discovered technologies. Touchscreen technology on smartphones is an example of this. Touch screen technology has emerged as a result of work done by EA Johnson in the 1960s. As a result of a series of R&D (Research & Development) activities made in the 1980s, Hewlett Packard introduced a touchscreen computer, and nowadays many touchscreen technologies such as the Apple PDA and the 1996 Apple Palm series are used (V.Ryan, 2013).

Market Pull Model is the innovation process that is triggered by a request for a new product coming from the market or the necessity of resolving a problem. According to this model, the need for innovation is; market research is determined by the requirements of the end or potential customers. Market pull is also starting with the desire of customers to make improvements in existing products. In the 1990s, there was a market requirement for a camera that could take an infinite number of pictures and instantly see the pictures we took. The requirements for this market had led to the development of digital cameras, and the existence of digital cameras has led to the development of photo editing software. Every requirement in the market brings with it the next innovation (V.Ryan, 2013).

Although technology and the market are two distinct driving forces to create innovation, it appears that most of the innovations are formed by the combination of technological and market factors in a creative context. Additionally, most of the failures in the process of creating innovation are based on inability to follow technological trends and to evaluate the market correctly. Although the relationship between science and technology and the constantly changing market is quite complex, it is assumed that it is possible to achieve the success by setting a good balance between technology and market with ***Coupling Model*** of innovation management (Dodgson and Rothwell, 1995). This balance between technology and market requirements is important at every stage, from the first thought of the idea of innovation to the end of research, design and development work, to the presentation of a new product or process market (Dodgson and Rothwell, 1995). It is a model that recognizes the interaction and feedback systems between different elements and tries to combine R&D (Research & Development) and marketing studies (Preez and Louw, 2008).

Interactive Model suggests that new knowledge has been brought to the point with the help of knowledge already existing in the company (R&D studies, etc.) (Clark and Guy, 1997). Innovation management process emphasizes the importance of relationships among the departments within the company and it is argued that innovation can come from all departments of the company. For this reason, it is stated that the interaction between the units in the company is very important. If the company is looking for technological solutions, it will look at the existing solution proposals, and if this solution does not satisfy the proposal, it will try to bring new information to the market (Fischer, 2001).

The interactive model is a framework that connects "Technology push" and "Market pull" models. There is no clear starting point for the interactive model, like the simultaneous coupling model. Interactive innovation is emerging with the latest developments in science and technology, needs in the society and in the market, and organizational skills. Innovation is not just between R&D or production and marketing, but between science technology and all functions linked to the market (Trott, 1998).

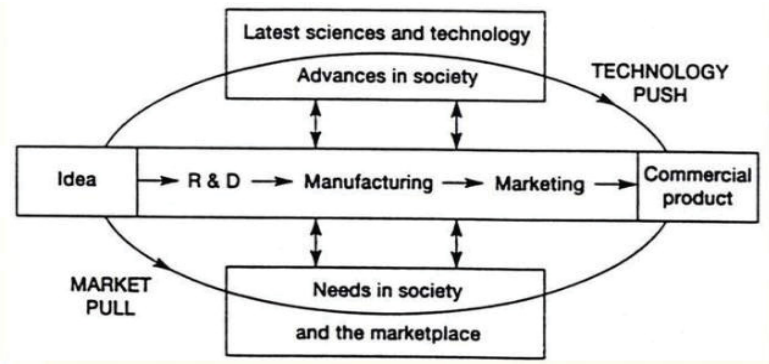

Figure 1: Interactive Model (Rothwell and Zegveld, 1985)

Network Model: According to this model, it is not enough to cooperate only with internal departments for innovation like the interactive model. In addition to internal departments, links with other institutions, universities, research centers, suppliers, and consumers should be established. According to Freeman, the network model *"establishes open connections with a group of complementary forces operating on the field, in order to reduce all the great dynamic and static uncertainties that may arise"* (Freeman, 1991).

Finally, according to the *Open Innovation Model*, a company aims to make the best use of the ideas of internal and external sources. Companies have the thought to be successful if they only they can best use of internal and external ideas (Preez and Louw, 2008). This model argues that establishing a better business model is more important than entering the market first. In the open innovation model, companies take their technology from many different sources. It is important to be able to benefit from using outsourced information by allowing it to use its own ideas in external institutions as well as by protecting the intellectual property rights. It combines internal and external ideas to advance the development of new technologies for the market.

1.3 The Role of Creative Thinking in Innovation

There are three key points to be aware of during the innovation process, i) identifying and understanding the problem, ii) finding ideas that can solve the problem, and to selecting the most appropriate one among all ideas (Modlin, 2015). In order to solve a problem, it is necessary to determine the possible solutions to the problem that can be detected and identified first. At this point, there is an important role of creative thinking methods. When it is necessary to be decided as a group, the brainstorming method is used when the group members are concerned about not being able to express their ideas freely due to the hierarchy and when we have little time to make a decision (Rawlinson, 2017). Some researchers have argued that brainstorming is the best tool for group idea production (Isaksen and Gaulin, 2005). Other popular group decision-making methods include Delphi (Chan et al., 2001), Rank Order Centroid (RoC) (Edwards and Barron, 1994) and Ratio Method (Weber and Borcherding, 1993). One of the important elements of creative thinking is to get support from methods of finding unique and new ideas during individual thinking. At this point, methods such as lateral thinking (Bono and Zimbalist, 2010) and morphological analysis (Hubka and Eder, 2012) may play an important role as well.

The aim of this study is to apply the interactive innovation management model in a case study with the selected employees who have close relation with the customers after supporting them with detailed information and trainings to enable them to produce innovative ideas in an effective way.

The next organization of the paper is as follows. Chapter 2 emphasizes the necessity of the insurance sector as well as the fact that it is in other sectors to establish a culture of innovation management. It is mentioned that the importance of innovations in the insurance sector is increasingly recognized today and the studies in this domain have been included. It is pointed out that the number of studies in insurance domain is still low and more information needs to be revealed. In Chapter 3, our case study in the insurance domain has been elaborated in detail. The results obtained were analyzed in Section 4.

2. Problem Definition

As in other domains of the sector, the insurance domain is in search of development and improvement of methods, processes, tools, and products because of the dynamic natures of the environmental factors such as

consumer, customer, competitor, and technology (Mills and Tubiana, 2013). It is clear that the spread of innovative thinking culture in insurance institutions is necessary to provide these innovations and to catch up the time.

Today, the insurance industry seems to be moving slowly but steadily on innovation management. Most insurance companies are very concerned about the innovation management stage in order to make long-term investments (Modlin, 2015).

It is observed that studies on innovation management in the insurance domain are very few. In a small number of these studies, Preez and friends aimed to sell innovative insurance products through new distribution channels (for example using smartphones), targeting low-income markets in an effort to innovate in the insurance industry. They have used the brainstorming method to find innovative ideas for this purpose. By combining ideas from different categories, they have defined various new concepts. They have taken a feasibility report for each of the concepts that they have developed and tried to develop the project by way of these concepts. Since the projects have not yet ended at the time of publishing, there is no clear information about the results of the work. But they say that they have come a long way since they first described innovation (Preez and Louw, 2008).

In the literature, no other studies related to innovation management have been found in the insurance sector, indicating that there is very little work to be done in this area. This study was carried out in an international insurance company in Istanbul, Turkey (Sompo Japan Insurance, Turkey) and proposes a practical framework for innovation management that we hope will contribute to the lack of innovation management in the insurance domain.

3. Methods

Our study consists of 8 steps covered in the following headings, are shown in Figure 2.

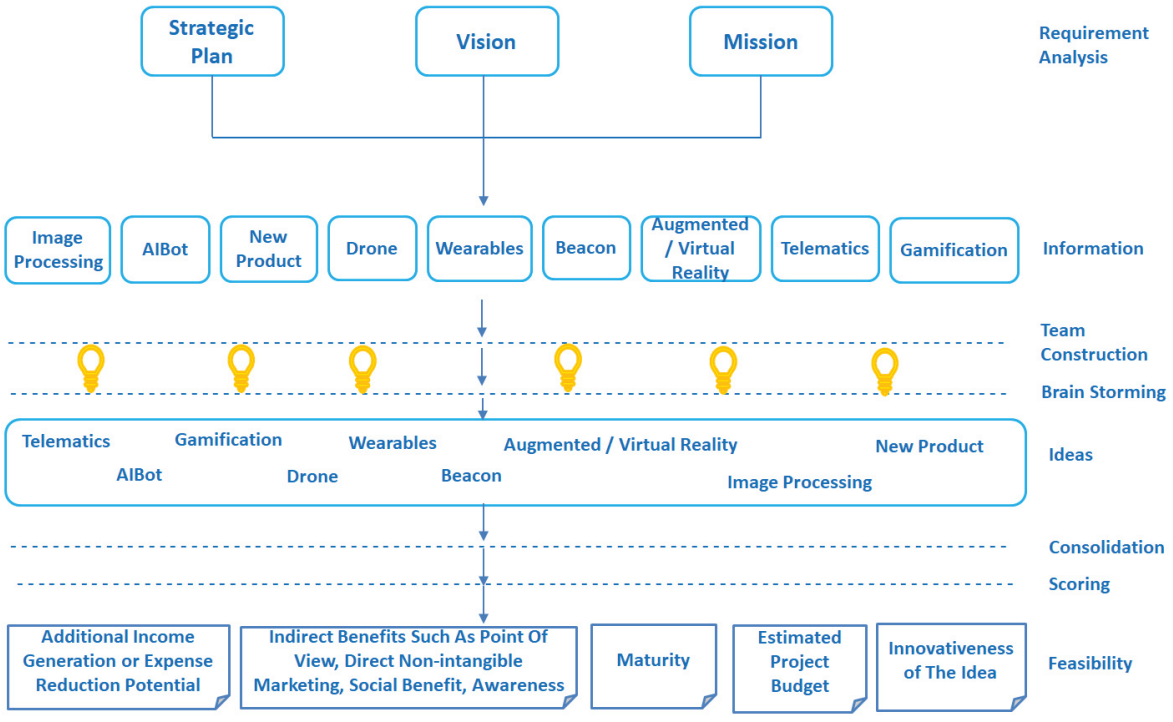

Figure 2: The framework of the extended interactive innovation management model

As described in the literature for the interactive innovation management model; the latest developments in society and technology should be determined and the expectations of the society and the market should be perfectly met. The produced innovative ideas should be in the technological areas which can be determined after a requirement analysis (Rothwell and Zegveld, 1985).

Basically in this study, first by considering the strategic plan, vision, and mission of the insurance company, the current situation and requirement analysis are carried out. As a result of the requirement analysis, the technological areas are determined by which there should be innovative studies will be made. Then we have informed the employees about the 9 technologies that we have set as a result of the negotiations we had with company executives at the beginning. They employees are asked to produce ideas that they can apply in their businesses. After a couple of trainings, teamworks and brainstorming, 328 ideas were produced. Then the ideas were scored with respect to the criteria based on strategic objective of the company and then consolidated. Finally the feasibility reports were issued for the selected most appropriate ideas. The result of these stages brings 6 ideas to be applied, produced and/or commercialized. Since the production and commercialization process will take too much time, we have not included this part in our study.

3.1 The Requirement Analysis with Executives m

Every new project, product, and activity in the workplace comes to meet a business requirement (Business Requirements Analysis, 2015). Many studies show that the main reason for project failure is the lack of product requirements or the lack of necessary support (Kumar, 2006). Today, many organizations believe that management requirement analysis will increase the likelihood of project success.

Requirement analysis also referred to as requirement engineering in the literature, aims to meet customer expectations with new or significantly modified products (Wohlin and Aurum, 2005). It is believed that making decisions by conducting requirement analysis before management of any project will contribute significantly to meet business objectives by managing project scope and costs.

Although direct involvement of excecutives in the process of creating a vision for innovation is an important element, it is more valuable for companies to work as widely as possible in their innovation development work (Mills and Tubiana, 2013).

For this reason, in our study, we first performed a comprehensive requirement analysis with the company executives. During the requirement analysis conducted by the executives, it was discussed the expectations of the customers and what they could do to meet these expectations. During these meetings, it is confirmed that the employees rather than executives who are directly conducting with the customers are more capable of understanding and describing the customer expectations in detail. For this reason, the interactive innovation management model (Fischer, 2001) has been preferred by providing an effective communication and interaction environment among all departments.

3.2 Increasing the Knowledge Capacity of Employees

Another characteristic of the interactive innovation management model is that it acknowledges that innovation will build on the company's existing knowledge (Clark and Guy, 1997). In addition, it is very important that employees are willing to contribute the study in terms of productivity. For this reason, weekly technology bulletins such as Telematics, AIBot, Gamification, Drone, Wearables, Beacon, Augmented / Virtual Reality and Image Processing were prepared and shared with all employees for 2 months in order to increase the knowledge of the employees and to identify the volenteers. On this page, although an interactive model was chosen as the innovation management model, it also benefited from some elements in the Coupling innovation management model (Preez and Louw, 2008), by providing information on technology trends for employees with extensive knowledge of customer expectations.

All those studies are coordinated by the digital transformation office of the insurance company. It is often reminded by the same office via e-mails that the purpose of preparing the bulletins is to produce and implement innovative ideas in these areas. Apart from this, all employees were asked to think about innovations in technological areas that said 'how good it would be if this innovation was done on this field,' and these ideas were collected through an online questionnaire. This method is very similar to the recommendation of constructing a sentence with *"I wish ..."* as a catalyst by La Sella (Salle, 2008) in order to create innovative ideas.

It is anticipated that the ideas of innovation to be revealed will be in line with the institution's strategic objectives. For this reason, the vision, mission and strategic objectives of the company have been shared with all employees during this stage.

3.3 Selecting the Candidates

The on-line questionnaire mentioned above is used to identify candidates who will voluntarily participate in innovation management activities. Employees in the questionnaires were asked whether they wanted to be included in the innovation study and were asked to select one of the technological themes previously announced in the bulletins for innovation work. Employees are also given the opportunity to choose this technology and write it down if there is a proposed innovation in the technology field.

Following the collection of these preliminary requests, the approvals are requested from the managers of the employees for spending the required time for the relevant work.

Being able to experience a comprehensive innovation management process has been an important motivation for employees in this study. In addition, a number of in-house and out-sourced training opportunities to contribute to personal development were also presented.

The number of applicants to participate in the first stage is 37. 5 of candidates are interested in drone technology, 10 in gamification, 4 in AIbot, 4 in wearables, 6 in new products, 4 in telematics, 3 in image processing, and 1 in beacons technology.

3.4 Training and Workshops on Creative Thinking Methods

22 of 37 volunteers are accepted to involve in two training sessions, called "Innovation Groups Initial Training". In the first session of the training, science, technology and innovation concepts, technology and innovation management issues were discussed and types of innovation (based on Oslo Manual (OECD and EUROSTAT, 2005)) were explained. There was also an interactive training on creative thinking techniques. In the second session, the technological newsletters were sent back to the participant readers, and the details of the technology and examples of applications in the world were shared. In this way, both the conceptual plane of the participants has strengthened; as well as the knowledge about the technology they would produce innovative ideas.

3.5 Gathering the innovation Ideas

In order to obtain more concrete and valuable suggestions from the voluntary employees involved in the innovation management process, the brainstorming method has been applied.

Brainstorming is the best tool known for group idea production (Isaksen and Gaulin, 2005).The brainstorming method is preferred since we try to make the search for solutions easier by starting from the maximum creative ideas that will be released during the group discussion method.

Basic idea behind the brainstorming method; the greater the number of ideas about a given problem, the more likely it is to find the most appropriate solution (Litchfield, Fan and Brown, 2011).

A comfortable, peaceful and authentic environment was created for the participants to the idea production phase. In order to conceal their ideas, they are guaranteed that they will not be subjected to inappropriate or unfavourable criticisms, even if their unconventional ideas are absurd to other members and executives.

The study was applied in a medium-sized meeting room. Elements to distract the participants were removed from the room. In order to make them feel comfortable, a friendly atmosphere was created and tea and coffee treats were offered.

In addition to the 4 moderators, two different sessions were organized with 17 volunteers as 4 groups using the idea sheet method in the brainstorming study. In the first session, ideas about AIbot, telematics, gamification and drone technologies were produced; while ideas about wearables, beacon, image processing, new products, and Augmented / Virtual Reality technologies were produced in the second session. The ideas produced after the two sessions were put together in an online environment.

As a result of brain storming, 328 ideas were produced. Of these ideas, 59 are about AIbot, 35 are telematics, 32 are Gamification, 33 are Drone, 11 are Wearables, 40 are Beacon, 34 are Augmented / Virtual Reality, 45 are Image Processing technologies and 39 are New Product.

3.6 Consolidating the Innovative Ideas

During the brainstorming sessions, it is possible to produce similar ideas by different groups for the same subject. Even so, this situation has been taken to ensure diversity. However, this situation requires a good consolidation of ideas produced. To do this, 328 ideas produced primarily are classified according to technologies. The ideas have been read by the moderators and the similar ideas are merged.

After the process of consolidating ideas, 62 different ideas were obtained. Of these ideas, 7 are about AIbot, 5 are telematics, 5 are Gamification, 8 are Drone, 5 are Wearables, 4 are Beacon, 6 are Augmented / Virtual Reality, 8 are Image Processing, and 14 are New Product.

3.7 Scoring the Innovation Ideas

After the ideas were consolidated, the digital transformation office also asked from the volunteers to evaluate all consolidated ideas based on the following criteria by an online questionnaire:

- Potential of Additional Income Generating or Expense Reduction (Multi / Medium / Low).
- Indirect Benefits such as Marketing, Social Benefit, Awareness (High / Medium / Low).
- Estimated time period to apply (Long: 18 + Month / Medium: 6-18 Months / Short: 1-6 Months).
- Estimated project budget (Much: > 500,000TRL / Intermediate: 500,000-100,000 TRL / Less: <100,000 TRL).
- Innovativeness (Very / Medium / Less).

After this online evaluation, all candidates were invited to evaluate the scored ideas again. In this evaluation, the scores of the ideas were shared with the participants. So that the most innovative, the most revenue-generating, the shortest time requiring, etc. ideas can be sorted and then discussed and re-scored very easily by the volunteers.

3.8 Feasibility Studies of the Innovation Ideas

The projects are then sorted with respect to the ranks which were created with respect to the above criteria. The Digital Transformation Department of the company made a feasibility study on the top 10 of the innovative ideas and found 6 of them feasible to be projected and offered to the executive of the company.

4. Result and Discussions

Innovation studies are crucial in order to grow and survive in today's competitive conditions (The Boston Consulting Group, 2006). The importance of innovation for companies in the world is being recognized day by day, and the development and applications of innovation in different sectors are increasing.

As is the case in other sectors, the insurance industry also recognizes the need to disseminate innovation culture and the need for innovative practices (Insurance Industry Innovation Consulting Solutions, 2017); (Mills and Tubiana, 2013). But despite that as a result of the extensive literature search, the lack of studies in the insurance sector is noteworthy.

In the field of innovation, studies are carried out in various sectors. There are various innovation management models (technology push, market pull, coupling model, interactive model, network model and open innovation) and these innovation methods are applied differently in different sectors (du Preez and Louw, 2008).

Interactive innovation management process in this study was applied to an international insurance company that has been serving the insurance industry; preliminary steps for the implementation of innovative ideas are carried out.

Our work with volunteers working at SOMPO Japan-Turkey Company was completed in 10 weeks. The company has a total of 510 employees and 22 people volunteered working in different departments.

The most important feature that differentiates this study from other innovation applications is that the interactive innovation model has been implemented in an insurance company with the collaboration of executives and employees by using a set of well-known methods in a special order starting from the

requirement analysis and idea generation to the evaluation of the ideas. Additionally, the idea generation is based on only the predetermined technologies which are decided with respect to the requirement analysis. Later ideas were scored and a feasibility report was presented again from the most appropriate ones. As results of all these studies, 6 of 328 ideas are determined that can be realized. These 6 ideas are in the process of passing on to the company.

Table 1: The numbers of ideas in different stages of the study

	Gathering the Ideas		Consolidation and Scoring	Feasibility
Technologies	**Suggested Ideas In the on-line Survey**	**Generated Ideas by Brainstorming**	**Scored and Evaluated Ideas**	**Feasible Ideas Presented to the Executives**
Image Processing	3	45	8	0
AIBot	4	59	7	2
Beacon	1	40	4	1
Gamification	10	32	5	2
Drone	4	33	8	0
New Product	5	39	14	1
Telematics	4	35	5	0
Virtual Reality	0	34	6	0
Wearables	4	11	5	0
TOTAL	**35**	**328**	**62**	**6**

It has been observed that volunteers have a high level of motivation during the whole stages. After this study, the company has initiated a series of training activities for improving the capacity of the employees in different skills, such as customer relations, effective communication, marketing, etc.

The interactive innovation management model that is proposed to the company will be continuously applied by the digital transformation office of company by considering the policy and strategic objectives in the coming years.

This study is the first study based on literature in the insurance sector in Turkey, and one of the rare examples in the world began to appear recently. From this point of view, this study is considered to be a guide for the researchers who will work in this domain.

However, according to our observations during the study, it is evaluated that it would be beneficial to offer individual mentorship to volunteers about technology and innovation management, creative thinking methods and commercialization will be very beneficial in the future works.

References

Benedetto, D. and C.Anthony (1999) 'Identifying The Key Success Factors In New Product Launch', J Prod Innov Manag, 16, pp. 530–544. doi: /10.1111/1540-5885.1660530.

Bono, E. and Zimbalist, E. (2010) 'Lateral Thinking', in, pp. 144–211.

Business Requirements Analysis (2015). Available at: https://www.mindtools.com/pages/article/newPPM_77.htm (Accessed: 5 October 2017).

Chan, A. P. C. et al. (2001) 'Application Of Delphi Method In Selection Of Procurement Systems For Construction Projects', Construction Management and Economics. Taylor & Francis Group, 19(7), pp. 699–718. doi: 10.1080/01446190110066128.

Clark, J. and Guy, K. (1997) Innovation And Competitiveness, Technology Analysis & Strategic Management. London: Routledge. doi: 10.1080/09537329808524322.

Cooper, R. G. (1979) 'The Dimensions Of Industrial New Product Success And Failure', Journal of Marketing. American Marketing Association, 43(3), p. 93. doi: 10.2307/1250151.

Davila, T., Epstein, M. J. and Shelton, R. (2007) 'The Creative Enterprise: Managing Innovative Organizations and People'.

Dodgson, M. and Rothwell, R. (1995) Industry Innovation: Success, Strategy, Trends", The Handbook Of Industry Innovation. Edward Elgar Publishing. Available at: https://econpapers.repec.org/bookchap/elgeebook/143.htm (Accessed: 5 October 2017).

Edwards, W. and Barron, F. H. (1994) 'SMARTS And SMARTER: Improved Simple Methods For Multiattribute Utility Measurement', Organizational Behavior and Human Decision Processes. Academic Press, 60(3), pp. 306–325. doi: 10.1006/OBHD.1994.1087.

Fischer, M. M. (2001) 'Innovation, Knowledge Creation And Systems Of Innovation', The Annals of Regional Science. Springer-Verlag, 35(2), pp. 199–216. doi: 10.1007/s001680000034.

Freeman, C. (1991) 'Networks Of Innovators: A Synthesis Of Research Issues', Research Policy. North-Holland, 20(5), pp. 499–514. doi: 10.1016/0048-7333(91)90072-X.

Frenkel, A., Maital, S. and Grupp, H. (2000) 'Measuring Dynamic Technical Change: A Technometric Approach', International Journal of Technology Management, 20(3/4), p. 429. doi: 10.1504/IJTM.2000.002864.

Hubka, V. and Eder, W. E. (2012) Theory of Technical Systems: A Total Concept Theory for Engineering Design. Springer Science & Business Media.

Insurance Industry Innovation Consulting Solutions (2017). Available at: http://www.virtusa.com/industries/insurance/industry-solutions/innovation/ (Accessed: 7 October 2017).

Isaksen, S. G. and Gaulin, J. P. (2005) 'A Reexamination Of Brainstorming Research: Implications For Research And Practice', GIFRED CHILD QUARTERLY, 49(4), pp. 315–329. Available at: http://www.cpsb.com/resources/downloads/public/GCQ_Isaksen_Gaulin.pdf (Accessed: 5 October 2017).

Kumar, V. S. (2006) 'Effective Requirements Management', in Paper presented at PMI® Global Congress 2006—EMEA, Madrid, Spain. Newtown Square, PA: Project Management Institute. Available at: https://www.pmi.org/learning/library/effective-requirements-management-project-success-8181 (Accessed: 5 October 2017).

Litchfield, R., Fan, J. and Brown, V. (2011) 'Directing Idea Generation Using Brainstorming With Specific Novelty Goals.', Motivation& Emotion. Plenum Press, 35(2), pp. 135–143. doi: 10.1007/s11031-011-9203-3.

Mills, H. and Tubiana, B. (2013) Innovation In Insurance: The Path To Progress | Deloitte Insights. Available at: https://dupress.deloitte.com/dup-us-en/topics/innovation/innovation-in-insurance.html (Accessed: 7 October 2017).

Modlin, C. (2015) Insurance Industry Innovation - 3 Things Insurers Can Do - Willis Towers Watson, AMERICAS INSIGHTS. Available at: https://www.towerswatson.com/en/Insights/Newsletters/Americas/americas-insights/2015/insurance-industry-innovation-3-things-insurers-must-do (Accessed: 7 October 2017).

Ning, L. (2017) Innovation And Change Module Specification. Available at: http://www.londoninternational.ac.uk/sites/default/files/documents/mba/inovation_and_change.pdf (Accessed: 4 October 2017).

OECD (2005) Oslo Manual: Guidelines For Collecting And Interpreting Innovation Data. 3rd Editio. Paris: OECD Publishing. doi: 10.1787/9789264013100-en.

OECD and EUROSTAT (2005) Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data. 3rd Editio. Paris: OECD Publishing. doi: 10.1787/9789264013100-en.

Preez, N. D. du and Louw, L. (2008) 'A Framework For Managing The Innovation Process', in PICMET. Cape Town, South Africa, pp. 546–558. Available at: http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=4599663 (Accessed: 23 September 2017).

du Preez, N. D. and Louw, L. (2008) 'A Framework For Managing The Innovation Process', in PICMET '08 - 2008 Portland International Conference on Management of Engineering & Technology. IEEE, pp. 546–558. doi: 10.1109/PICMET.2008.4599663.

Rawlinson, J. G. (2017) Creative Thinking And Brainstorming. New York, USA: Routledge. Available at: https://books.google.com.tr/books?hl=tr&lr=&id=A803DwAAQBAJ&oi=fnd&pg=PT6&dq=brainstorming+&ots=qgkTOfz55S&sig=8cRF9cGUUB06EEkIAtbJORqGtI4&redir_esc=y#v=onepage&q=idea&f=false (Accessed: 26 January 2018).

Rothwell, R. (1992) 'Successful Industrial Innovation: Critical Factors For The 1990s', R&D Management, 22(3), pp. 221–239.

Rothwell, R. and Zegveld, W. (1985) Reindustrialization and Technology. New York: Longman Group Limited.

Salle, R. La (2008) La Salle Matrix Thinking – A Structured Approach To Business Building. Available at: www.matrixthinking.com (Accessed: 29 January 2018).

The Boston Consulting Group (2006). Available at: https://www.bcg.com/documents/file14826.pdf (Accessed: 28 September 2017).

Trott, P. (1998) Innovation management and new product development.

Trott, P. (2005) Innovation Management And New Product Development. Financial Times/Prentice Hall.

V.Ryan (2013) Innovation Process Models. Available at: http://www.technologystudent.com/prddes1/revcardtec1.html (Accessed: 29 September 2017).

Weber, M. and Borcherding, K. (1993) 'Behavioral Influences On Weight Judgments In Multiattribute Decision Making', European Journal of Operational Research. North-Holland, 67(1), pp. 1–12. doi: 10.1016/0377-2217(93)90318-H.

Wohlin, C. and Aurum, A. (2005) Engineering and Managing Software Requirements. Berlin: Springer. doi: 10.1007/3-540-28244-0.

Adoption of a Smart Parking Solution: Parking Information at Your Fingertips

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Abstract: The knowledge of the Portuguese public regarding smart cities is still limited, such knowledge being more present in the technological and business environments. Portuguese cities are starting to invest in smart issues as a response to their complexity and challenges. The ENABLE Consortium's INTELPARK Solution (fictitious names given for anonymity purposes) described herein is an example of a smart parking solution that, through the combination of hardware and software, provides key information about the parking area being managed (for example, occupancy or vehicle infraction information). This technological solution, focused on optimizing and making the management of parking areas more efficient, will serve everyone involved: from the driver to the manager. This article aims to focus on the prospective user (in this case, the driver who will park his or her vehicle in the parking area), since the consumer / traveller driving a vehicle is the main reason for the success or failure of any product and service, such as this one, in the marketplace. In addition, we are living in times of profound digital transformation in which access to information, oftentimes down to the second, becomes increasingly important for the user as well as the search for solutions that increase well-being, quality of life and comfort. Thus, 209 valid online survey answers were received, with structured questions, responses which were gathered from drivers or end users and in a non-probabilistic sampling research process. The main goal was to know how the mobile application INTELPARK, associated with this smart solution, was perceived by the end user, and to understand the potential interest in it and how frequently it would be used. The data collected was analysed through descriptive statistics and via the chi-squared test, in order to find associations between variables. The research concludes that future end users of this mobile intelligent parking application will have the following profile: they will be older, highly literate and with a higher gross monthly income. Moreover, these results also show that parking is seen to be an issue of citizenship and which promotes quality of life rather than simply being a source of revenue.

Keywords: smart cities, smart solutions, smart parking, traffic, mobile application

1. Introduction

Cities occupy only 3% of the land area, but consume 60% to 80% of the energy and are home to half of the world population (3.5 billion inhabitants) (United Nations, 2015). Cities account for 70% of CO2 emissions, and up to 30% originate in the search for parking (Parking Network, 2014). Due to the demographic, social and environmental importance of cities, the investment in new management models, and in innovative solutions (e.g. the usage of information and communication technologies) is increasing and smart cities are being born, supporting cities' competitiveness, quality of life, development and sustainable growth.

One of the major challenges of these urban centers is mobility and the number of vehicles on public roads, emitting polluting gases, leading to road congestion and affecting quality of life (*The Guardian*, 2015). In Europe, the technological solutions for an efficient urban area management have increased, helping to reduce the negative impact of cars. For example, solutions include the pre-booking of facilities (parking lots) and mobile applications with information about available parking places.

An example of a technological solution, a smart parking solution, is ENABLE Consortium's INTELPARK Solution (fictitious names given for anonymity purposes) that focuses on solving the difficulty for drivers in finding a vacant parking space. It is implemented in the infrastructure of the city and brings advantages for citizens, managers and cities.

The present research intends to study the suitability of this new technology to the needs of the user, as well its adoption. To this end, an online survey was conducted involving potential users and focusing on their interest in the mobile application, its future impact on their life, the possible usage frequency, among others.

Therefore, we seek to contribute to the broader discussion on welfare, quality of life, sustainability of the planet and on the efficient management of resources.

2. Innovation, product diffusion and adoption

2.1 Innovation: definition, dissemination and adoption

In the 1930s, Joseph A. Schumpeter, the initiator of the innovation dialogue, defined innovation as "the process of doing something that is already being done, but in a different way" (Schumpeter, 1947, p. 151). For Eurostat & OECD (2005, p. 46), it "is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations".

Rogers (1995) states that the decision-making process for adopting innovation comprises five steps:

- Knowledge (when the individual is exposed to and absorbs knowledge about the innovation);
- Persuasion (when the individual forms an attitude, favourable or not, towards the innovation);
- Decision (when the individual engages in some form of activity that leads him to accept or reject the innovation);
- Implementation (when the individual uses the innovation);
- Confirmation (when the individual seeks reinforcement of the decision he or she made and may even go back on the decision taken).

Moore (1991), in turn, presented the Technology Adoption Lifecycle Model, representing the market penetration of any technological product, according to the user's response to the innovation. There are five classifications for consumers: innovators (technology is central to their lives and they are eager to try new ideas), early adopters (although not tech savvy, they adhere to new products soon and easily understand the benefits of the new technology and relate it to their concerns), early majority (guided by their practical sense they prefer to first see how the product is working with other people and only then invest in it), late majority (more sceptical and reticent, requiring additional proof that the product works) and laggards (not technology friendly, only having a connection to technology when forced to buy a product in which the technology is so well hidden that they do not even notice it) (Moore, 1991; Rogers, 1995).

However, the model has three gaps, each one representing the difficulty that a technological innovation faces when going from one segment of users (buyers) to another. Therefore, there is a gap between the innovators and the early adopters, between the early adopters and the early majority, and between the early and the late majority. The first gap occurs when a technological product cannot demonstrate any core benefit, making it difficult for people to understand why it is being used. The second gap is related to the lack of technological knowledge of the second group. At this stage of product development in the market, some attention is needed to make the product easy to use so that it may continue to succeed, otherwise it will not go forward and will never reach the late majority. The gap between the early adopters and the early majority is called the chasm (or abyss) and it is the most difficult gap to be overcome by the innovation, given the difference between the two groups and their size. Finally, let it be stated that for an innovation to become a "household name" and for its creators to become rich the innovation must make it over the chasm and into the early majority segment, soon to be followed by the conquering of the late majority segment of buyers.

Although attention must be paid to all of the groups of consumers described above, there are other details that the company has to be aware of, such as the transfer of ideas between individuals that inevitably ends up influencing the success of a certain innovation. This transfer or sharing of ideas can be influenced by several reasons. One is the degree of similarity between individuals in terms of attributes such as education, beliefs or even social status. Consequently, the more similar they are, the more fluid the exchange of ideas.

3. Smart Cities

A smart city is a city interconnected by communication and information technologies, with the aim of increasing innovation, efficiency, sustainability, competitiveness and economic growth, while improving quality of life and providing for a wiser management of natural resources (Batty et al., 2012; Joshi, Saxena, Godbole, & Shreya, 2016; Komninos, Pallot, & Schaffers, 2013). Smart cities have different areas of activity depending on the urban areas and on the technological intervention that may be required: smart economy, smart people,

smart governance, smart mobility, smart environment and smart living (Batty et al. 2012; Komninos et al., 2013). From these, smart solutions/products/services are created and integrated (e.g. air quality monitoring, traffic monitoring).

4. The ENABLE Consortium's INTELPARK Solution

Parking plays a key role in road traffic, and eventually all vehicles need a parking space. Uncertainty and the lack of information regarding the location of available parking spaces makes the whole process complicated, causing many drivers to lose a significant percentage of their time searching for adequate parking (Thompson & Richardson, 1998).

The INTELPARK solution created by the ENABLE Consortium was the answer supplied by the three founding Portuguese companies, specialized in R&D, to solve the need for increasing the efficiency of parking management and to transform it into a more accurate tool to improve urban mobility and, ultimately, quality of life.

The INTELPARK solution is a smart parking solution, inserted in the Smart Mobility area and composed by hardware - magnetic sensors (installed in the parking space), communication gateway (which connects the hardware and the software) and an occupation indicator (informing about parking availability) - and software - a management platform (aggregating all of the information) and a mobile application (informs drivers of parking availability and how to get there) - that complement each other. The smart parking solution supports the management of parking areas in big cities and helps drivers to find a parking place or even to pay or book in advance.

The ENABLE Consortium's system, installed in the infrastructure itself, allows for interoperability, providing real-time information (Oliveira & Ferreira, 2014). This predictive power is the unique selling point of the ENABLE Consortium. In addition, the mobile smartphone application for drivers, adds value to the offer.

Therefore, the solution is transversal to all those involved: private and public entities and drivers (the end users).

Ultimately, the end users' parking experience will improve due to the information available. Payment is made more flexible, making it more convenient and faster given the various payment options available (mobile application and even kiosks). The driver will be able to save time, fuel and other associated costs, decreasing the frustration associated to the vehicle parking process as well as reducing CO2 emissions for which he or she is responsible.

5. Methodology

This research is exploratory, following a quantitative methodology through the administration of an online survey using Google Forms, which was shared on Facebook and sent via e-mail to the researchers' network of contacts and the database of students of the Department of Economics, Management, Industrial Engineering and Tourism of the University of Aveiro. The sample for the survey is classified as being a non-probabilistic convenience sample.

In the survey, structured questions were used: multiple choice questions and sentences with a Likert scale of 5 points.

The survey was divided into three main sections:

- Socio-demographic data: age group, gender, education, nationality and gross monthly income.
- Parking habits: related to owning a car, where the respondent usually parks and how often he or she pays fines;
- The mobile smart parking application: regarding the prior use of a similar mobile application the respondent had to rate certain statements;

There were 219 responses to the survey in total, but only 210 were considered valid. In order to analyse the quantitative data, JMP software was used for the descriptive statistics and the calculations for the chi-squared test and association between categories were done manually and according to Oakshot (2016).

6. Analysis of the surveys

6.1 Descriptive statistics

The analysis of the surveys was based on a total of valid 210 responses.

The sociodemographic information, parking habits and opinion on the mobile application of the Smart Parking Solution of the sample is presented in tables 1-3 below.

Table 1: Sociodemographic responses to the survey

Question	Answer
Age	18-24 years old – 60% 25-40 years old – 18.6% 41-50 years old – 15.2% 51-65 years old – 5.2% >65 years old – 1%
Gender	Female – 66.67% Male – 33.33%
Qualifications	Basic education – 0% High school – 21% Bachelor's – 51.9% Master's – 19.5% PhD – 7.6%
Nationality	Portuguese – 98.56% European but not Portuguese – 0.48% South American – 0.48% North American – 0.48% Asian – 0% African – 0% Oceania – 0%
Gross monthly income	I do not have my own income – 52.4% Minimum wage – 5.2% More than the minimum wage but less than € 1,000 / month – 11.9% 1,000€ - 1,500€/month – 10.5% 1,500€ - 3,000€/month – 12.8% 3,000€ - 5,000€ / month – 4.3% > 5,000€ - 2.8%

6.2 Chi-squared tests - Association between categories

The chi-squared test is a non-parametric test, that is, it does not test a parameter or a ratio (Oakshot, 2016, p.10). In this case, the chi-squared test is used to test the associations between categories. In it we have two options for each hypothesis: the null hypothesis (when the association is not confirmed) and an alternative hypothesis (when the association is confirmed). According to the social sciences, the alternative hypothesis is normally tested at the 5% of level of significance. In total, twenty-four associations were tested, using the chi-squared test. Of these twenty-four associations, six showed a positive association. These are shown below (due to space limitations the calculations are only shown for the first association found).

Table 2: Parking habits

Question	Answer
Do you own a car?	Yes - 62.9% Car sharing - 25.7% No - 11.4%
Do you usually park in paid parking?	Yes (5 and 4) - 2.4% and 17.6% Neutral (3) - 32.4% No (2 and 1) - 38.6% and 9%
Where do you usually park?	City center - 69.5% Around the city/Suburbs - 30.5%
Have you been fined for being badly parked / in violation in the last 12 months?	No - 76.7% Yes, I was fined one or a few times - 22.9% Yes, I was fined many times - 0.5%

Table 3: Opinion on the mobile application of the Smart Parking Solution

Question	Answer
Have you used any mobile smart parking application yet?	Yes – 7.6% No – 92.4%
I am / would be interested in an application like this	I completely agree (5 and 4) - 38.1% and 31.4% Neutral (3) - 21% I strongly disagree (2 and 1) - 7.1% and 2.4%
I do / would regularly use the application	I completely agree (5 and 4) - 37.2% and 31.4% Neutral (3) - 22.3% I completely disagree (2 and 1) - 7.03% and 2.16%
The application changes / would change how we look for parking places and how we pay	I agree completely (5 and 4) - 38.41% and 38.41% Neutral (3) - 16.52% I strongly disagree (2 and 1) - 5.12% and 1.54%
The application is / would be useful for my day	I completely agree (5 and 4) - 33.76% and 32.07% Neutral (3) - 23.21% I strongly disagree (2 and 1) - 7.88% and 3.09%

6.3 Qualifications of the respondent x being fined for being badly parked / in violation in the last 12 months

The first category association is between the qualifications of the respondent and the question "Have you been fined for being badly parked / in violation in the last 12 months?". The answers to it were "Yes, I was fined one or a few times.", "Yes, I was fined many times." And "No, I did not." To simplify, the data of the two positive answers were added, leaving only the "Yes" and the "No" options. The null hypothesis is that there is no association between the categories, that they are thus independent. The alternative hypothesis is that there is an association between the categories, that they are thus dependent. Please see the tables and calculations below.

Table 4: Qualifications of the respondent x being fined for being badly parked / in violation in the last 12 months

	Yes	No	Total
High school	7	37	44
Bachelor's	20	89	109
Master's	16	25	41
PhD	6	10	16
Total	49	161	210

Table 5: Frequency table (qualifications of the respondent x being fined for being badly parked / in violation in the last 12 months)

	Yes	No
High school	10.267	33.733
Bachelor's	25.433	83.567
Masters	9.567	31.433
PhD	3.733	12.267

Table 6: Chi-squared test (qualifications of the respondent x being fined for being badly parked / in violation in the last 12 months)

	Yes	No
High school	1.04	0.316
Bachelor's	1.161	0.353
Masters	4.326	1.317
PhD	1.377	0.419

Degrees of freedom = 3

1. Calculated value = 10.309; 2) Critical value = 7.815
2. < 1), therefore we accept the alternative hypothesis at the significance level of 5%, which means that the variables are dependent and there is an association between the qualifications of the respondent and being fined for being badly parked / in violation in the last 12 months.

6.4 Gross monthly income of the respondent x being fined for being badly parked / in violation in the last 12 months

The second category association is between the gross monthly income of the respondent and the question "Have you been fined for being badly parked / in violation in the last 12 months?". To simplify, the answers were aggregated into two groups: "Yes" and "No". The null hypothesis is that there is no association between the gross monthly income of the respondent and being fined for being badly parked / in violation in the last 12 months, that is, they are independent categories. The alternative hypothesis is that there is an association between gross monthly income and being fined for being badly parked / in violation in the last 12 months, that is, they are dependent categories.

1) Calculated value = 14.445; 2) Critical value = 7.815
2) > 1), therefore we accept the alternative hypothesis at the significance level of 5%, which means that the variables are dependent and there is an association between the gross monthly income of the respondent and being fined for being badly parked / in violation in the last 12 months.

6.5 Gross monthly income of the respondent x habit of parking in paid parking areas

The third association between categories is for the question classified through a 5-point Likert scale: "Do you park in paid parking?" and the gross monthly income of the respondent. To simplify, the answers were aggregated: "Don't agree" (1 and 2), "Agree" (4 and 5) and "Neutral" (3). The null hypothesis is that there is no association between the monthly gross income of the respondent and the habit of parking in paid parking lots, that is, they are independent categories. The alternative hypothesis is that, in fact, there is an association between the monthly gross income of the respondent and the habit of parking in paid parking lots, that is, they are dependent categories.

1) Calculated value = 20.211; 2) Critical value = 12.592
2) < 1), therefore we accept the alternative hypothesis at the significance level of 5%, which means that the variables are dependent and there is an association between the monthly gross income of the respondent and the habit of parking in paid parking lots.

6.6 Age group of the respondent x car ownership

The fourth association between categories is for the question "Do you own a car?"; to which three options were given: "Yes", "I share a car with other people (for example, with my parents)" and "No"; and the respondents' age range. The null hypothesis is that there is no association between the age group of the respondent and car ownership, that is, they are independent categories. The alternative hypothesis is that, in fact, there is an association between the age group of the respondent and car ownership, that is, they are dependent categories.

1) Calculated value = 17.387; 2) Critical value = 5.991
2) < 1), therefore we accept the alternative hypothesis at the significance level of 5%, which means that the variables are dependent and there is an association between the age group of the respondent and car ownership.

6.7 Qualifications of the respondent x car ownership

The fifth association between categories is for the question "Do you own a car?"; to which three options were given: "Yes", "I share a car with other people (for example, with my parents)" and "No"; and the qualifications of the respondent. The null hypothesis is that there is no association between the qualifications of the respondent and car ownership, that is, they are independent categories. The alternative hypothesis is that, in fact, there is an association between the qualifications of the respondent and car ownership, that is, they are dependent categories.

1) Calculated value = 20.818; 2) Critical value = 12.592
2) < 1), therefore we accept the alternative hypothesis at the significance level of 5% which means that the variables are dependent and there is an association between the qualifications of the respondent and car ownership.

6.8 Gross monthly income x car ownership

The sixth association between categories is for the question "Do you own a car?"; to which three options were given: "Yes", "I share a car with other people (for example, with my parents)" and "No"; and the gross monthly income of the respondent. The null hypothesis is that there is no association between the gross monthly income of the respondent and car ownership, that is, they are independent categories. The alternative hypothesis is that, in fact, there is an association between the gross monthly income of the respondent and car ownership, that is, they are dependent categories.

1) Calculated value= 47.375; 2) Critical value = 12.592
2) < 1), therefore we accepted the alternative hypothesis at the significance level of 5%, which means that the variables are dependent and there is an association between the gross monthly income of the respondent and car ownership.

Proven from previous calculations, there are six associations between variables, indicated by the arrows in figure 1.

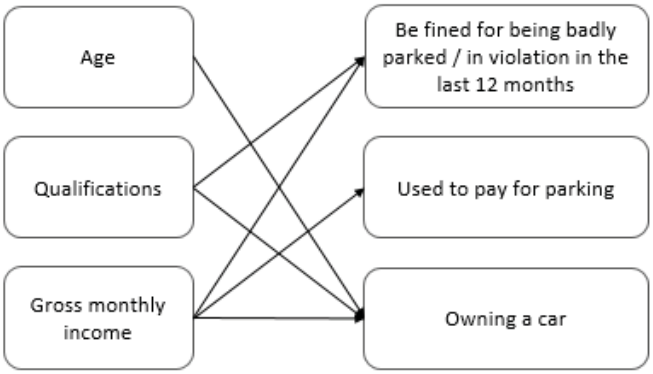

Figure 1: Dependent associations between categories

From figure 1 we can verify that the age group is associated with:

- Owning a car.

The respondents' qualifications are associated with:

- Being fined for being badly parked or in violation in the last 12 months;
- Owning a car;

In addition, gross monthly income is associated with:

- Being fined for being badly parked or in violation in the last 12 months;
- Owning a car;
- Being used to paying for parking.

7. Discussion

This research sought to add to the knowledge on the Portuguese public regarding smart cities and smart parking. We thus verified the degree of adoption of a smart parking solution, by drivers, as well as the influence of several sociodemographic factors related to the same issue and application.

From the descriptive statistic results we can state that the majority of our sample has never used a similar smart parking mobile app (92.4%) and this may be explained by smart solutions not having been implemented on a large scale in Portuguese territory or, at least, in the residential area of the respondents. However, the majority of the sample shows an interest (69.5%), would make regular use of the app (68.51%) and believes it would change the way they look for a parking place and pay for it (76.82%). In addition, only 11.43% of the respondents said they did not have a car, which makes this sample more prepared to respond appropriately, since the remaining 88.57% of the respondents drive and need parking.

The younger respondents (18-24 and 25-50 years old) showed more interest in the app, but the older respondents are the ones who pay more often for parking and the explanation for this might be their

qualifications (older respondents were found to have higher literacy) but also their higher gross monthly income. According to the survey data, the two are related since those with higher literacy occupy higher-paying positions (the percentage of respondents receiving a gross monthly income of more than €1,000 increases with age).

Contrary to what one might think, the data collected shows that there is a tendency for men and women to behave equally in relation to parking, since no gender-dependent relationships were found. Despite this, there was an indication that women are more receptive to innovation (according to the descriptive statistics, but not according to the inferential statistics, the latter referring to statistically significant associations between categories), since they showed more interest in the smart parking mobile application. However, men are the ones who usually pay more for parking, and their gross monthly income can be considered as an explanatory factor. On average, the men in the sample receive higher salaries: the percentage of male respondents receiving a gross monthly income above €1,000 compared to the female respondents is almost twice as high.

Trying to explain this difference using the literacy argument, according to the data obtained, does not make sense, since 77.71% of the female respondents and 75.52% of the male respondents have a bachelor's, master's or doctoral degree. This is, therefore, a curious fact, and may be indicative of the existence of gender inequality in the workplace.

In addition, the gross monthly income has an influence on the payment of parking fines, paying for parking and owning a car. Engel's Law can help explain this phenomenon, asserting that the income spent on primary goods will decrease as wages increase, so individuals with higher incomes will spend more money on luxury items (Houthakker, 1957). Thus, the ability to pay fines is seen to be a “luxury”, since a higher income is related to the payment of more fines. For example, individuals who are late or in a hurry, apparently prefer to pay a fine rather than fail to arrive on time. Therefore, it can be assumed that individuals with higher literacy also pay more fines, countering the idea that higher literacy rates are synonymous with a more civic-type behavior. Those who have lower incomes cannot afford to pay fines and therefore have a more civic-type behavior, perhaps for the wrong reasons. Money is effectively seen to be a great conditioner of behavior.

However, it is important to say that this conclusion cannot be generalized to all situations.

8. Conclusion

We share the perspective that smart cities and the technology associated to them will have a major impact on urban planning and policies (Batty et al., 2012). The city, as we know it, is turning into a place where the use of Information and Communication Technologies (ICT) is complementing physical actions. Real-time information is increasingly available to citizens making it possible to reduce resource consumption, improve the utilization capacity of the existing infrastructure, leading to the creation of new services, subsequently improving commerce, while improving also city management and increasing resilience (Harrison & Donnelly, 2011).

Technological solutions must always adapt and even merge with the flows and dynamics of each city and its citizens. New technologies tend to polarize and divide at different levels, so it is necessary to explore and investigate in a number of areas (e.g. urban policies or economic development) how they can be improved on to better fit citizens and their needs (Batty et al., 2012; Joshi et al., 2016).

The number of cars sold increases annually, accentuating the difference between the number of cars in circulation and the number of available parking spaces. A technology solution such as the INTELPARK smart parking solution will simplify drivers’ parking experience. However, this type of technology will only work if there is user adoption and acceptance. Thus, it is necessary to understand what influences and matters to drivers in order to create the right technology (and the right marketing campaign to communicate its benefits).

The research concludes that future end users of this mobile intelligent parking application will have the following profile: they will be older, highly literate and with a higher gross monthly income. Thus, marketing efforts for the parking application should be directed at this segment. However, with the benefit of the general population in mind, city councils could also create special pricing conditions for younger individuals in order to encourage them to adhere to smart parking solutions. Such conditions could include special pricing for parking for young citizens who could access such benefits through face recognition technology – much as the Apple

iPhone X uses, in 2018 – and as a way to control who is actually benefitting from the special reduced-price conditions.

9. Limitations and Future Research Suggestions

It would be interesting to do an international study (e.g. cross cultural) and / or a study of other technological solutions – as was done in previous studies – see for example Gonçalves & Oliveira (2010) and Gonçalves, Martins, Branco, Perez-Cota, & Oliveira (2016). Additionally, studies with specific samples which are appropriate to the objectives of the study should be performed; relating this to the case in hand, future studies should include more higher-income citizens. It is also imperative that we increase our understanding of how consumers behave, and how they adopt other smart solutions – applied to other domains of public life (e.g. smart waste management, smart air quality). Furthermore, there is the possibility that we may do additional field research based on a technology acceptance and usage model so as to understand the true determinants of the adoption of this type of technology by users. Another possible avenue for future research is the utilization of an organizational technology adoption model so as to understand the factors which may influence the adoption, by organizations, of such a system (be they car park managers or firms which use the service).

10. Compliance with Ethical Standards

This study is based on part of a master's internship report done by one of the authors (Lima, 2017). The initial work has been translated from Portuguese to English and has been summarised to include herein the main highlights of what was a larger and more in-depth study. New material has also been added. Publishing master's dissertation / project / internship results, to reach a wider audience, is one of the objectives of the Master's in Management at the University of Aveiro.

References

Batty, M. et al. (2012) 'Smart cities of the future', European Physical Journal: Special Topics, vol.214(1), pp. 481–518. doi: 10.1140/epjst/e2012-01703-3.

Eurostat and OECD (2005) Oslo Manual: guidelines for collecting and interpreting innovation data. Organisation for Economic Cooperation and Development, OECD.

Geng, Y. and Cassandras, C. G. (2012) "A new "Smart Parking" System Infrastructure and Implementation", Procedia - Social and Behavioral Sciences, vol.54, 4th October, pp. 1278–1287. doi: 10.1016/j.sbspro.2012.09.842.

Gonçalves, R., Martins, J., Branco, F., Perez-Cota, M., Au-Yong Oliveira, M. (2016). Increasing the reach of enterprises through electronic commerce: A focus group study aimed at the cases of Portugal and Spain. Computer Science and Information Systems, vol.13(3), November, pp.927-955. DOI: 10.2298/CSIS160804036G.

Gonçalves, R., Oliveira, M.A. (2010). Interacting with technology in an ever more complex world: Designing for an all-inclusive society. In: Cynthia G. Wagner (Ed.), Strategies and Technologies for a Sustainable Future, World Future Society, Boston, USA, pp.257-268.

Harrison, C. and Donnelly, I. A. (2011) 'A Theory of Smart Cities', Proceedings of the 55th Annual Meeting of the ISSS - 2011, Hull, UK, pp. 1–15. doi: 10.1017/CBO9781107415324.004.

Houthakker, H. S. (1957) 'An International Comparison of Household Expenditure Pattters and Commemorating the Centenary of Engel's Law.', Econometrica, pp. 532–551. doi: 10.2307/1905382.

Joshi, S. et al. (2016) 'Developing Smart Cities: An Integrated Framework', Procedia Computer Science, vol.93 (September), pp. 902–909. doi: 10.1016/j.procs.2016.07.258.

Komninos, N., Pallot, M. and Schaffers, H. (2013) 'Special Issue on Smart Cities and the Future Internet in Europe', Journal of the Knowledge Economy, vol.4(2), pp. 119–134. doi: 10.1007/s13132-012-0083-x.

Lima, F. (2017) Qualidade de vida, sustentabilidade e eficiência na gestão dos recursos: um estudo sobre a adoção do Smart Parking da Parkware. Master's dissertation. University of Aveiro.

Moore, G. A. (1991). Crossing the Chasm. HarperCollins Publishers.

Oakshot, L. (2016) Essential quantitative methods - for business, management and finance. 6th edition. Palgrave.

Oliveira, M. A. and Ferreira, J. J. P. (2014) 'Interoperability: Working together to enhance innovation. [What increased interoperability within and between teams means for management and business].', The Futurist, World Trends & Forecasts, WordBuzz | Commerce. World Future Society, pp. 6–7.

Parking Network (2014) Driving down the real cost of parking in europe. Available at: http://www.parking-net.com/parking-news/apcoa/real-cost-of-parking (Accessed: 12 January 2017).

Rogers, E. M. (1995). Diffusion of innovations. Macmillian Publishing Co. https://doi.org/citeulike-article-id:126680

Schumpeter, J. A. (1947) 'Economic History Association The Creative Response in Economic History', Source: The Journal of Economic History, vol.7(2), pp. 149–159. doi: 10.1017/S0022050700054279.

The Guardian (2015) The European cities moving faster on clean energy than their governments. Available at: https://www.theguardian.com/public-leaders-network/2015/jul/06/european-cities-clean-energy-governments-eu-climate-targets (Accessed: 12 January 2017).

Thompson, R. G. and Richardson, A. J. (1998) 'A Parking Search Model', Transportation Research Part A: Policy and Practice, vol.32(3), pp. 159–170. doi: 10.1016/S0965-8564(97)00005-0.

United Nations (2015) Cities - United Nations Sustainable Development Action 2015. Available at: http://www.un.org/sustainabledevelopment/cities/ (Accessed: 18 July 2017).

The Information Problem on the way to Becoming a "Gazelle"

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Abstract: In the context of globalization, the relative share of small enterprises is constantly increasing. The purpose of the study was to identify the factors determining the growth or stagnation and fall of small enterprises, the impact of entrepreneurs' personality on business success, and possible ways to influence a company to improve its performance. A longitudinal study was conducted which involved monitoring of 68 small enterprises in the North-West region of the Russian Federation for more than 15 years. Direct observations were supported by interviews, which enabled us to compare the independent monitoring with comments by direct participants as well as to gain insight into the causes and consequences of certain situations. The variance in entrepreneurs' response to similar situations showed difference in their psychological traits and the effect it has on companies' performance. At the same time, it demonstrated the impact of the fundamental laws of human psychology. The findings confirmed the key role of entrepreneurial personality for the growth of small businesses. Furthermore, for the first time in this field of research, the study identified the "Information Problem" as a major factor hindering the robust development of small high-growth firms managed by talented entrepreneurs and preventing their transition into the category of medium-sized businesses. The proposed solution to the Information Problem implemented as a software tool allows entrepreneurs to cope with the challenges of growth. The implementation and use of the product does not require significant intellectual and financial resources; therefore it could become the "penicillin" for potential "gazelles" to overcome the crisis of transition.

Keywords: entrepreneurship, small business, high-growth firms, "gazelles"

1. Introduction

Over the last few years, the issues and trends of small business development have been at the center of public discussions among both academics and policy-makers. Despite Marx's predictions that capitalism would result in the dominance of a handful of large-scale companies, which would in turn divide society into giant corporations' owners and employees, one sees an opposite pattern. A steady increase in the number of small enterprises witnessed since the 1980s, a greater fragmentation of markets and industries, and a rapid rise in self-employment in small business demolish this hypothesis.

In the OECD area, small and medium-sized enterprises (SMEs) are nowadays the backbone of national economies. Being the predominant form of enterprise, they account for approximately 99% of all firms (OECD, 2016). SMEs provide the main source of employment, accounting for about 70% of jobs on average, and are major contributors to value creation, generating between 50% and 60% of value added. In developing countries, SMEs contribute up to 45% of total employment and 33% of GDP (OECD, 2017).

Russian economy was always driven by large enterprises and government entities, not startups. Entrepreneurship was not a formal part of the Soviet culture, and entrepreneurs were not held in particularly high esteem. The lingering effects of this heritage on the national culture still often lead to misconceptions about the nature and value of entrepreneurship. Technical capabilities are traditionally quite high, but business skills lag behind, and their improvement will take time. SMEs, startups, and nimble innovative companies have only recently been trying to make a significant contribution to the economy. As of today, SMEs represent just 21% of GDP (OC&C, 2018).

In many countries, including present-day Russia, governments concur that small businesses can be important drivers of inclusive and sustainable economic growth, job generators and incubators for innovation. In addition, it is widely recognized that their development can contribute to economic diversification and resilience. Furthermore, boosting SME potential is especially relevant for stabilizing the economy of developing resource-rich countries like Russia that are vulnerable to commodity price fluctuations.

Recognizing the importance of small businesses for economic growth prompts national governments to establish policies that support SMEs as a strategic priority. The policies include a wide array of support programs, tax incentives, subsidies, looser credit terms and other benefits for entrepreneurs.

However, with all the heavy investments into such programs, governments do not necessarily achieve the expected result. There are certain limits to what public policy and direct government intervention alone can achieve. There is empirical evidence to suggest that these attempts sometimes produce even counterproductive results for high-growth entrepreneurship (Van Stel et al., 2004).

The objective of the study was to identify the reasons why many small enterprises are incapable of growth — and to offer a problem-solving algorithm. We present the "Information Problem" concept, confirm the importance of internal factors in small enterprise development and present the author's methodology that helps to meet the challenge.

2. Literature review

A transition of a small enterprise into a medium-sized is akin to the adolescent period for people. Many, if not all, have to face "puberty" difficulties at a certain phase of maturation. At every stage of life, one encounters a particular problem inherent to this period, but it is the pubertal period that we pay enormous attention to as it determines the whole subsequent life of the individual. In terms of enterprise evolution, the move from a small into a medium-sized business seems to be the most significant period, as it sets up foundations for the firm's successful development. The enterprise experiences transition from informal processes within the enterprise to formalized ones (Davila, 2005; Greiner, 1972). That is why the study of factors contributing to the success of this process (as well as the ones impeding it) is extremely important.

The above given data indicate that the process of small enterprise development is not as dependent on external factors as is commonly believed and that the reasons preventing the progress are also of internal character. One of the key internal factors is the entrepreneur's personality as it largely determines the chances of success at the initial stage of the venture development.

Although views on entrepreneurship have transformed over the years, so far the most accepted definitions are those proposed by Schumpeter (1911), Knight (1921), and Kirzner (1973). Knight defined an entrepreneur as a person who decides to take an action that involves risk for the sake of reward, while Kirzner emphasized the entrepreneurial role of an intermediary who facilitates market creation. Both views rest upon general equilibrium theory, i.e. the neoclassical model of the economy which is limited to resource optimization in a stable environment and considers upheavals such as new ventures giving rise to whole new industries as external developments over which the management does not exert any influence.

Schumpeter, in contrast, focused on the power of creative destruction associated with the entrepreneur-innovator and highlighted the relationship between entrepreneurship and economic growth. He was the first to stress the importance of entrepreneurs as the main vehicle to move an economy away from a state of equilibrium through innovations. Aghion and Howitt (1992) attempted to further develop Schumpeterian theory of growth through creative destruction, where innovators drive out previous inefficient enterprises. Other authors focus on Schumpeter's assumption that innovation-based economic growth requires an effective selection among high-skill entrepreneurs (Acemoglu, Aghion & Zilibotti, 2006; Michelacci, 2003). These theories establish a direct link between entrepreneurship and economic growth and consider innovations to be a key to entering the market.

Thus, despite some differences, research indicates that entrepreneurship is a key component of innovation creation. In other words, it is the entrepreneur fulfilling his or her potential through new venture creation who ultimately enables economic growth.

There has been a substantial amount of research on the entrepreneur's personality. Scholars attempt to identify particular individual attributes that would enable one to describe a successful entrepreneur and in this way outline general patterns of small enterprise development. According to researchers, entrepreneurs are characterized by such features as risk-taking propensity, creativity, ambiguity tolerance, autonomy, self-confidence, persistence, alertness, opportunity recognition, etc.

Admittedly, the existence of such traits does increase a person's chances of establishing a successful business and can be seen as a kind of a gift similar to a talent for music or arts (Gardner, 2011). In this connection, the seminal work of Birch (1987) is of considerable interest, demonstrating that only 4% of all enterprises are able

to show sustained growth and exert a deep, if not decisive, influence on macroeconomic outcomes. Birch coined the term "gazelles" to refer to this type of fast-growing, dynamic enterprises (Birch, 1987; Birch & Medoff, 1994). Among other enterprises, Birch distinguished large companies called "elephants" and small companies called "mice". These company types differ in size, but are both characterized by slow growth and a low contribution to employment (Tachiki, 2014).

Along with a relatively small percentage of "gazelles" in the whole population of companies, it is found that most of them cannot maintain their status for a long time. Existing research on "gazelles" in Russia provides evidence that stable growth rates are shown only by a small number of enterprises. According to Yudanov (2010), 40–48% of the enterprises observed in this status failed to keep it and soon slipped out of the category. A similar picture is seen in the Western economies. What prevents "gazelles" from maintaining high growth rates observed at the initial stage?

3. The problem statement

Focusing on personality traits that distinguish successful entrepreneurs from the herd and on their impact on enterprise growth, researchers often ignore the influence of attributes and patterns inherent to each individual due to the fundamental laws of human psychology. Yet, it seems that these primary laws, abilities and limits (such as the human brain's memory-storage capacity and the capacity to perceive and process information) directly affect entrepreneurial success, i.e. the ability of "gazelles" to maintain a given rate of growth and move into the category of medium and large companies.

According to Miller (1956), who uncovered the basic patterns of perception and processing of information, the human brain's short-term memory is able to hold and process an average of 7±2 items of information (the famous Miller's magical number) with no loss in quality. In other words, an individual is able to consider no more than five to nine factors when making decisions, can directly work with no more than five to nine people, etc.

To get an idea of how basic psychophysiological characteristics of the entrepreneurial manager, and, in particular, the limitation deduced by Miller, influence the performance of a small enterprise, one should trace its life cycle. At the initial stage, there is no professional management. All daily activities tend to be at the sole discretion of the entrepreneur. Being the business owner, its manager and often employee at the same time, the entrepreneur is directly involved in all routine processes of his or her venture.

If we look at the small enterprise as a system where each process (e.g., relations with suppliers and customers, advertising, production, etc.) is an information flow, we will see that at the early stage of development all flows inevitably pass through the entrepreneurial manager. The situation is natural given the small scale of operations and the absence of complex managerial tasks. The attributes more or less inherent to all entrepreneurs, such as the drive for success, risk taking propensity, creativity, self-confidence and ability to act under uncertainty, enable them to successfully overcome challenges. At the stage of the enterprise establishment, these qualities are of critical importance and exercise a decisive influence on the development process.

However, as the enterprise grows, many changes occur, and with regard to "gazelles", they occur rapidly. The scale of operations increases: the number of orders and the volume of purchases grow, production expands, the staff size increases, and the tasks become more challenging. This implies complication and a significant increase in the number of information flows. Apart from that, the situation remains the same, with almost all flows, regardless of their urgency and importance, passing directly through the entrepreneurial manager. At a certain stage, it becomes obvious that the volume of incoming information starts to well exceed his/her ability to perceive and process it. The entrepreneurial manager continually experiences time shortage and is unable to fully control business operations. With more and more failures to process incoming information and make timely and proper decisions, he/she begins to hamper the development of the company.

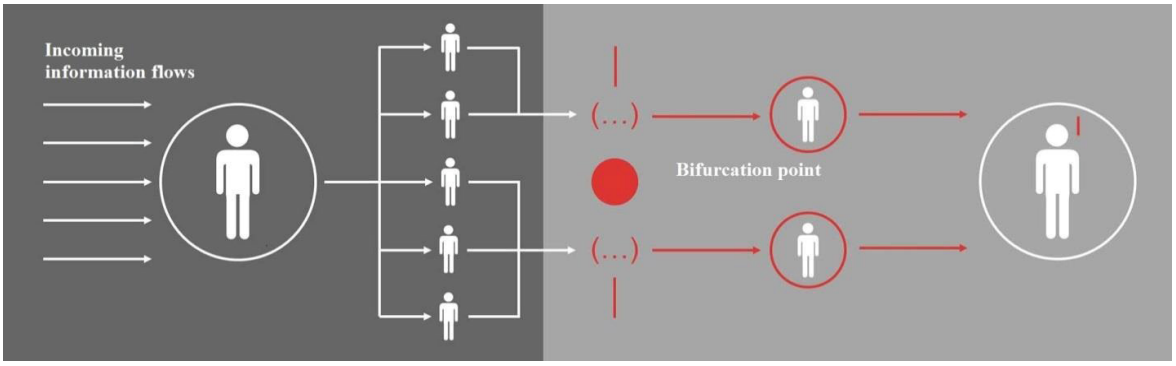
Thus, the entrepreneurial manager is faced with what we call the Information Problem. With no appropriate measures taken, the business begins to stagnate and lose competitiveness. As we can see, the Information Problem is, on the one hand, an indicator of the enterprise growth, and on the other hand, an obstacle for its further development.

4. Research model

For the purpose of the study, a longitudinal study was performed which involved monitoring small enterprises for more than 15 years. The sample was comprised of 68 micro and small businesses (according to the Russian Federation law, these are the firms that employ up to 100 persons and have an annual turnover not exceeding RUB 800 million) from the North-West region of Russia. The same location ensured that enterprises were exposed to equal political, economic, geographic, socio-cultural, environmental and other external influences; they had almost the same funding options available and their owners served as top managers. The sample included startups and young companies as well as more established enterprises operating in different industries (manufacturing, trade and services) and led by entrepreneurs of varying gender and age.

Over the period of the study, some enterprises went out of business (62%), while others moved to the category of medium-sized. Various aspects of business operations were studied, including daily activities, external and internal management issues faced by the entrepreneurs and the ways to handle them, entrepreneurial performance, etc. Special attention was given to the entrepreneurs' actions and their response to certain situations. Direct observations were supported by interviews, which enabled us to gain insight into the entrepreneurs' views on the problems accompanying companies' development and to analyze their response to external effects. The variance in the entrepreneurs' response to similar situations showed difference in their psychological traits and the effect it has on companies' performance. At the same time, it demonstrated the impact of fundamental laws of human psychology.

To generate a problem-solving algorithm, the findings were analyzed in terms of the fundamental laws of human psychology and, in particular, an individual's ability to perceive and process incoming information. As a result, the author developed a small-enterprise management approach which allows for efficient redistribution of information flows and, thereby, allows entrepreneurs to cope with the challenges of growth. Redistribution of information flows is based on authority delegation and/or automation of the tasks that do not relate to direct enterprise management and can be performed by employees without the entrepreneur's participation (see Figure 1).



Entrepreneur as a subject who receives all information flows.

Entrepreneur as a subject who receives ever-increasing information flows.

At this stage, an enterprise may undergo various changes in its management structure.

Supervisor with a function of filtration and transformation of information flows.

Entrepreneur as a subject who receives transformed information flows.

Figure 1: The informational Problem and its solution

The algorithm for the developed methodology consists of the following steps: making a "snapshot" of information flows, measures estimation, data analysis, and reassignment of responsibilities. The algorithm was successfully built into the developed web service.

To make a "snapshot" of information flows, a concept of external and internal factors affecting an enterprise was used. When external (environmental) factors enter the enterprise, they launch processes in which internal flows are formed (see Figure 2). Generating a "snapshot" of information flows includes three main stages: (1) making a list of external flows that go through the entrepreneurial manager; (2) making a list of employees participating in the processes of formation and transformation of internal flows that go through the entrepreneurial manager; (3) description and visualization of information flows routes between the entrepreneurial manager, employees and the environment.

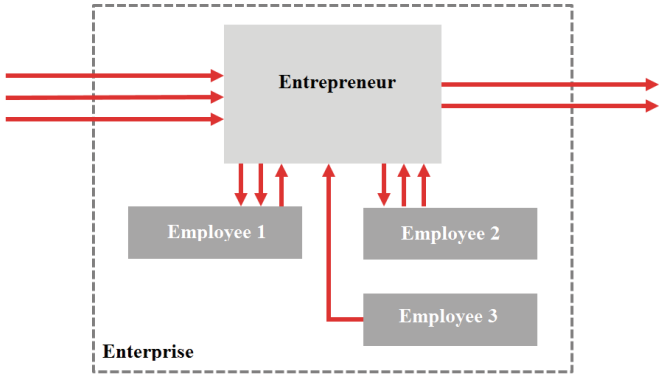


Figure 2: A "snapshot" of entrepreneur's information flows

To effectively redistribute information flows, it is necessary to measure them in terms of time and priority. The estimation of time consumption does not require mathematical accuracy, as long as it is aligned with subjective perception of the entrepreneurial manager. Prioritization of information flows might also be intuitive or might depend on certain criteria. Combining time consumption estimates and priority level of each task gives a comprehensive view of information flows at an enterprise.

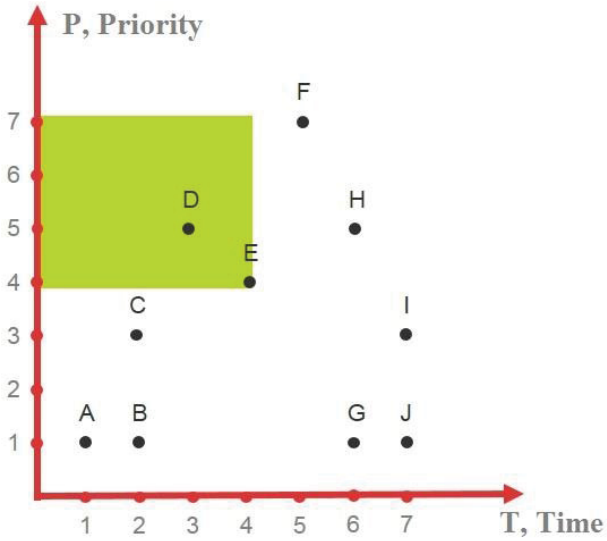


Figure 3: The "transmission corridor" of information flows

It seems reasonable to first process information flows with the highest priority and the least processing time. We assume an information flow to be appropriate if its time value is 1–4 and its priority level is 4–7. We refer to this range of values as a "transmission corridor" (see Figure 3). For example, the information flows D and E in Figure 3 are the most appropriate and require a direct involvement on the part of the entrepreneur.

5. Results

To implement the proposed approach we developed a specialty software product — Smart Management of Information Flows (SMIF) tool. To test the tool, we selected companies that meet "gazelle" criteria, i.e. young (not older than 5 years) fast-growing dynamic companies that annually increase their revenues by at least 20% (Audretsch, 2012). The sample included 30 companies.

The introduction of the developed tool in the surveyed companies helped their executives make timely decisions regarding necessary structural changes and enabled a more systematic and meaningful authority delegation process. In the course of this transformation, the entrepreneurial managers started to develop a consistent view of enterprise management and to recognize a need for business processes reorganization. This enabled the enterprises to promptly respond to market needs and ensured greater competitiveness.

The Podpisnyje Izdanija ("Subscription Editions") bookstore represented one of the most prominent success stories. It should be noted that the retail book industry in Russia is going through a major crisis. The last 5 years saw a 12% drop in book sales. However, the revenue of the named store increased greatly over the same period. Within a short time, the up-and-coming entrepreneur who had took the reins in 2012 was able to build a new team (the headcount increased from a handful of employees to 25) and optimize business process performance. The entrepreneur disengaged himself from excessive information flows associated with routine operating activities, which enabled him to focus on more value-adding creative tasks related to development and production of tasteful, but inexpensive souvenirs and gifts. The launch of the new line of business accounted for the rapid growth in revenue and offered the small individual retailer opportunities to penetrate new regional markets. The revenue increased by 49.7% in 2015 and by 68.9% in 2016. Another example is the Probka ("Cork") restaurant founded by a famous chef in 2000. The early success of the business led to an expansion, with 7 more projects launched over the next 10 years. Although employee engagement was always a priority for the entrepreneur, he eventually came to a point where the task of managing an increasingly large team became too overwhelming. He thus faced the Information Problem. Financial performance declined accordingly: the network experienced consistent losses for 4 years since 2010. In 2014, the founder made a key decision to withdraw from operating control of all restaurants at once, built a high-quality management system and focused on managing a single favorite restaurant. The company soon achieved break-even and started making money. The revenue increased by almost 100% in 2015.

Out of 30 studied enterprises, 26 successfully overcame the crisis by timely introducing of a new management system and maintaining the growth dynamics. The remaining 4 enterprises went out of business, and their founders have no intent to continue an entrepreneurial career.

6. Discussion

In earlier studies, researchers tended to consider entrepreneurial personality traits as the main, if not the only, significant inherent factor affecting business development. Nevertheless, it is impossible to deny that continuous successful development of an enterprise and its transition to a new level proves to be a challenge even for a talented entrepreneurial manager. Experience indicates that entrepreneurs can perfectly adjust to unfavorable conditions and cope with various difficulties, but are not able to manage their own enterprise in an efficient way when it comes to successful growth and development in the presence of the Information Problem. Thus, the critical point in enterprises' development is, ironically, business success, rather than a lack of resources, administrative hurdles or insufficient information support.

The Information Problem directly associated with the entrepreneur's personality and determined by the fundamental laws of human psychology has not so far been suggested as a research topic. Yet, real-life cases indicate that it is due to the very nature of his/her personality that the entrepreneur facing the problem is generally incapable of identifying and overcoming it. This elucidates why "gazelles" taken to a certain level of growth eventually drop out of the race as their managers do not find a solution to the Information Problem.

An obvious answer to this problem is information flows redistribution that makes it possible for the entrepreneur to free up some time to focus on strategic issues. In this case, (s)he keeps managerial functions, but the management activity becomes more conscious, structured and, hence, efficient. However, in the course of business routine, the implementation of this solution may face a number of difficulties. To begin with, the entrepreneur is often not aware of the degree of complexity of the task at hand, not able to stand back and make a sound judgment and, therefore, does not take timely measures to help the enterprise out of the Information Problem.

The situation is complicated by the fact that even being aware of the Information Problem, the entrepreneur may experience difficulties in solving it due to his or her personality. Apart from the positive qualities that contribute to business success, talented entrepreneurs tend to exhibit such traits as the lack of consistency,

narcissism, intolerance of dissent, obsessive desire to control, etc. that cause a pathological unwillingness to delegate. Considering all tasks to be equally important, the entrepreneur is often simply not able to delegate properly. As a result of spontaneous redistribution of responsibilities, a paradoxical situation often occurs, where employees solve critical tasks relating to finance, marketing, etc., whereas the entrepreneur is immersed in irrelevant matters of little significance for the enterprise development.

The good news is that the Information Problem is quite solvable if entrepreneurs are aware of the pattern of its occurrence and the ways to overcome it. Adherence to the proposed methodology algorithm could help identify the problem in a timely manner and take the necessary steps for its solution.

7. Conclusions

The findings of the study justify the importance of the fundamental laws of human psychology in any business transition phase. They also provide a new way to look at issues of small enterprise development and factors that contribute or impede its success.

For the first time in this field of research, we identified the Information Problem as a key factor hindering the robust development of small high-growth firms managed by talented entrepreneurs and preventing their transition into the category of medium-sized businesses. The Information Problem concept explains why even talented entrepreneurs are unable to cope with processes typical for enterprises experiencing a period of rapid growth. Tackling the Informational Problem is a necessary condition for the development of “gazelles” — the companies that are of critical significance for national economies.

Special personality traits, such as entrepreneurial talent which allows the enterprise to become a “gazelle”, are not sufficient for the company to maintain this status. After reaching a certain limit, the enterprise, suppressed by the entrepreneur him/herself, is unable to continue its development. A very small percentage of “gazelles” succeed in coping with this challenge.

One of the possible solutions could be to use specialty software such as the tool proposed by the author for small enterprise information management. The tool allows for efficient redistribution of information flows and, thereby, enables entrepreneurs to cope with the challenges of growth. The implementation and application of the product does not require significant intellectual and financial resources and hence is affordable to almost any enterprise. Therefore it could become the “penicillin” for potential “gazelles” to overcome the crisis of transition and continue successful development.

References

Acemoglu, D., Aghion, P., and F. Zilibotti. (2006). Distance to the frontier, selection and economic growth. Journal of the European Economic Association 4 (1), pp 37–74.

Aghion, P. and P. Howitt. 1992. A model of growth through creative destruction. Econometrica, vol. 60(2), pp 323–351.

Audretsch, D. (2012). Determinants of High-growth Entrepreneurship. Report prepared for the OECD/DBA International Workshop on High-growth Firms: Local Policies and Local Determinants, Copenhagen, 28 March.

Birch, D. L. (1987). Job Creation America: How Our Smallest Companies Put the Most People to Work. Free Press.

Birch, D., and J. Medoff. 1994. Gazelles. In: Solomon, L., and A. Levenson (Eds.), Labor Markets, Employment Policy and Job Creation. Economics and Education, pp 159–167.

Davila, T. (2005). An Exploratory study on the emergence of management systems: formalizing human Resources in small growing firms. Accounting, Organizations and Society 30(3), pp 222–248.

Eurostat. (2011). Key Figures on the European Business with a Special Feature on SMEs.

Gardner, H. (2011). Frames of Mind: The Theory of Multiple Intelligences. Basic Books.

Greiner, L. E. (1972). Evolution and Revolution as Organizations Grow. Harvard Business Review, pp 37–46.

Kirzner, I. (1973). Competition and Entrepreneurship. University of Chicago Press.

Knight, F. H. (1921). Risk, Uncertainty, and Profit. Houghton Mifflin.

Michelacci, C. (2003). Low returns in R&D due to lack of entrepreneurial skills. Economic Journal, 113(484), pp 207–225.

Miller, G. A. (1956). The magical number seven, plus or minus two: some limits in our capacity for processing information. The Psychological Review, 63, pp 81–97.

OC&C. Tech entrepreneurship ecosystem in the Russian Federation. 2018, http://www.occstrategy.com/-/media/files/insight-documents/tr/tech-eship-ecosystem-in-focus-countries_russia.ashx.

OECD (2016), Entrepreneurship at a Glance 2016, OECD Publishing, Paris.

OECD (2017), Enhancing the Contributions of SMEs in a Global and Digitalised Economy. Retrieved April 10, 2018 from https://www.oecd.org/mcm/documents/C-MIN-2017-8-EN.pdf.

Rosstat. (2015). Small and Medium-sized Business in Russia 2015. Statistical Compilation.

Schumpeter, J. (1911). Theorie der Wirtschaftlichen Entwicklung. Verlag von Duncker & Humblot.
Tachiki, D. (2013). High growth innovative enterprises: A Research Note on Japan. Tamagawa University, Faculty of Business Administration Bulletin, 21, pp 61–75.
Van Stel, A., & Storey, D. J. (2004). The link between firm births and job creation: Is there a upas tree effect? Regional Studies, 38, pp 893–909.
Yudanov, A. Yu. (2010). Entrepreneurs of entrepreneurship: firms-gazelles in Russia. Journal of the New Economic Association, 5, pp 91–108.

The Case of an Entrepreneurial University and its Competitive Advantage in Academia

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Abstract: This study followed a mixed methodology – five semi-structured interviews were performed, and transcribed in full, with four senior lecturers and one administrative employee at the university; and a survey with 124 valid responses, answered by students of the university, was also conducted. The research question was the following: how does the University of Aveiro achieve its competitive advantage, in view of its competition in Porto, Coimbra and Lisbon, which are the three main geographical areas nearby? The University of Aveiro may also be seen, however, to be competing with other international universities, as the University of Aveiro is highly placed in the international rankings for young universities (the University of Aveiro was, in 2017, ranked 81st in the Times Higher Education Young University Rankings, for universities aged under fifty years). The resources, capabilities and key competences of the University of Aveiro, founded in 1973, were analysed. The results of the study indicate that 76% of the respondents of the survey chose the University of Aveiro as their first choice in their applications, which means that these students are following their first choice for their careers. The University has constructed its attractiveness around value innovation: its low price (not only for its annual fees, but also concerning the cost of living in the Aveiro area – in central Portugal), coupled to its superior and highly recognized teaching practices, its highly recognized research around its 18 research centres, its start-up incubator, its creative science park, its cooperation and knowledge transfer to society (via its many partnerships with different organizations), its multicultural environment (the University of Aveiro is a favourite of Erasmus students), its award-winning campus (in architectural terms), and its organizational culture geared towards the satisfaction of its students, as well as its organizational structure in a matrix format whereby the university is built around different and unique departments (for different functional areas of study) with each having a degree of autonomy, though being managed centrally by the university rectorate. The University of Aveiro is thus seen to be very entrepreneurial as it has remained flexible, dynamic, and principally open to new teaching methods.

Keywords: Strategy, Resources, Competences, Competitive Advantage, Innovative Teaching Methods, Entrepreneurial University

1. Introduction

> *"Universities need to evolve from teaching and learning, research and engagement to being drivers of innovation and entrepreneurship. And they need to work with all stakeholders in the innovation and entrepreneurship system – in the best interests of the nation and citizens."*
>
> (MacGregor, 2015)

There are several factors, including the swift development of Internet skills and globalization, which make it increasingly harder for organisations to establish a long term sustainable competitive advantage (Hitt, et al., 2011). The question is, how does one forge that advantage? In the case of the University of Aveiro (UA), what sets it apart from its rivals? Which are its competitive factors in the higher education sector? This case study about the UA focuses on the analysis of the resources, capabilities and key competences that differentiate and sustain its position in the market. We see the UA as being highly entrepreneurial. That is, the UA puts into practice certain leadership and governance principles that categorise it as being entrepreneurial. We start this case study by briefly introducing the target institution – the UA, followed by a review of the literature, which is focused on the relevant key concepts for the analysis of the case study. We then end the study with a discussion of the results obtained and a conclusion.

2. University of Aveiro

The UA was established in December 1973, officially starting its activities in 1974, with merely 46 students (Universidade de Aveiro, 2014). Currently, around 14 600 students attend its facilities which are located at the Campus Universitário de Santiago (Universidade de Aveiro, 2017). Its Rector, Professor Manuel António

Assunção, can count on a Rectoral staff formed by four Vice-Rectors and six Pro-Rectors (Universidade de Aveiro, 2017a). According to the Rector's Strategic Plan, the UA is defined as being a public foundation of private law (Universidade de Aveiro, 2012) and its mission is:

> *"To create knowledge, expand the access to learning in benefit of the people and society, through research, teaching and cooperation; adopt a global development program for the individual, partake in the creation of a European research and educational space and of a regional development model based on innovation and scientific and technological knowledge"* (Universidade de Aveiro, 2017).

As for its organisational units the UA encompasses, as stated by its Web page (Universidade de Aveiro, 2014a) the following, as portrayed in Figure 1.

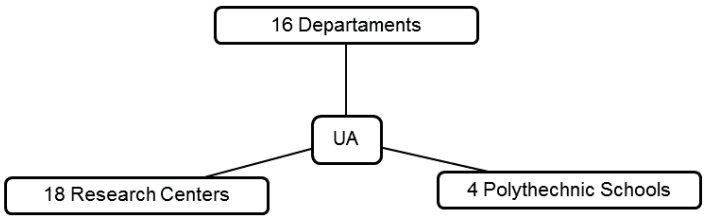

Figure 1: Organizational Structures of the UA

Source: Own personal research

According to article 35, number 1 of the University of Aveiro's by-laws/charters, the organisational units have "(…) scientific, pedagogical and cultural autonomy corresponding to their scope of intervention and experience/maintain management/regulatory autonomy mitigated in the conditions foreseen in the current by-laws/charters." (Universidade de Aveiro, 2009). Its matrix structure allows an interdisciplinary approach and cooperation between the several departments, and also provides for a bigger variety of teaching methods (Universidade de Aveiro, 2012).

In Figure 2 we present the 2017 numbers referring to Courses, Human Resources and Students.

14 574 Students				
184 Undergraduate and Postgraduate Courses	**294** Postdoctoral scholarships	**903** Teaching Staff	**635** Technicians and administrative personnel	**118** Researchers

Figure 2: UA in numbers (2017)

Source: Adapted from the UA Web Page (Universidade de Aveiro, 2017)

In the research field the UA is scored as being one of the best knowledge producers nationally and internationally, bringing together researchers from different backgrounds and nationalities, with advanced research projects on behalf of the society we live in (Universidade de Aveiro, 2012a).

It also includes the UNAVE, translated to being the Association for Professional Training and Research of the University of Aveiro, and also the IEUA, the University's Business Incubator. Nine firms lodged in this Incubator were present at the Web Summit 2017 that took place in Lisbon (UA-Online, 2017). These two facilities show the effectiveness of the UA in cooperating with the entrepreneurial environment while also offering services to the community through its commitment to research and innovation in all the different collaboration programs it has joined, such as the Creative Science Park – Aveiro Region (Universidade de Aveiro, 2012a).

Internationalisation through exchange programs is an increasingly used method by higher education institutions. In the UA's case, it is present in various international forums and it participates in several mobility programs like the Erasmus Program, for instance (Universidade de Aveiro, 2013). Thus, it provides a University network based on the sharing of teaching methods, cultures and interdisciplinary realities, not only at the European level but also globally.

Therefore, a university's position in international rankings allows them not only to have enhanced visibility but also to evaluate their performance in different categories by means of specific indicators. That said, according to the Times Higher Education World University Rankings, the UA is in the 81st position in the Young Universities Rankings 2017, being the best classified Portuguese university to appear in the list, and is consequently considered as being one of the 500 best universities in the world as far as general performance goes (Times Higher Education, 2017).

3. Literature review

An entrepreneurial university is one which is adaptive and which has individuality and a unique local flavour (Clark, 1998). Universities "that have willed themselves to change" (Clark, 1998, p.3) rather than "those that remain entirely encapsulated in a traditional mode" (Clark, 1998, p.3) are defined herein as being entrepreneurial. "An entrepreneurial university, on its own, actively seeks to innovate in how it goes about its business. It seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future." (Clark, 1998, p.4).

In MacGregor (2015), six key elements of an entrepreneurial university are indicated, as follows: "good leadership and governance, capacity incentives, entrepreneurship in teaching and learning, a culture of entrepreneurship, stakeholder partnerships, and internationalization." Furthermore, entrepreneurial universities consistently address "problems such as unemployment, poverty, low economic growth and inequality" (MacGregor, 2015).

The object of this study also concerns the concept of competitive advantage; the aim is to understand how it is achieved. According to Porter (1985) it may be said that a firm has competitive advantage over another when it obtains and maintains profits that surpass those of their rivals – what a firm desires is for it to be sustained over time. This concept can also divide itself into two sub-concepts for a better understanding: cost advantage and differential advantage. This competitive advantage only exists when a firm can produce the same benefits as another firm, but with a relatively lower cost (cost advantage), or the benefits of its products were able to surpass those of its competitors (differential advantage): in that way, competitive advantage can be achieved once a firm can generate higher value for its customers and superior profits for itself (Santos, 2009).

The development of this advantage depends on several resources that should be superior to those of its competitors. As reported by Barney (1991) cited by Santos (2009) resources can be patents and registered brands, proprietary know-how, the set of defined clients or the company's reputation; capabilities are what allows firms to exploit their resources in a successful way – this combination is considered as being part of the firm's nuclear competences, which enable the "innovation, efficiency, quality and response of clients, that may be used to create cost advantage or differential advantage" (Santos, 2009, p. 12).

Therein, the concept of competitiveness is essential. Note that it does not only have a meaning attached to it – its idea depends largely on the context it works in (Paulo, 2009). Looking at Porter, in his book *Competitive Advantage* (1985), competitiveness or competitive strategy consists in a consistent pursuit of a favourable position in the market, which should be profitable and sustainable. According to the author, there are two issues that underpin the choice for the best competitive strategy: the first one is "the attractiveness of industries to long term profitability and the aspects that determinate it" (Porter, 1985, p.1) and the second one refers to the "determinants of the relative competitive position inside an industry" (Porter, 1985, p.1). In order to delineate a good competitive strategy to and within a firm, Porter also designed a world-renowned model that defines the competitive intensity of a sector and that depends on five basic forces, as follows:

industry rivalry, threat of new entrants, threat of substitutes, bargaining power of buyers and the bargaining power of suppliers (Porter's Five Forces Model). Sustainable competitiveness, which is a connection and important link between productivity, sustained development and corporate competitiveness is bundled in all this and emerges increasingly and with more strength.

In a world getting progressively closer (and perhaps thus getting ever smaller) due to the effects of globalisation (and ever more facilitated air travel) a more scrutinized approach is imperative also associating it to the concept of internationalisation. Globalisation is a multi-level process that is spurred on by external pressures and the influence they carry in society (be it markets, politics and/or values) – due to the

"acceleration, massification, diffusion, and expansion of transnational people, products, finance, image and information flows" (Castro, 2015, p.7). In other words, constant access to a tremendous and unprecedented amount of information, anywhere and by anyone has allowed the world to become a "global village", where communication and knowledge flows are steadfast and unstoppable. The terms globalisation and internationalisation were considered, for a long time, as synonyms and later came the conclusion that they were complementary: internationalisation is perceived as a consequence of the current globalisation, which is evident, among other areas, also in higher education (the best example is the Erasmus Program). The phenomenon of "global village" led us to believe that with so much information circulation the effortlessness in which one witnesses the evolution of time is immense, and in that way innovation becomes something that is impossible not to happen.

All these changes are contributing to transforming current society into the so-called knowledge society. This concept is specifically designated in the literature as being the "third industrial revolution" – where the most important capital is knowledge (Etzkowitz, 2001). Here is where Universities play a big role, seeing as they are part of the biggest "engine" for the development and production of knowledge. Generally speaking, in order to create this society, there is a junction of knowledge and information which provide "structural mechanisms in which social coordination merges with economic interactions and political control and management" (Pais, 2007, p.5). The role of Universities does not end here for they are much more than a body that simply produces and relays knowledge: they belong in an organisational culture with values, beliefs and norms that they adopt and seek to follow. Furthermore, according to Gomes (2000) the organisational culture has certain tasks that are decisive: "contact, integration, motivation, involvement, commitment or implication, identification, performance, success or organisational excellency" (Araújo, 2014), and they are aimed to be performed by Universities to their stakeholders, in this case their students, who are looking not only for personal, individual and professional growth but also to credit the institution that gives them the necessary tools to fulfil their goals.

4. Methodology

This study followed a mixed methodology. Five semi-structured interviews were performed (in November 2017), recorded in audio and transcribed in full, with four senior lecturers and one administrative employee at the university. The interviews aimed to understand not only the strategic orientations of the organization, the intended positioning in the industry and the perception of competitive advantage, but also the existing organizational culture, and in that context, employees with different functions and responsibilities were selected. Since the students constitute a primary stakeholder for any educational institution, it was considered pertinent to confront what the institutional aspirations are, with the students' perceptions. In this sense, a questionnaire was carried out (in October and November 2017), aiming to understand not only what leads the students to choose the UA, but also their degree of satisfaction and current perception of it. The questionnaire was anonymous, executed and disseminated online, and obtained 124 valid answers.

5. Results

5.1 Interviews

When the question about what distinguishes the University of Aveiro from other higher education institutions in the country is raised, the quality of research, education, networking with the labour market, the university campus and the academic community are highlighted. In the interview with Professor Carlos Costa, Head of the Department of Economics, Management, Industrial Engineering and Tourism (DEGEIT), Professor Carlos Costa said that a great factor of differentiation is quality – both scientific and in terms of relationships established with companies and organizations. A specialization in research, namely "the search for excellence in very specific areas", was also pointed out by Dr Ana Dias, as a key differentiator. The fact that the UA is a young university and already holds relevant positions in international reference rankings, also distinguishes and confers it a competitive position. In fact, the Pro-Rector for Internationalization, Dr Marlene Amorim, indicated that "the UA has consistently ranked among the top 100 universities in the world under the age of 50 years". Dr Manuel Oliveira, Director of the Master's course in Management, also stated that "the University of Aveiro, because it is younger, is more agile, more entrepreneurial and closer to students." Another aspect that distinguishes the UA is internationalization: "it currently has more than 70 nationalities in its *Campi* (among students, lecturers, researchers and administrative staff)", the Pro-Rector stated. Dr Marlene Amorim also emphasized the environment and infrastructures "that offer national and international students a degree of

modernity, security and hospitality that have been repeatedly underlined and which are of fundamental importance for the attractiveness of the UA and for the academic success of its community".

In relation to key competences, three major axes have been identified. "Point number one – to teach, this is why we exist, our mission is to teach, to train students," Professor Carlos Costa specified. In this context, Dr Manuel Oliveira referred to the importance of having a qualified and specialized teaching team, indicating that "there is a lot of concern to hire people with very specific knowledge" that meet the needs of the students; he also referred to the meritocracy environment and the fact that students have a role in the quality of teaching through feedback provided within the quality management systems which have been implemented. The second point enumerated by the Director of DEGEIT was research - "to do good research, quality research that allows the university to grow, but also allows society to evolve". Finally, Professor Carlos Costa referred to cooperation with society, to guarantee that the “teaching and research will be useful externally".

At the internal level, Deolinda Lopes, a collaborator in the academic management services since 1978, listed three strengths of the university, namely, "organization, professionalism and quality". Dr Ana Dias emphasized "the opportunities for development and sharing of knowledge", an aspect also addressed by Dr Manuel Oliveira, when he referred in the interview to an environment of mutual aid, not only between and with students, but also among colleagues. This lecturer also elevated the internal organization, where human capital is competent, qualified and experienced, and where "there is a lot of transparency" and willingness to collaborate and support in solving problems. Dr Manuel Oliveira also emphasized the importance of having "good managers and good directors in key places". Professor Carlos Costa, as the Head of DEGEIT, stated that "the university is managed in a democratic way and with total autonomy" and Dr Marlene Amorim clarified that the university is regulated by its own rules and that "advisory bodies exist to support the activity of the rectory and management teams”; furthermore, there are "mechanisms that ensure the representativeness and voice of departments and other organizational units in the UA's internal discussions and decisions”.

Regarding competitive dynamics, Professor Carlos Costa began by noting that the competitors of the University of Aveiro are generally "all universities and all polytechnics". However, he also indicated that the analysis of competition should consider aspects such as the level of development or the specializations. In turn, the Pro-Rector Marlene Amorim, informed that the UA competes at the national and international level, in several areas, such as "the recruitment of students, or the raising of funded research projects”. From the point of view of methodologies for monitoring and evaluating the industry, the Director referred to the final results, mirrored in the reference rankings. Internally, the Pro-Rector mentioned methodologies of evaluation at the academic level, for example, with the monitoring of the level of first-entry candidates or entry-level ratings, and the level of research, where metrics such as the number of publications in relevant databases, the number of citations of publications of UA faculty and researchers, the number of registered patents and the international projects and their amount of financing are applied. From the standpoint of monitoring the industry, there is also the concept of benchmarking. "Benchmarking is an important alternative which the UA uses (...) to guide its innovation and management to the best levels," Dr Marlene Amorim stated. She also mentioned that this assimilation and incorporation of best practices takes place at the personal level, of lecturers and researchers, and also at the institutional level, for example, arising from the participation of the university in national and international networks of higher education.

The evolutionary perception for Deolinda Lopes was very positive; she affirmed that there was a "great development in structures”, “a significant increase of the student community" and she also referred to the diversification of the quality education offered. Lecturer Dr Ana Dias also highlighted "the ability to reach other markets and attract new students and new audiences" over the years. Since the UA was just over 40 years old, Dr Manuel Oliveira pointed out that the university was now reaching maturity, and alerted as to the uncertainty of keeping its young spirit or the possibility of becoming “heavy and similar to other older Universities – it may be inevitable”. However, the Senior Lecturer reinforced the existing academic environment, and expressed his opinion - "at the University of Aveiro, I note that the students are happy", considering that "the students of Aveiro are well on their way". To continue with the young and innovative spirit that distinguishes it, he considered that it is clear that the university “will have to change” and “to make progress along with society". Furthermore, the Head of DEGEIT stated that the UA “has all the skills of the future"; warning, however, of the need for change not only in universities but in education in general; the goal is to prepare the students and "create the conditions for each one to make his way, learn and find solutions".

Dr Marlene Amorim envisioned the UA of the future "with an even more international component, with a greater diversity of publics than the current ones, and therefore with social concerns, of integration and increasing plurality". The Pro-Rector also expected "a strong focus on applied research, and in its connection and integration with teaching methods".

5.2 Survey

5.2.1 Sample Data

The sample is made up of 124 students from the University of Aveiro – 71.8% female and 28.2% male, with the majority (80.6%) aged between 18 and 25 years. Regarding the study cycles, the sample is made up of Master's students (55.6%), Bachelor's students (32.3%) and PhD's (12.1%), coming from different areas of knowledge.

***5.2.2** Survey Results*

Initially, we sought to understand the motivation of the students to choose to study at the UA. First, it was found that, for the majority of the respondents (75.8%), the UA was their first option. The aspects that had more weight in their choice were:

- 1st. The reputation/ UA's teaching of excellence;
- 2nd. Geographical proximity to the place of residence;
- 3rd. Course contents.

Research plays an essential role in teaching and developing, improving and structuring knowledge and society. In this sense, we sought to know if the students had knowledge of research projects developed in the UA, and if they would be interested in working in this area. Most students (80.6%) reported having knowledge of research projects developed by the university, however, only 21% would be effectively interested in working in this field, 26.6% considered this possibility, and the majority (52.4%) had no such interest at the moment.

In a third phase, the objective was to assess students' opinions, not only on what they considered to be the great differentiating factor of the UA compared to other Portuguese educational institutions, but also on what they considered to be strengths and weaknesses of the university. Regarding differentiation, the environment and university campus, including the resources and interconnection between the different departments, the quality of teaching and the proximity between teachers and students, research and the fact that it is a young and dynamic university that focuses on innovation and entrepreneurship, stand out. The three strengths most identified by the students were the quality of teaching, the teaching team, both for their training and their proximity to the students, and the university campus, not only for the centralization of the departments, but also due to the infrastructures and all the surrounding landscape. On the other hand, the three weaknesses most frequently enumerated were the slowness and bureaucracy inherent to the academic services, the lack of maintenance in some departments and the variability of the teaching staff (very good teachers and others below expectations).

Finally, an evaluation scale of different components of the UA was proposed, in order to perceive the degree of student satisfaction. The scale adopted was from 1 to 5 (where, 1 - "Not satisfied" 2 - "Indifferent" 3 - "Satisfied" 4 - "Very satisfied" 5 - "Exceeded expectations"), and applied to the quality of teaching, research, student support services, the academic community, the university campus, and the resources available to the students. The results are shown in Figure 3.

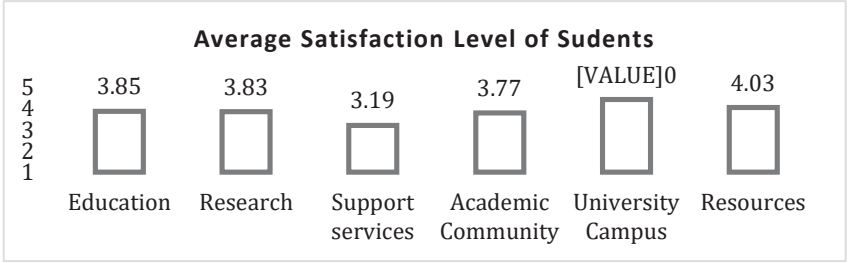

Figure 3: Average Satisfaction Level of UA's Students (November, 2017)

Source: Own personal research

Figure 3 indicates that, on average, students are satisfied with the University of Aveiro. The University Campus is among the components most appreciated by the students, presenting an average level of satisfaction of 4.4 out of 5, and for the majority (54%), it exceeded expectations. Furthermore, concerning available resources, the average degree of satisfaction is high. As concerns education, 75% of the students are very satisfied or considered that their expectations were exceeded. Research, with an average level of satisfaction of 3.83, is subject to great satisfaction or exceeding expectations by about 65% of the students. About 44% of the students are very satisfied with the academic community and, lastly, regarding support services, about 66% of the sample is satisfied or very satisfied.

6. Discussion

Competitive advantages and the differences they produce in organizational performance are often related to the resources that organizations have and how they are managed (Hitt, et al., 2011). Resources, capabilities and key competences form the basis for creating a competitive advantage. This notion is critically important to the success of organizations, because the combination of what they can do (through their resources, capabilities, key competencies and competitive advantages) with what they could do (depending on the external environment) allows them to develop their vision, achieve their mission, and select and implement their strategies (Hitt, et al., 2011).

The University of Aveiro establishes its competitive advantage in terms of both cost and differentiation. The following illustration (Figure 4) represents a proposal for the UA's "creation of competitive advantage" model, based on all the consulted information and field work.

At the resources level, the UA presents solid tangible resources, highlighting its Campus, with all its infrastructures and equipment – pointed out as a factor of differentiation, attractiveness and satisfaction.

Furthermore, at the organizational level, we conclude that both the fact that the organizational structure has a matrix nature and that there are internal processes of quality assurance, provides favourable conditions for the establishment of a competent and healthy organizational culture. The UA also possesses and develops the technology necessary for its activity, both at the level of teaching and research, as well as at a more operational level. As intangible resources, human capital is understood as a key factor for guaranteeing organizational quality (Universidade de Aveiro, 2017). Innovation is also a central concept in the UA, in terms of education, scientific production, entrepreneurship and the dynamization of events, among others. At the level of reputation, which has emerged as the main decision factor for students when opting for the UA, several strands are considered, such as quality teaching, research excellence, the UA brand itself, cooperation and internationalization.

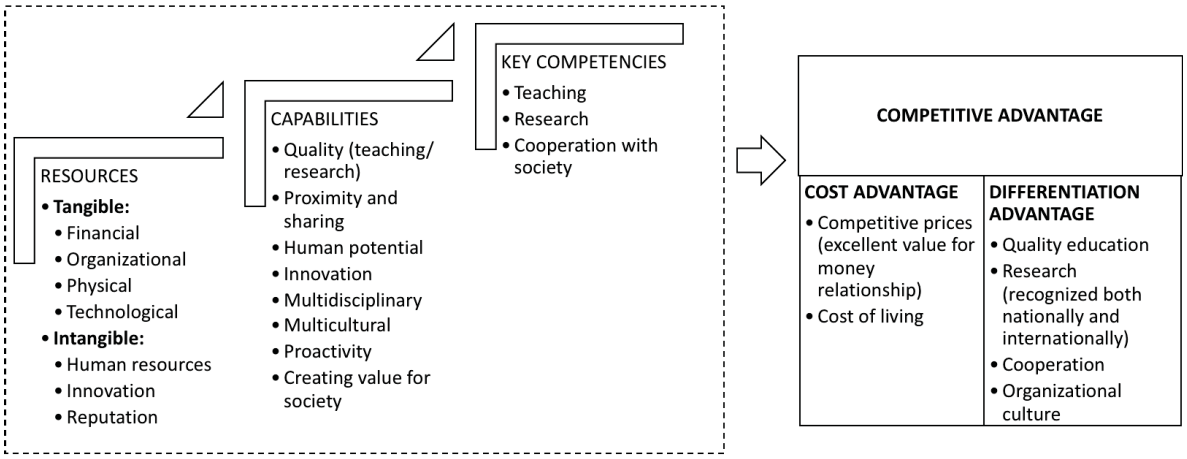

Figure 4: Proposed model of the UA's competitive advantage building process

Source: Own personal research

The capabilities of the UA result from the strategic integration of its resources in order to achieve its mission. Particularly noteworthy are the ability to offer quality training and education, being able to maintain an environment of proximity between teachers and students, the capacity for quality scientific production, the

development of human potential, both at the academic and personal level, as well as concerning the integration in the labour market, the multidisciplinary nature and multiculturalism, proactivity and capacity to innovate, and the capacity to create value for society.

Key competencies are capabilities that give an organization an advantage over its rivals, distinguishing it and reflecting its personality (Hitt, et al., 2011). In the case of the UA, these are based on three major areas – teaching, research and cooperation with society. It is a young and dynamic university, which focuses on quality teaching, proximity, interdisciplinarity, exchange, innovation and cooperation; at the level of research, it is based on recognized quality in international reference rankings, registered patents, publications and citations for UA faculty and researchers; finally, at the level of cooperation with society, it acts at the level of employability not only through the dissemination of opportunities and integration of students in internships, but also in the organization of events and projects integrated with the community.

The combination of all these elements makes it possible to observe that the UA manages to establish its competitive advantage, both at the level of cost, offering quality training at an acceptable (competitive) cost, and at the level of differentiation, not only for its key competencies, but by what supports them, thus revealing value innovation – as described by Kim and Mauborgne (2005, p.13):

> *"Value innovation is a new way of thinking about and executing strategy that results in the creation of a blue ocean and a break from the competition. Importantly, value innovation defies one of the most commonly accepted dogmas of competition-based strategy: the value-cost trade-off. It is conventionally believed that companies can either create greater value to customers at a higher cost or create reasonable value at a lower cost. Here strategy is seen as making a choice between differentiation and low cost. In contrast, those that seek to create blue oceans pursue differentiation and low cost simultaneously."*

It is necessary to consider that the condition of a competitive advantage is not a static one, and in that sense, the key competences that give rise to it must be supported and monitored. They should not, however, be transformed into fixed competences, since they are only a source of competitive advantage if they really allow the creation of value for the organization. If, on the other hand, they are no longer differentiating factors relative to rivals, organizations should naturally focus on identifying, selecting or developing other capabilities that will enable them to achieve a sustainable competitive advantage (Hitt, et al., 2011).

In this context, new studies arise from the increasing variability and instability of the market and of the whole external environment, which indicate the need to move away from the term "sustainability" and to adopt concepts such as "flexibility" in relation to competitive advantage (Sołoducho-Pelc, 2014). Thus, the challenge arises concerning the strategic planning of the ideal competitive advantage, resulting from the combination of sustainability, temporality and differentiation (Sołoducho-Pelc, 2014).

7. Conclusions – An entrepreneurial university

We conclude that the UA is an entrepreneurial university. According to the European Commission and OECD (2012), an entrepreneurial univeristy is one where, among others: "entrepreneurship is a major part of the university strategy; […] the faculties and units have autonomy to act; […] the university is a driving force for entrepreneurship development in the wider regional, social and community environment; […] there are mechanisms in place for breaking down traditional boundaries and fostering new relationships – bringing internal stakeholders together (staff and students) and building synergies between them; […] the university invests in staff development to support its entrepreneurial agenda; […] staff take an entrepreneurial approach to teaching in all departments, promoting diversity and innovation in teaching and learning; […] the university provides access to business incubation facilities". The guiding framework provided by the European Commission and OECD (2012) seeks to advise and inspire, as regards cultural change. By providing a means through which universities may assess themselves the European Commission and OECD (2012) provide a valuable tool to help universities fulfill their vision for the future. We hope with our study (and with our interviews and survey) to have given a detailed perspective of what an entrepreneurial university seeks to achieve. As a suggestion for future research we encourage universities to assess themselves, on a scale of 0-10, as described in the document produced by the European Commission and OECD (2012).

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References

Araújo, S. (2014) A presença da cultura organizacional chinesa nos negócios em Portugal. [Online]
Available at: https://ria.ua.pt/handle/10773/13735
[Accessed November 2017].

Assunção, M. A. (2014) Programa de Ação 2014-2018. [Online]
Available at: http://www.ua.pt/reitoria/PageText.aspx?id=11249
[Accessed October 2017].

Castro, R. (2015) A importância e a influência dos stakeholders para a internacionalização do ensino superior: contribuições para a formação do contabilista. [Online]
Available at: https://ria.ua.pt/handle/10773/14811
[Accessed November 2017].

Clark, Burton R. (1998) Creating entrepreneurial universities. Organizational Pathways of Transformation. Pergamon Press.

Etzkowitz, H. (2001) Triple Helix - University, Industry, Government, Inovation in Action. New York: Routledge Taylor and Francis.

European Commission and OECD (2012) A Guiding Framework for Entrepreneurial Universities. Final version 18 December.
Available at: https://www.oecd.org/site/cfecpr/EC-OECD%20Entrepreneurial%20Universities%20Framework.pdf, accessed on 29-07-2018.

Hitt, M. A., Ireland, D. & Hoskisson, R. E. (2011) Strategic Management: Competitiveness and Globalization: Concepts. 9th ed. Mason: South-Western, Cengage Learning.

Kim, W. C., Mauborgne, R. (2005) Blue ocean strategy: How to create uncontested market space and make the competition irrelevant. 1st ed. Boston, MA: Harvard Business School Press.

MacGregor, K. (2015) Six key elements of an entrepreneurial university. University World News, 7 November, Issue Nº389.
Available at: http://www.universityworldnews.com/article.php?story=20151106141848199, accessed on 29-07-2018.

Pais, P. (2007) Relações Universidade-Empresa: Contextos, Estratégias e Fatores Críticos. [Online]
Available at: http://ria.ua.pt/handle/10773/3411
[Accessed November 2017].

Paulo, S. (2009) Competitividade Sustentável: Ferramentas de Gestão – Caso ROCA. [Online]
Available at: http://ria.ua.pt/handle/10773/1857
[Accessed November 2017].

Porter, M. E. (1985) Competitive Advantage: Creating and Sustaining Superior Performance. New York: The Free Press.

Santiago, I. (2009) Inovação e Competitividade como Fatores de Oportunidade num Contexto de Crise. [Online]
Available at: http://ria.ua.pt/handle/10773/1796
[Acedido em November 2017].

Santos, J. (2009) Teorias de Internacionalização: Aplicação a um Caso de Estudo. [Online]
Available at: http://ria.ua.pt/handle/10773/1760
[Accessed November 2017].

Sołoducho-Pelc, L. (2014) Competitive Advantage: The Courage in Formulating Objectives and Expansiveness of a Strategy. 10th International Strategic Management Conference, Volume 150, pp. 271-280.

Times Higher Education (2017) University of Aveiro, s.l.: s.n.

UA-Online (2017) Empresas e projetos com marca UA participam na Web Summit. [Online]
Available at: http://uaonline.ua.pt/pub/detail.asp?lg=pt&c=52308
[Accessed November 2017].

Universidade de Aveiro (2009) Estatutos da Universidade de Aveiro - Despacho normativo n.º 18-A/2009. [Online]
Available at: http://www.ua.pt/gaqap/uaemmudanca/page/9527
[Accessed November 2017].

Universidade de Aveiro (2012a) Portefólio - A Universidade de Aveiro. [Online]
Available at: http://portefolio.ua.pt/pdfs.aspx
[Accessed em November 2017].

Universidade de Aveiro (2012) Universidade de Aveiro - Plano Estratégico. [Online]
Available at: https://www.ua.pt/sigq/
[Accessed October 2017].

Universidade de Aveiro (2013) Cooperação Internacional. [Online]
Available at: https://www.ua.pt/PageText.aspx?id=470
[Accessed November 2017].

Universidade de Aveiro (2014a) Campus da UA – mapa em pdf. [Online]
Available at: http://www.ua.pt/PageText.aspx?id=431
[Accessed November 2017].
Universidade de Aveiro (2014) História. [Online]
Available at: http://www.ua.pt/PageText.aspx?id=152
[Accessed November 2017].
Universidade de Aveiro (2017) A UA Apresenta-se. [Online]
Available at: http://www.ua.pt/page/151
[Acedido em November 2017].
Universidade de Aveiro (2017a) Reitoria. [Online]
Available at: http://www.ua.pt/reitoria/
[Acedido em November 2017].
Universidade de Aveiro (2017) Relatório de Gestão e Contas 2016: Grupo Universidade de Aveiro, Aveiro: Universidade de Aveiro.

How People with a Disability Innovate (or not) at a Major Portuguese University

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Abstract: The main purpose of this case study was to identify the perception that people with a disability have about the concept of organizational innovation. Therefore, we aimed to provide an answer to the following research question: "How do people with a disability innovate?". The idea for doing this study emerged due to the lack of information and knowledge about the subject. We live in an era when it is easier to see people who suffer from a mental or physical malaise working in institutions or companies – more so than several years ago. Furthermore, people currently have a better understanding about the importance of embracing all individuals in society, and how it is necessary to give them all the same opportunities and to accept them in the business environment. At the same time that companies and institutions are accepting these people there may still be some gaps that make disabled people's work more difficult, resulting in a need to innovate in order to find new ways to overcome some obstacles that appear in their day-to-day lives. The way that people with disabilities modernize and modify some "basic" tasks may lead to a result that may be more productive and profitable for them and/or for the organization where they are inserted. To achieve that productivity and profitability, and also to boost their self-esteem, it is important to make sure that all the necessary tools are provided and that continuous monitoring is implemented to support these employees – creating not only a better understanding of their point of view but also improving their global efficiency. This is a qualitative study based on personal interviews with disabled people as well as being based on interactions with other employees at a major Portuguese university. The intention is to contribute to the increase of information in this area through a direct study with stakeholders while, additionally, adding to the perception of how coworkers and customers face and deal with disabled workers and whether they consider them capable of innovating or driving innovation. This case study concludes with some final considerations about the lack of opportunities given to disabled people which affects the evolution of their work in the workplace.

Keywords: minority groups, organizational innovation, corporate culture, social responsibility, human resources management, employees, practices, integration.

1. Introduction

Over time we have seen a greater interest in people with a disability and in ways to include them in the workplace. We have witnessed a greater concern for the unification of society at the same time as we have witnessed a diversification of the internal organizational environment to also embrace people with certain disabilities. Additionally, some firms, in particular, want to perform a more active role in society, namely by contributing more to the social responsibility aspect of business (Folha dirigida, 2018), the realm under which this study is included.

We found that research is still lacking which involves people with disabilities and especially in Portugal. When one considers research involving Portuguese subjects with disabilities and their link to innovation there is even less academic and scientific knowledge available. We intend to voice some of the opinions of the people we interviewed and who have disabilities.

While performing this research the research team realized that people with disabilities are not naturally seen to be active contributors to innovation activities – also because organisational innovation – which can "improve the quality and efficiency of work, enhance the exchange of information, and improve firms' ability to learn and utilise new knowledge and technologies" (*Oslo Manual*, 2005, p.12) has not been recognized by many people as also being valued innovation activity. The general population tends to view product innovation - which involves "significant changes in the capabilities of goods or services. Both entirely new goods and services and significant improvements to existing products are included" (*Oslo Manual*, 2005, p.17) – as the only valid type of innovation taking place in organisations.

It is fair to say that people with disabilities may be seen to represent a different aspect of business, one which is more complicated. They may not have the knowledge, capabilities or other necessary characteristics to get the work done efficiently and effectively. Furthermore, people with disabilities may represent higher labour costs, due to the necessary adaptations required to accommodate them in the work environment (including costs linked to insurance). Additionally, stereotypes and preconceptions by employers, or even by customers, may result in less of a disposition to hire people with disabilities (Mark et al., 2014).

One may thus conclude that despite there currently being a more positive attitude towards including people with disabilities in the labour market, certain stigmas still exist – related to productivity, performance, and adaptation which may all negatively influence the hiring of such people (*Jornal Expresso*, 2012).

Therefore, to contradict some stigmas, certain institutions exist which seek to provide for a more socially developed society and by way of implementing social action services. As an example of this we have the university being studied herein, which has been defining and implementing protocols with various entities, one of them being CERCIAV, to promote the social inclusion of people with disabilities or incapacities, while at the same time supporting their rights as citizens (CERCIAV, 2014). Thanks to these protocols the university in question has amongst its employees individuals diagnosed with certain disabilities – namely, working in the library, the rectorate and in the campus canteen.

This study is concerned with determining how these employees perceive and understand the concept of organisational innovation and if they have opportunities to innovate; and if they do innovate, how this is achieved.

To maximize the integration of all employees steps need to be taken. To innovate more successfully all employees need to be involved. At a time when social responsibility is at a high in popularity firms need to go beyond what is legally required to provide for fully inclusive workplaces.

The structure of the article, after the introduction, is as follows: a review of the literature comes next, which discusses issues related to the main theme of the article and others such as an inclusive education and the professional future of people with disabilities. We also discuss what expectations people with disabilities have for their careers and how they define organizational strategy and innovation. Furthermore, what does innovation mean to people with disabilities?

The methodology adopted to answer the questions posed was a case study involving a Portuguese State-owned university. Six employees with disabilities and who worked (for a salary) for the university were interviewed. After analyzing and treating the data gathered the results are discussed and the main conclusions presented.

Finally, it is relevant to state that one of the co-authors worked for some time at a training institute for people with disabilities. The mission of the institute was to train people for jobs and to get them job placements in the job market. People who were blind (this group of people was actually relatively easy to employ); or who had perhaps dived from a rock on a beach and broken their spine, in shallow water; or people who had had motorbike accidents and lost an arm or a leg; or people with severe breathing impairments, meaning that they had to always carry round oxygen tanks to stay alive; were the customers of the institute, which was state-run and surviving from subsidies granted – to the value of about 6 million euros, annually, at the time. The issue is that the customers were people who had, generally speaking, the same desires as other people for companionship, self-actualization, fulfillment and love. Do not think that because people look different that they will not have specific desires common to human beings. We thought it relevant to state this as people may be led to think otherwise.

2. Literature review

2.1 Inclusive education and professional futures for people with disabilities

According to Shah (2005), who researched "how education influences the career choices of young disabled people", in Britain, preliminary research revealed that a significant number of people with disabilities also feel that they received insufficient support at school and were not encouraged to pursue their studies in higher education, which led to even less job prospects later on. Special training and experience, as concerns teachers,

was seen to be lacking, in particular in the early stages of the learning process and system. This poor educational foundation affects individuals in subsequent stages of their lives and leads to the first signs of discrimination. School and its effect on people's lives is oftentimes underestimated as in fact this overall experience is essential, in both personal as well as professional terms. Competences and abilities and a sense of responsibility are developed in this school-time period which will affect how people interact with their environments later on in life. A simple fact is that people with disabilities are expected to contribute less to society than people without disabilities and so the former group of people are not seen as needing the same academic qualifications as the latter group of people. In fact, the very opposite is true. Whereby brilliant individuals, endowed with more abilities than the average person, such as Steve Jobs or Mark Zuckerberg or even Bill Gates; may get on very well without a college education; this is not the case for people with disabilities, who need all of the help that society may give them.

Shah (2005) also revealed that the research group of young people (aged 13 years to 25 years old) with disabilities saw their dreams for worthwhile and interesting careers disappear due to a lack of support. "The post-school options of young people in special schools were limited and likely to be more dependent on their physical needs, relating to their impairment, rather than their individual educational and occupational aspirations. Dreams of pursuing a particular career path had to be sacrificed for having support needs suitably met." (Shah, 2005, p.114).

Specialized schools and teachers with specific training are lacking (especially in Portugal) and this means that little opportunities exist for the academic development of certain minorities. The USA is seen to have better prepared schools for diversity (e.g. for the autistic) and for children with special needs. Certain countries and regions are simply not equipped to cater to a diverse set of needs and due to a general lack of funding and awareness of the problem significant adverse effects are the consequence for people with certain disabilities.

In Portugal, due to the financial crisis which hit us in 2011, when we had to borrow 78 billion euros, in order to remain functional, as a society, this meant that many financial cuts had to be put into effect. Minority groups which are not seen to contribute fully to society tend to be the most affected in such periods of hardship. Even outside these extreme periods a poorer country, such as Portugal, will not have extensive funds to help people with special needs be fully integrated in society.

In China, for example, "although China has a civilized history and distinguished Confucian tradition of valuing education, special education as an institution was not established until the 19th century, when Western culture began to influence China. The subsequent development of special education has been slow due to adverse political and economic conditions. After the 1980s, a modern system of special education from preschool to higher education was formed, and since then, China has been moving toward the goals of effective inclusive education in response to global trends and the open-reform policy." (Deng, Poon-Mcbrayer and Farnsworth, 2001, p.288).

Another example is Australia, where there is inclusive education, whereby students with disabilities and special needs are included in classrooms with regular students. A significant problem is that teachers do not feel prepared to deal with the specific issues that inclusive education entails, having been poorly prepared for this (Stephenson, O'Neill, and Carter, 2012).

While business studies, for example, are "in fashion", and able to provide for higher paid salary jobs; degrees linked to social aspects of society – such as those involving people with special needs – are not so popular, though being equally or more difficult in the challenge that they entail.

Despite the increase in awareness, relatively speaking, only a small number of firms hire people with disabilities. Mitchna et al. (2017) reveal that, in Europe, amongst people with disabilities, the employment rate is 27% lower than with people without disabilities. This figure is worse in less developed European countries. Some people with disabilities may not seek employment due to them having low expectations of finding a job. With those companies that do hire people with disabilities what may be verified is that the job settings are frequently badly adapted to the needs of people with disabilities; knowledge is lacking amongst employers as to what is necessary (Mitchna et al., 2017). On the other hand, some employers may be more interested in obtaining the financial benefits of hiring people with disabilities (or interested in being seen as socially responsible), rather than being interested in the inclusion perspective itself. If this is the case, then the

productivity and general performance of the people hired will not be a main concern, if at all. Employers in general are also concerned that people with disabilities may have limited capacities, be prone to disease, or represent an additional responsibility and risk (Mitchna et al., 2017) – as there is a general lack of knowledge and understanding linked to this group in society.

Kaye et al. (2011) refer to the importance of costs related to accommodating people with disabilities in firms as being a deciding factor as concerns the hiring and retaining of people from this job segment. Additional sensibility is also required when dealing with people with disabilities and employers may also be concerned that they may not be disciplined and that if a case goes to court (for example, linked to dismissals) that they, the employer, will lose. Therefore, these aspects also work against the employment and retaining of people with disabilities (Kaye et al., 2011). Performance appraisal expertise of people with disabilities and their [extra] supervision needs are also generally unknown and so also represent an additional barrier to inclusion (Kaye et al., 2011).

The discussion above thus leads to, and explains, the lack of qualified and employable people with disabilities in the workplace.

2.2 Organisational strategy and innovation and people with disabilities

Firms adopt strategies to integrate and coordinate commitments and actions destined to explore essential competences, in view of obtaining a competitive advantage (Hitt et al., 2011). Both internal and external environments need to be researched, analysed and evaluated in order for an effective strategy to be developed. The innovation factor, of the firm's products, services and processes, is what in the end will determine whether the firm will be able to achieve consistent above average returns, or not (Hitt et al., 2011).

NP 4456:2007 defines innovation as being the implementation of a new or significantly improved solution for a firm; a new product or service; a new process; a new organizational method or marketing strategy. The objective is to reinforce an organisation's competitive position, improving performance or knowledge. The rapid and unprecedented evolution of technology has had a significant effect on innovations and on how firms innovate – improving efficiency and productivity, and increasing market shares and profitability for company owners when technology is well leveraged. Organisations are currently increasingly seen as open systems which are constantly adapting to environmental change by following a path of innovation in order to improve performance (Damanpour, 2017).

The link of the above to people with disabilities is not readily made, by most people. People with disabilities are not connected to innovation activities – unless they are able to surpass prejudices, like the late Stephen Hawking was able to. Such is a rare case indeed, even in modern society.

The term disability has appeared to include many different types of disability, limitations and participation restrictions. Oftentimes firms will need a specific strategy aimed at solving the problems linked to disabilities if they are to be inclusive and solve rather than create barriers to inclusion.

A disability is a functional problem or a limiting body structure, such as paralysis or blindness; an activity limitation or other difficulty for an individual to execute a given task, such as eating or walking. Disabilities are distinct from work or other types of discrimination. A disability is thus not just a health problem, but it is rather a complex phenomenon which reflects the interaction between body characteristics and the society in which one resides.

People with disabilities require that environmental as well as social barriers be removed from their daily lives – things as simple as having adapted bathrooms and ramps to get into buildings (rather than there being only stairs available). After all, this needs to occur so that their needs, much as with other people, may be met. Environmental factors may facilitate or make more difficult certain interactions and include what products and technologies, and not only the natural environment, provide for. Other intervening factors include relationships, attitudes, systems, and public policy. Personal factors such as motivation and self-esteem will also affect how people want to actively participate in society. Online accessibility is also important, in the digital age, and websites and e-commerce opportunities need to be available, much as for other individuals (Gonçalves et al., 2013, 2017), though many firms do not know how to achieve this and / or are not interested, due to the additional costs involved. The World Health Organization (2011) warns against generalising in this

area as disabilities and those who have them have a diverse set of different personal factors, are of different genders, age groups, socioeconomic status, sexuality, ethnicity and / or cultural heritage.

As concerns innovation one must recognise that the standard work environment was projected for people without disabilities, and people with disabilities need to trust a variety of product adaptations in their daily lives. Conradie et al. (2017) reveal that more solutions need to be developed, and this will require more participation by all of those involved. Innovation by people with disabilities is not generally communicated and serves to, principally; satisfy their own needs with no further motivation beyond that. Innovation by people with disabilities thus tends not to be commercialized. Note that certain innovations with commercial value serve both people with and without disabilities. Unmet needs are a reason to innovate; however, if the disability is significant this will mean that the probability that an innovation will be created by that person and in a way that satisfies both people with and without disabilities will be small.

Innovation by people with a disability thus, in sum, tends to occur to solve their own very real personal problems and difficulties, which they encounter in society.

Finally, with life expectancy getting ever longer, and the retirement age getting to be ever older, we must realise that people with disabilities will continue to increase and it is imperative that we find ways to include such people in the workplace.

3. Case study

3.1 Methodology

We performed research at a major state-owned (public) and very reputable university in Portugal – the University of Aveiro. There was some surprise in the contacts that led up to the interviews as people we interacted with did not understand why we wanted to interview people with disabilities on innovation, since they were not performing research and development (R&D) activities. The three main departments at the university in which people with disabilities worked were contacted and authorisation was given to go ahead with the interviews in two of these departments.

We thus followed a qualitative methodology in our study and performed semi-structured interviews following an interview script. The objective was to gather qualitative data on a contemporary problem not focused on in the literature. Namely, how people, in Portugal, with disabilities innovate, if at all, at their workplaces in organisations. We also discussed how this target group views innovation, how they view creativity, what they think of change, and if they identify and point out opportunities for improvement.

The interviews were performed between the 14th of March and the 3rd of April 2018. The individual interviews were audio recorded with the consent of the interviewees. Manual notes were also taken. Two groups of three interviewees each were formed. The first group was made up by employees working in the rectorate. The second group was made up by employees working in the library. The rectorate group of employees were blind and their interviews lasted between twenty and thirty-five minutes. In this case the interviewees gave direct and objective answers as they were acquainted with the term innovation. The interviews with the library workers were longer and the disabilities in this case were neurological and linked to movement. Neurological disabilities had to do with less stable and more volatile personalities. The interviews lasted, in this second group, between forty and fifty minutes as some of the concepts had to be explained – namely those linked to innovation – as the academic qualifications of the respondents were also lower.

The interviews were performed until data saturation was reached and until the point whereby no new data was resulting from the interactions.

Table 1 lists some characteristics of the interviewees (age and academic qualifications), as well as the jobs and job tasks that they perform.

Table 1: Some characteristics of the interviewees

Job	Age	Academic qualifications	Job tasks
Library worker	39 years old	4th grade	- Putting books away - Cleaning shelves and carts - Checking shelves
Library worker	42 years old	6th grade	- Cleaning - Providing support to reception desks - Taking care of the plants in the library
Library worker	28 years old	9th grade	- Cloak room - Book quotations - Restoring books - Tidying up
Rectorate worker	37 years old	12th grade	- Telephone – general attendance - Receiving and transferring telephone calls - Sorting themes out
Rectorate worker	34 years old	12th grade	- Receiving and transferring telephone calls - General clarification
Rectorate worker	61 years old	12th grade	- Telephone – general attendance - Clarification on various subjects - Answering e-mails

3.2 Data treatment and the patterns identified in the data

Data treatment involved the identification of patterns in the interview data and in comparing the different perspectives gathered, as espoused in the Business Narrative Modelling Language method (Oliveira and Ferreira, 2010, 2011; Au-Yong-Oliveira et al., 2015). Statements that served to solve the questions posed were considered to be especially pertinent to the analysis.

Patterns identified in the data include the following: **1) Gain information** (Bjork and Holopainen, 2005) – as some of the informants had difficulty in defining what the meaning of innovation was. Though the word was not unknown to them, some of the interviewees were not able to express what it meant. **2) Collaboration** (Bjork and Holopainen, 2005) – people with a disability define themselves as being collaborative, in the workplace. Perhaps due to them not being able to perform a number of tasks by themselves, they see themselves as being actively dedicated to their tasks and demonstrating flexibility and team work. **3) Privileged abilities** (Bjork and Holopainen, 2005) – the people who we interviewed, and with disabilities, view themselves as adapting well to new environments. Evolution, over time, occurs quite easily, as they like to learn and discover new things, and to develop themselves. **4) Rewards** (Bjork and Holopainen, 2005) – the people interviewed feel a sense of self-actualization through their work and feel welcomed in the workplace; they appreciate the support given and like what they do.

As concerns innovating in the workplace, the following additional patterns were identified in the data: **5) Limited set of actions** – "players can only have a few actions to choose from" (Bjork and Holopainen, 2005, p.160). In sum, some of the respondents voiced the perspective that given the tasks that they had to execute and by following the rules and guidelines given, and as they depended on third parties, that there was not much room for [organisational] innovation at all. **6) Handicaps** – there is a need to make "gameplay easier for certain players in order to make all players have the same chance to succeed" (Bjork and Holopainen, 2005, p.396) – in effect, some respondents stated that they felt a fear of the unknown, especially as people with disabilities experience additional difficulties. Change to something different and unrelated is, however, seen negatively (much as people without disabilities may react and feel if changed to something not linked to their experience and preferences). **7) Puzzle solving** (Bjork and Holopainen, 2005) – Change is welcomed as an opportunity for progression, despite being difficult. Change is easier if occurring within the job task and workplace.

Table 2 has some quotes and evidence from the interviews.

Table 2: Quotes and evidence from the interviews

Theme	Objective	Interview evidence
Innovation	Understand how people with disabilities view innovation	"Innovation is a word I have heard of, but I am not sure what it means" (Library worker 1)
		"That word is not new to me but I do not know what it means" (Library worker 2)
		"To innovate is to make things which do not exist" (Library worker 3)
		"Innovation to me means, generally, to evolve, develop, create new expectations and new objectives. It means to develop things increasingly better" (Rectorate worker 1)
		"When we speak of innovation we refer to something which is getting better" (Rectorate worker 2)
		"Innovation is everything which is new" (Rectorate worker 3)
Creativity	Understand whether people with disabilities are creative	"I have a lot of imagination" (Library worker 1)
		"I have some ideas. The most difficult thing is to get the people involved to accept them, to put them in practice" (Library worker 2)
		"I have been motivated to innovate, but more on a personal level" (Library worker 3)
		"There is some disposition for us to be heard" (Rectorate worker 2)
Difficulties	Understand what difficulties people with disabilities face	"Sometimes colleagues are very aggressive when dealing with me" (Library worker 1)
		"We are very limited as concerns work as we cannot do any type of work" (Rectorate worker 1)
		"More accessibility should be created with our telephone consoles" (Rectorate worker 2)

4. A further discussion of the results

For the most part, the interview results confirm the literature. However, organizational innovation, as addressed herein, needs to be communicated in the business environment more, so that certain individual contributions may come to be expected, including from people with disabilities. Our study has shown that people with disabilities may be well aware, and indeed expend much effort, towards organizational innovation.

According to Amabile (1988) creativity is seen to be essential to organizational innovation processes. Creativity is linked to personal characteristics – namely, personality and intellectual characteristics. Certain creative individuals when given the freedom to do so will expend effort and time in the creative process. People with disabilities are no different, as the aforementioned case of Stephen Hawking showed us. People with disabilities, as mentioned above, have the same general desires and needs as other people, and this needs to be recognized – by employers, placed higher up in the organization, but also by fellow employees. In the interviews we saw no evidence to show that the people with disabilities were less creative than people without disabilities. In fact, to the contrary, we saw a strong desire to improve on workplace characteristics, by these individuals, which was very refreshing to the research team. People with disabilities may be very motivated to be productive and exceed the expectations of their employers – on the one hand because jobs are so hard for them to find; on the other because, as they are used to hardship, their minds are continuously working to improve their external environments.

It should be noted however that the job tasks of the interviewees are seen to be repetitive and very routine. Thus, the interview subjects do not feel that they can innovate as concerns their daily routines – which are sequential and methodical. The tasks have been previously defined and so it is difficult to innovate and be creative. Furthermore, as concerns physical and architectural barriers at work, these do exist. These barriers impede better job performance and lead to limitations being felt by the interviewees.

The interviewees do actually think of solutions to improve their work; however these are often never actually voiced to anyone. Financial limitations are also felt as concerns the improving of work stations for people with disabilities. In fact, the interviewees feel that they do not have the ideal resources to innovate. They feel that suggestions to improve on their work spaces and processes are generally not heard and given due attention by their supervisors, mainly due to financial limitations. For the most part the job tends to get done and so improvements are seen as unnecessary. For example, the blind interviewees asked for audio or tactile resources. One blind interviewee in particular stated that job resources need to be adequate and so there exists an incentive to innovate on a personal level, identifying barriers to be overcome.

Relative to job motivation the interviewees are generally imaginative people who want to perform well. There is an effort to do things well at the first attempt. The interviewees revealed themselves to be perfectionists who are in favour of continuous improvement. Innovation occurs with them mainly in their personal job methods which they seek to do the best way possible, depending on the conditions imposed by their superiors.

Resources are generally insufficient and though they possess the creativity and motivation to innovate the techniques available to do so are limited. They do, however, state that they have what they need to perform their daily tasks.

For the blind interviewees answering telephone calls they need the help of third parties, for example, to see missed call information, which they cannot see. Also, they cannot recognize telephone numbers or access them. They need a voice system to be incorporated in the telephones. Furthermore, the Internet pages of the university present some gaps for blind people. Screen readers are needed such as JAWS (accessibility software for blind people) which read the information on screen monitors and transmit that information to a voice synthesizer which aids digital inclusion. Another case mentioned is that these blind employees, when in training at the university, have to use their own personal computers, as the ones available lack voice software.

This leads to a feeling of discrimination as they are not given equal opportunities and resources (concerning access to training). Voice software licenses need to be bought for computers used for training, and this was suggested to senior leadership at the university by one of the blind respondents. Acoustic improvements were also suggested by another blind interviewee as various people speaking at the same time at work affects blind people quite significantly (what they can capture). Therefore, as we have shown above, people with disabilities have a great deal to offer organisations in terms of organizational innovation.

5. Conclusions

Schooling is not seen to be adequate or encouraging of people with disabilities to pursue a higher education degree. Tools are lacking in schools, as is specific training, in order to transfer knowledge better, to motivate, stimulate and provide the necessary competences to progress – both personally and professionally.

Integration is thus difficult. Due to a feeling of being ill-prepared to face higher education and / or the job market many people with disabilities do not seek employment at all. This in itself means that innovation by people with disabilities is occurring to a much lower degree than it could. Some people with disabilities do make it, however, to the job market. These individuals will have found ways to overcome certain obstacles which they have come across, in their paths to employment.

Certain resources which support this job segment are used to gain employment (e.g. CERCIAV). The entities where people with disabilities may find work need to be pointed out to them by organisations such as CERCIAV. Not many options exist and unfortunately this means that jobs need to be accepted which will make use of their capacities, even if the conditions offered are not very favourable. The alternative in many cases is to be unemployed. People with disabilities thus tend to grasp their first real job offers; locations where they will do their best to excel and adapt, often suggesting job improvements (organisational innovation) where appropriate.

We saw a desire to please senior management, much as with people without disabilities, or perhaps even more, as jobs are highly valued. People with disabilities are highly motivated to show that they can get the job done and seek greater responsibility and recognition at work.

Oftentimes supervisors of people with disabilities do not act on suggestions for continuous process improvement given by people with disabilities. The lack of financial resources was pointed out as being important to this outcome. Other reasons pointed out are tradition and how things have been done over the years. Thus, suggestions for improvement often go “unheard” or are outright ignored which means that little space for innovation at work exists, in reality, for this job segment.

The notion that people with disabilities are very capable of doing anything was communicated by all of the interviewees. All people have limitations, whether they have a disability or not. People with disabilities are

elements in society and thus should have the same job opportunities as others. We have found this to be far from reality, currently, in Portugal, but also abroad.

The limitations that people with disabilities may have are seen to be a form of seeing the world differently. These different perspectives may be essential and lead to ways of thinking and functioning "outside-the-box". As one blind interviewee stated, "I am capable of, through the texture of a jumper, to know its colour and you, who can see, cannot do that".

Finally, at a time when one hears a lot about the importance of soft skills, this group of people tends to have a lot of soft skills. Needing other people to get by has made them good collaborators and team players and this in itself is a good reason to employ people with disabilities.

Future research might seek to broaden the research performed to include a larger sample of people with disabilities. Future research may also include people with a more diverse set of disabilities. Additionally, several types of organization may be studied, rather than only a single organization. Different environments and industries may reveal interesting and important information concerning this minority group – which, as mentioned herein, is seen to grow in number, and thus in importance, in years to come.

References

Au-Yong-Oliveira, M., Moutinho, R., Ferreira, J.J.P., Ramos, A.L. (2015) "Present and future languages – How innovation has changed us". Journal of Technology Management and Innovation, Vol.10, no.2, pp.166-182.

Amabile T. M. (1988) "A model of creativity and innovation in organizations". Research in Organizational Behaviour, Vol.10, pp.123-163.

Bjork, S., Holopainen, J. (2005) Patterns in game design. Charles River Media, Boston.

Branco, M.P.P.D.C.P. (2013) "A comunicação Organizacional como Estratégia de Gestão". Master's thesis. Mestrado em Ensino do 1.o Ciclo do Ensino Básico. March. Escola Superior de Educação João de Deus.

Cooperativa para a Educação e Reabilitação dos Cidadãos Incapacitados de Aveiro. (2014) Parcerias. Retrieved 30 March from http://www.cerciav.pt/conteudos.aspx?id=4.

Conradie, P. D., Herregodts, A.L., De Marez, L., & Saldien, J. (2017) "People with disabilities as product Innovators: a pilot study". Disability and Rehabilitation: Assistive Technology, Vol.0, no.0, pp.1-7.

Damanpour, F. (2017) Organizational Innovation. Oxford Research Encyclopedia of Business and Management. Retrieved 7 Apr. 2018, from http://business.oxfordre.com/view/10.1093/acrefore/9780190224851.001.0001/acrefore-9780190224851-e-19

Deng, M., Poon-Mcbrayer, K.F., and Farnsworth, E.B. (2001) "The development of special education in China – A sociocultural review". Remedial and Special Education, Vol.22, no.5, pp.288-298.

Gonçalves, R., Martins, J., Pereira, J., Oliveira, M.A., Ferreira, J.J.P. (2013) "Enterprise web accessibility levels amongst the Forbes 250: Where art thou o virtuous leader?" Journal of Business Ethics, March, vol.113(2), pp.363-375.

Gonçalves, R., Rocha, T., Martins, J., Branco, F., Au-Yong Oliveira, M. (2017) "Evaluation of e-commerce websites accessibility and usability: an e-commerce platform analysis with the inclusion of blind users". Universal Access in the Information Society.

Jornal Expresso (2012) "Emprego para portadores de deficiência". Retrieved 30 March from http://expressoemprego.pt/carreiras/emprego-para-portadores-de-deficiencia/5191.

Folha dirigida (2018) Pessoas com deficiência conquistam espaço no mercado de trabalho. Retrieved 30 March from https://folhadirigida.com.br/mercado-de-trabalho/especiais/pessoas-com-deficiencia-conquistam-espaco-no-mercado-de-trabalho.

Hitt A., Ireland, R., Hoskisson, R. (2011) Strategic management: Competitiveness and Globalization. 7th Ed. Thomson South-Western. United States of America.

Kaye, H. S., Jans, L. H., & Jones, E. C. (2011) "Why Don't Employers Hire and Retain Workers with Disabilities?". Journal of Occupational Rehabilitation, Vol.21, no.4, pp.526–536.

Mitchna, A., Kmieciak, R., Burzynska-Ptaszek, K. (2017) "Job preferences and expectations of disabled people and small and medium-sized enterprises in Poland: Implications for disabled people's professional development". Human Resource Development Quarterly, Vol.28, no.3, Fall, pp.299-323.

Nações Unidas- Comissão Económica para a América Latina (2002) Globalização e Desenvolvimento. Vigésimo nono período de sessões, Brasília, Brazil.

NP 4456:2007 Gestão da Investigação, Desenvolvimento e Inovação (IDI) – Terminologia e definições das actividades de IDI.

Oliveira, M.A., Ferreira, J.J.P. (2010) "Strategic change communication using a novel Business narrative modelling language". 3rd International Conference of Education, Research and Innovation – ICERI 2010 (IATED). Madrid, Spain, 15-17 November. Conference proceedings, pp.5911-5920. Book Editor(s): Chova, L.G., Belenguer, D.M., Torres, I.C.

Oliveira, M.A., Ferreira, J.J.P. (2011) "Facilitating qualitative research in business studies - Using the business narrative to model value creation". African Journal of Business Management, Vol.5, no.1, 4 January, pp.68-75.

Oslo Manual (2005) Guidelines for collecting and interpreting innovation data. 3rd edition. OECD Publishing.
Shah, S. (2005) "Voices and choices: how education influences the career choices of young disabled people". Journal of Research in Special Educational Needs, Vol.5, no.3, pp.112-117.
Stephenson, J., O'Neill, S., and Carter, M. (2012) "Teaching Students with Disabilities: A Web-based Examination of Preparation of Preservice Primary School Teachers". Australian Journal of Teacher Education, Vol.37, no5, article 3, pp.13-23.
World Health Organization (2011). World report on disability 2011. World Health Organization, The World Bank.

Costs of Transaction in Logistics 4.0 and Influence of Innovation Networks

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Abstract: The strategic position of each company does not depend exclusively on the quantity and quality of the resources it has, but on the position it occupies within the network in which it operates. Networking helps reduce transaction costs and business coordination: Valuable information about customers, suppliers, competitors, and good partners is easily shared among network stakeholders, resulting in savings in transaction costs. There may be high transaction costs when there are two different stages of property ownership, and the 4th industrial revolution seeks to challenge the logistical areas for technological digitization and large domain integration and seeks to present a new operational, organizational, and managerial paradigm that will be termed : logistics 4.0. Methodologically, the research is based on a bibliographical review and seeks to find grounds that theoretically justify the reduction of Transaction Costs through Logistics 4.0. Thus, the main objectives of this research are to analyze and understand the relationship between Logistics 4.0 and Transaction Costs, as well as to evaluate the influence of innovation networks in this area. Minimizing these transaction costs is materialized by aligning management structures with the creation of unique structures, thereby reducing the opportunistic behavior of the other party, especially if there is a dependency relationship between the two parties. Logistics 4.0 is based on intelligence and technological equipment and is developed with online tools, seeking to respond to faster, virtual and automatic information systems. Information speed is a major influencer of good results, and improvements in the transmission of information and knowledge seek to improve the management of organizations through their networks and aims to reduce their transaction costs from the new technological and logistical revolutions.

Keywords: Networks; transaction costs; Logistics 4.0; innovation.

1. Introduction

Strategically providing the logistics area with efficient, effective and competent resources, regardless of the institution, has come to be seen as a very important pillar so that they can carry out their activities in a sustainable way so that they reach their most varied objectives (Almeida , 2011).

Logistics in the various sectors as a centerpiece of the company's strategy, over time, becomes a necessity rather than an option and must be applied and managed as a strategic weapon, as like any other industry in the efficient management and effective use of its resources is the most direct way that can exist to assure quality standards demanded by increasingly demanding customers (Carvalho et al, 2017).

Through the work developed by Ballou (2004), Tseng, Yue and Taylor (2005) and Paura (2012) we have to realize that there are three basic activities of logistics: Order Processing (basic factor of identification of the need to be met) ; Maintenance of stock (Ensure that all materials identified as "stockable" always have quantities in stock to meet existing orders) and Transport (whether internal or external should always be ensured so that the necessary goods can be allocated, where necessary correct time). These activities should always be carried out, as rigorously as possible, so that the logistics cycle itself will never be called into question and at the same time the normal operation of the services will not be jeopardized, and there will always be correct and updated information so that has to manage these processes as accurately as possible (Ballou, 2004, Tseng, Yue and Taylor, 2005 and Paura, 2012).

Whatever the methodology from a logistics point of view, institutions should be concerned about how they communicate and how effective they are, since only secure, effective and immediately accessible information systems can circulate correctly, giving meaning to the purpose of the logistics chain, identify the need and satisfy it in the best possible way (Branco, 2013).

The 4th industrial revolution seeks to challenge the logistic areas for a technological digitization and integration of large domain and tends to present a new operational, organizational and management paradigm, which will be denominated: logistics 4.0.

Methodologically, the study is based on a bibliographical review on the themes (1) Innovation Networks, (2) Transaction Costs, and (3) Logistics 4.0 and tries to find grounds that theoretically justify the reduction of Transaction Costs through the networks created in the Logistics 4.0. Thus, in the first place, several studies were done not only in documents indexed in the ISI Web of Science as in Scopus, in order to find literature favorable to the work within the theme of Logistics and Industry 4.0 and with incidence in the costs of transaction and in the theory of networks. Secondly, all abstracts were analyzed, and interesting and important abstracts were selected for the present study. During the reading of the abstracts, articles with a relevant scale were evaluated; little relevant; and less relevant. For the next phase, only the relevant articles were transited. In the last phase, after checking the abstracts of the initial research and excluding the non-relevant articles, the articles were recovered in full and the studies that were truly relevant to the present study were verified.

The main research question is: "Can Logistics 4.0 create cooperative conditions to lower transaction costs?" And as such, the main objectives of this research are: to analyze and understand the relationship between Logistics 4.0 and Transaction Costs as well how to assess the influence of innovation networks on this relationship.

The following chapters address the topics (1) Innovation Networks, (2) Transaction Costs, and (3) Logistics 4.0, then a contribution is made to answer our research question and the main conclusions are presented.

2. Review of Literature

2.1 Innovation Networks

In the organizational environment, the network represents a form of intermediary organization between the organization and the market. The organizational network is comprehensive and generally means that two or more organizations are involved in long-term relationships, with the main objective of revitalizing the various organizational processes to achieve competitiveness in an increasingly turbulent environment (Hakänsson, 1987).

Innovation Networks according to Pyka et al. (2002b), Felman et al. (2006), Braunerhjelm (2008), Huang and Chang (2008), Percival and Cozzarin (2008), Suire and Vicente (2008) and Weber and Khademian (2008) are now widely considered as an effective means of organization complex processes of research and development. The evolution of organizations led to the existence of an approximation in order to strengthen their relations, interconnected by cooperative relations in order to work continuously and together (Franco and Duarte, 2012). Certainly, a single isolated organization will be unable to train all the resources and competencies to fulfill its objectives, as knowledge will always be deficient compared to the knowledge of a network of organizations. Managers thus seek partners who can provide the information, support and advice needed to complete the complex, increasingly diverse tasks they have on the agenda (Franco and Duarte, 2012).

Whatever the distance between the partners, Veciana (2008) and Simões (2009), both affirms that the networks allow a relationship between the organizations in order to concentrate the exchange of experiences between them, as well as the sharing of knowledge, learning, among others (Felman et al., 2006). The intensity and frequency of the relationship between organizations is greater if they belong to the same network.

As for network content, interpersonal and inter-organizational relationships are seen as the means by which actors have access to a variety of resources, including knowledge, made available by other actors (Hoang & Antoncic, 2003). Innovation networks can bring key benefits to logistics, such as:

1. The content of the network: a key benefit of innovation networks is the network's access to a set of information and advice. Relationships may also have reputational or signaling content (Krackhardt & Stern, 1988; Hoang & Antoncic, 2003; Marouf, 2007);
2. Network management: another key benefit of innovation networks is their management mechanism that manages and coordinates the exchange relationships in the network. Trust among network actors

is, for the most part, seen as a critical element that can influence the quality of shared resources. Trust, as well as the depth and richness of exchange relationships, particularly with regard to the exchange of information, will be the critical elements (Granovetter, 1973; Nelson, 1989; Hoang & Antoncic, 2003; Marouf, 2007);

3. Network structure: it is defined as the pattern of relationships that result from strong and weak relationships among the actors that make up the same network. A general proposition is that the different positions that the actors occupy in the network structure have an important impact on the flow of resources and, consequently, on the results of the entrepreneurial activities (Granovetter, 1973; Hoang & Antoncic, 2003; Marouf, 2007). The most intuitive unit of measurement is the network size, defined as the number of direct connections between the focused actor and other actors. The analysis of the network dimension measures the extent to which resources can be accessed at the level of entrepreneur and organizations (Aldrich & Reese, 1993; Baum et al., 2000).

Thus, knowledge diffusion is the form of transfer of knowledge, directly or indirectly, from one part to another (Deeds et al., 1997; Malecki, 1985; Gilbert et al., 2008).

In the Logistic context, the cooperation represents a relationship between partners, finding the development of joint activities that are a source of performance improvement in the organizations that interact in this chain. For Barnes and Liao (2012) it is the skills and competencies of each organization that perform best, not only depending on the organizations' cooperation, but also on internal cooperation (between departments) (Stank et al., 2001) of synchronizing the work of the organization leads to greater efficiency (Jagdev and Thoben, 2001). The non-synchronization of the work in the execution can condition the performance of the Supply Chain, being not only important to share information, but also it is necessary to develop coordination mechanisms (Carvalho et al, 2010).

Christopher (2005) introduces the term interdependent to define logistic cooperation between organizations, presenting them as a network of interdependent organizations working together to manage and improve together flows of materials and information. Organizations when they understand that they do not control all the conditions necessary to individually achieve a given goal (Handfield and Bechtel, 2002) become interdependent with others and seek cooperation as a basic requirement for the creation of value and profitability of organizations (Moura, 2006).

But, innovation networks have flaws, or barriers, to integrate a network of innovation, identified by Pyka et al. (2002), Felman et al. (2006), Braunerhjelm (2008) and Huang and Chang (2008). The actors who wish to integrate this network must have the following requirements: (i) Autonomy; (ii) Social skills; (iii) Reactivity; (iv) Proactivity. Failure to meet some of these requirements will hamper integration and participation in the network.

2.2 Transaction Costs

Transaction Costs were first discussed by Coase in 1937, which awarded him the Nobel Prize for Economics in 1991, by questioning under what circumstances organizations produce for their own needs. Coase (1937) cit. in Barros (2012) states that companies exists because of the existence of a cost of using prices, thus arising the idea of the existence of transaction costs. This relationship sees the company as an alternative way in coordinating production, where it will choose how to organize production based on what will translate into lower transaction costs (Barros, 2012).

The transaction costs are according to Pondé (1996) cit. in Fagundes (s.d.) the consumption of economic resources resulting from adapting, structuring and monitoring the interactions between the different agents, ensuring compliance with contracts.

The theory presented by Coase argues that transactions do not only entail costs, but the attempt to minimize these costs ends up influencing the way economic activities organize themselves (Rocha, 2002). As can be seen, all the theories of transaction costs are associated with negotiation costs with other organizations, which are essentially contractual relations costs, resulting from market failures (Rocha, 2002). This theory argues that transaction costs are not only important, but also provide an important tool for understanding certain forms of economic organization (Rocha, 2002). In this way, transaction costs are defined as: "... costs not directly related to production, but which arise as agents interact with each other and the problems of coordination

that emerge" (Azevedo, 1996, pp. 28 -29). According to Williamson (1994), the minimization of these costs materializes through the alignment of management structures with the elaboration of unique structures, thus reducing the opportunistic behavior of the other party, especially if there is a dependency relationship between the two parties.

The various factors that influence market failures make it almost impossible for companies to pass on the specific information they need at a reasonable cost (Foss, 1993), and this is due to four main factors: high opportunism, limited rationality, uncertainty / complexity (contractual and organizational) and high presence of specific assets (Moschandreas, 1994).

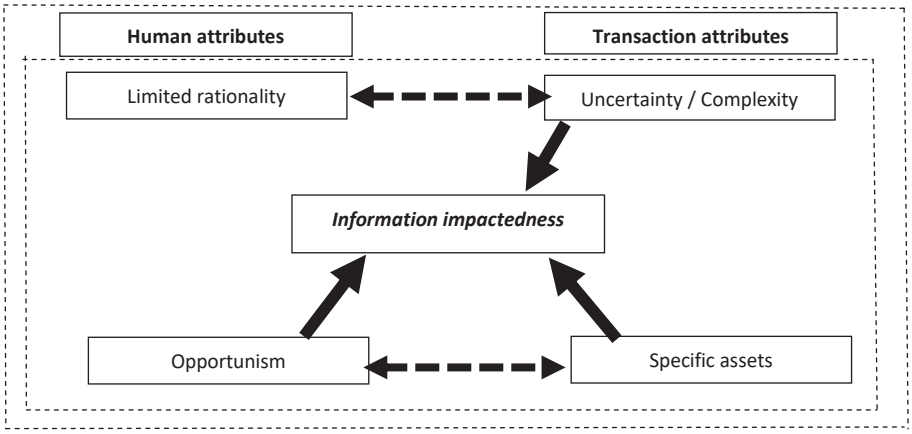

Figure 1: Information impactedness - Adapted from Moschandreas (1994).

As can be seen in the figure above, Information Impact, a definition that comes from Oliver Williamson (Nobel Prize in Economics - 2009), is a derived condition that arises when agents are interested to act opportunistically in the presence of uncertainty / complexity and arises when one participant in the transaction is better informed than the other (adverse selection and moral hazard) (Moschandreas, 1994).

Asset specificity is one of the most important factors contributing to high transaction costs and thus to integration. There are other factors leading to market failures that are also relevant to vertical integration. One of these flaws identified by Moschandreas (1994) is limited rationality, which in turn presupposes decision making using simplifying rules that extract key aspects of the problem without capture all its complexity. Since the rationality of economic agents is limited, this leads to incomplete contracts in the sense that it is impossible for them to project all future events (Kato & Margarido, 2000). According to Kreps (1990) cit. in Kato & Margarido, (2000) limited rationality means that it will be very costly for individuals to predict and contract for every eventuality that may arise throughout the transaction.

Considering that the rationality of the economic agents is limited, since they are not able to elaborate a model that can perfectly predict future events, this necessarily implies that contracts pertaining to any transaction are incomplete (Kato & Margarido, 2000). Although the economic agent's rationality is limited, they are aware that their contractual relations need adaptations and negotiations to safeguard their interests (Kato & Margarido, 2000).

Eiriz (2004: 126) mentions that "a strategic network, in order to be economically efficient, has to offer its actors lower transaction costs than can be obtained internally", and this is a way of knowing if the network will be relatively attractive the benefit / cost ratio.

Networking helps reduce transaction costs and business coordination: valuable information about customers, suppliers, competitors, good partners, etc., is easily shared among network stakeholders, resulting in transaction cost savings (Braunerhjelm, 2008).

Braunerhjelm (2008) argues that networks created to promote innovation among actors can show the following benefits:

- Networks facilitate the exchange of relevant information and knowledge;
- Networking helps reduce transaction costs and business coordination;

- The network transaction leads to rationalization of production;
- Networking increases the ability of companies to exploit economies of scale.

Given this, if there is an informational impact (or problems of asymmetry in complex contracts), opportunism and specific assets, we may be faced with influential determinants of integration.

2.3 Logistics (4.0)

Logistics by itself is defined by USAID (2012, p.13) "*as an operational component of supply chain management, including quantification, procurement, inventory management, transportation, fleet management, data collection (... .) Supply chain management includes logistics activities as well as the coordination and collaboration of workers, levels and functions. The supply chain includes international manufacturers and the dynamics of supply and demand (...)".*

Stressing the origin of logistics we have to go back quite a bit in time, since it is associated with a historical figure: Alexander the Great. He was the first, at military level, to adopt strategies (which without being denominated as logistical) promoted the success of military actions developed (Rodrigues, 2007; Dobroruka, 2009 and Rocha, 2012).

Noting that over the centuries this type of strategy has been improved and adapted to the different sectors of activity we can verify that around 1901 it was recognized academically as a research area when the first study about it was published, which study (Leite, Souza, Silva and Oliveira, 2015).

More recently, around the 70's and 80's, new methodologies were applied to the logistics area that shaped this strategic area and its applicability to the business reality and endowed it with the capacity to adapt to the needs that the constant technological and business evolution in the various sectors of activity, culminating in logistics techniques such as Just in Time (maximum stock minimization and continuous flow of product movement) or Kanban (use of visual indicators for distribution control) (Serio, Sampaio and Pereira , 2006; Adnan, Jaffar, Yusof and Halim, 2013 and Oliveira, Almeida and Sousa, 2013).

A logistic cycle is influenced by several vectors, inseparable and influenced from each other, which lead us to changes in momentary, unforeseeable and specific needs, and the responsible service must be prepared to respond to these needs in a timely manner so that never in any case the quality, safety and speed in the provision of the service or product are called into question.

Through the work developed by Ballou (2004), Tseng, Yue and Taylor (2005) and Paura (2012), we have to realize that there are three basic activities of logistics:

1. Order Processing: basic factor of identification of the need to be satisfied;
2. Stock maintenance: Ensure that all materials identified as "stockable" always have quantities in stock to meet existing orders;
3. Transportation: whether internal or external must always be guaranteed so that the necessary goods can be allocated, in the place necessary in the correct time;

These activities must always be carried out, as rigorously as possible, so that the logistics cycle itself is never called into question and at the same time that the normal operation of production is not jeopardized and there is always correct and updated information so that has to manage these processes as accurately as possible (Ballou, 2004, Tseng, Yue and Taylor, 2005 and Paura, 2012).

Conceptualizing the area under study, it is important to elucidate the concept of Supply Chain Management (SCM), and this integral part of logistics can be defined as the synthesis, maintenance and operationalization of the processes that constitute the supply chain, that as the objective of eliminating the needs of the end consumer identified previously, as well as equipping the institutions with competitive factors that allow them to distinguish themselves from the others (Besugo, 2011; Janvier-James, 2012 and Park, Nayyar and Low, 2013).

Using the studies developed by Courtois, Pillet and Bonnefous (2007) and Ayers (2001), the same author, Besugo (2011), characterizes SCM as having its main impact on the value chain management, fostering its

success, through the management of processes that go from the supplier to the final consumer, characterizing this chain as essential when looking for an integrated management of materials, since it has such a scope that encompasses areas such as the acquisition of goods and services (where includes not only purchases but also stock management, storage activities and distribution) (Roldão, 2002 and Besugo, 2011).

From the historical point of view, according to Serio, Sampaio and Pereira (2006) based on the study developed by Boyson, Cors, Dresner and Harrington (1999), subdivide the evolution of logistics in four recent chapters:

1. Underdeveloped logistics (until 1970): centralization of transport actions, inventory control, identification of needs and distribution;
2. Incipient logistics (between 1970 and 1980): Focus on transport and storage, starting to look at logistics as a process with integrated management needs of its stages;
3. Integrated Internal Logistics (up to 2000): integration of the notion that logistics can be a factor of competitiveness through not only managing the internal logistics of the institution, but also as a way of organizing them with a focus on the objectives and provision of its services with the best possible quality;
4. Integrated External Logistics (from 2000 to the publication of the article): at this stage of Logistics History, the most recent one, was the moment when it realized that it would not make any sense to look at the logistic cycle without there being a clear what the institutions' objectives are and how it could act in order to be as effective and efficient as possible. In this way, a greater emphasis was placed on forecasting needs (demand), information systems and, above all, how to interconnect all the phases that provide a better logistic performance;

Referring to the previous point, the need arises to frame Logistics 4.0 as an ability to integrate the company with the outside through the information systems. Logistics 4.0 brings increased business-to-business competitiveness, increased revenue and productivity, and process optimization (Dais, 2014).

Industrial evolution has directly influenced Logistics and the capacity of material flows to adapt to revolutions: the first industrial revolution works towards the mechanization and the hydraulic force; the second with mass production and assembly lines and electricity; the third with computing and automation; the fourth focuses on the breakthrough that allows machine-to-machine communication without human intervention (Kagermann et al, 2013 and Dais, 2014).

With the fourth industrial revolution, that is, with Logistics 4.0, the main innovative focus is the ability to develop communication between equipment and machines, through the Internet of Things (IOT), reducing time and costs (Kagermann et al, 2013 and Dais, 2014). In the industrial sphere, the IIOT, or internet of things in Industry, also ensures greater transparency in the supply chain, through the ability to verify the movement of cars, pallets and all the various materials in the supply chain.

In the new industrial era (4.0), the deployment of robotic solutions with less need for manpower will be evident (there are human-robot interaction robots) (Kagermann et al, 2013 and Dais, 2014).

In the context of Logistics 4.0, information transparency is an important factor: with a large number of connected objects and equipment, working in tandem and providing real-time information, it is necessary that communication and transmission standards are efficient, so that information and important data are always prioritized.

3. Logistics 4.0 and the relationship with Transaction Costs

The association of new technologies, at a global level, has assumed over time an extreme preponderance in what is the performance of organizations and their orientation to results. In this sequence, logistics does not escape the rule and given the impact it can have on the daily activity of organizations, it is preponderant that this activity is seen not only as support but as one of the central factors for organizations, so that they can be and to develop their activity in an efficient way.

The concept of logistics 4.0 which, as mentioned previously, associates the use of technology (essentially the internet of things), allowing a large number of activities to be carried out by technological innovations and which may be linked to each other by sharing a real-time information, eventually converging with the identified needs so that transaction costs can be reduced, contributing to the different elements of the movement of goods having useful and timely information, thus contributing to a better take decision-making.

Table 1: Logistics 4.0 and the relationship with Transaction Costs

<table>
<tr><th>Transaction Costs</th><th>Network Cooperation</th><th>Logístics 4.0</th><th>Stakeholders</th></tr>
<tr><td>Transaction implies costs</td><td>Networking should allow economic efficiencies;</td><td rowspan="4">Through Logistics 4.0, with internet mediation of things, there is network cooperation within the organizations and with the various stakeholders, ensuring the dissemination of information among the various actors and the integration of the various sectors / actors, ensuring coordination and management of the logistics cycle.</td><td>Offer your actors lower transaction costs than you can get internally.</td></tr>
<tr><td>Informational impact
Asymmetry of information
Limited Rationale</td><td>The existence of networks allows to improve the flow of information and knowledge.</td><td rowspan="2">Ease of access to information / knowledge.
Ability to know in Logistics, networks, prices and essential information;
Better coordination and balancing of deliveries, collections and logistics processes.</td></tr>
<tr><td>Coordination problems</td><td>The decrease of the distance between actors allows the existence of an improvement in the coordination and in the relation between actors.</td></tr>
</table>

Examples such as robotized warehouses, which allow to optimize the storage space and a fast and efficient access to articles or the technology of georeferencing of loads, that allows to locate in real time and to transmit this information to the client, are associated with this phenomenon of logistics 4.0 and are, when optimized, excellent mechanisms of relationship between the various integrating parts of the value chain, since all these examples allow to optimize the existing resources, reducing the costs associated with the process, which are not necessarily of production and allow, on the other access to real-time information that endows data organizations that influence their decision making, improving intrinsically the management of situations related to this area of activity.

Better management, quick and reliable access to information and optimization of resources (infrastructures or human resources) are some of the benefits that the application of technology to the logistics process can have at the level of transaction costs, since all these improvements allow, to provide organizations with greater capacity for relationship and transmission of information between the various internal levels and above all provides organizations with a greater capacity for knowledge and negotiation with the different external agents that are associated with their activity.

4. Conclusion

Considering the definitions presented by Pondé (1996) or Barros (2012) we see that transaction costs are inseparable from any activity, higher or lower, will always be associated costs and, like all others, should be analyzed and evaluated in a way which can be minimized without affecting the level of service provided. In this case, we can suggest different forms of management that benefit the results of this parameter, but it is important to realize that the implementation of technology that allows organizations to perform better, faster and faster to respond to identified needs and that allows them access the information in a quick way so that its decision making is the best possible allows us, possibly, a better management of the Transaction Costs.

Using the studies developed by Courtois, Pillet and Bonnefous (2007) and Ayers (2001), the same author, Besugo (2011), characterizes Logistics as its main incidence in the value chain management, fostering its success through of the management of processes that go from the supplier to the final consumer, characterizing this chain as essential when looking for an integrated management of materials, since it has such a scope that encompasses area such as the acquisition of goods and services (which includes not only the purchases but also the management of stocks, storage activities and distribution) (Roldão, 2002 and Besugo, 2011). Also observing the study by Carvalho (2004) we have to realize that the issue of communication between the various levels of the institution leads to their prudence, the use of information systems equipped with skills that allow an update and quick access to information.

Thus, the main research question presented was: "Can Logistics 4.0 create cooperative conditions to reduce transaction costs?" Thus, it can be said that the application of technology that is useful and has a direct impact on the performance of organizations, besides being a way to boost this performance, it is also a management tool that allows to be in real time, to receive information that can not only influence the decision making, but above all have data that allow to manage the activity of the organizations of form efficient and effective, as well as endowing them with mechanisms of relationship with the entities with which they relate in the course of their activity. Concluding that Transaction Costs can be influenced directly and positively by the new concept of Logistics 4.0, and this influence will only be noticed if the decision maker realizes that only aligning the human resources of the institutions with their policies and objectives as well as the technology that it implements within the organization is that it can influence positively the same and therefore become a mechanism of reduction of costs among which the Transaction Costs.

References

Almeida, N. A. (2011). Teoria Lean e Gestão de Stocks em Saúde. Coimbra: Faculade de Economia da Universidade de Coimbra, Relatório de Estágio.

Adnan, A. N., Jaffar, A. B., Yusof, N. B., & Halim, N. H. (2013). Implementation of Just in Time Production through Kanban System . Shah Alam, Selangor, Malaysia: Industrial Engineering Letters

Aldrich, H. E.; Reese, P. R. (1993). "Does Networking Pay Off? A panel study of entrepreneurs in the research triangle", In: Churchill, N. S. et al. (Eds.). Frontiers of Entrepreneurship Research, pp. 325-339.

Azevedo, P. F. d., 1996. Integração vertical e outros arranjos. s.l., s.n., pp. 1327-1344.

Ballou, R. H. (2004). Basic Business Logistics / Supply Chain Management. Prentice Hall Internacional: USA

Barnes, J. e Liao, Y. (2012). The effect of individual, network, and collaborative competencies on the supply chain management system. International Journal Production Economics, 140, 888-899.

Barros, P. M. A., 2012. Determinantes da Integração Vertical: uma análise de empresas Portuguesas. s.l.:UMinho.

Baum, J. A. C.; Calabrese, T.; Silverman, B. S. (2000). "Don't Go It Alone: alliance network composition and startups´performance in Canadian biotechnology", Strategic Management Journal, Volume 21, pp. 267-294.

Besugo, G. M. (2011). Gestão de um armazém de produtos não perecíveis - Caso de Estudo. Lisboa: Universidade Nova de Lisboa – Faculdade de Ciências e Tecnologia, Dissertação de Mestrado.

Boyson, S., Corsi, T., Dresner, M., & Harrington, L. (1999). Logistics and the Extended Enterprise.

Branco, M. P. (2013). A Comunicação Organizacional como Estratégia de Gestão. Lisboa: Escola Superior de Educação João de Deus, Relatório de Mestrado.

Braunerhjelm, Pontus (2008). "Specialization of Regions and Universities: the new versus the old", Industry and Innovation, Volume 15, N. º 3, pp. 253-275.

Braunerhjelm, Pontus (2008). "Specialization of Regions and Universities: the new versus the old", Industry and Innovation, Volume 15, N. º 3, pp. 253-275.

Carvalho, J. C., Guedes, A. P., Arantes, A. J., Martins, A. L., Póvoa, A. P., Luís, C. A., Dias, E. B., Dias, J. C., Menezes, J. C., Ferreira, L. M., Carvalho, M. S., Oliveira, R. C., Azevedo, S. G. e Ramos, T. (2010). Logística e Gestão da Cadeia de Abastecimento, (1ª Edição). Lisboa. Edições Sílabo

Carvalho, J. C., Guedes, A., Arantes, A., PaulaPóvoa, A., Luís, C., EuricoDias, Ramos, T. (2017). Logística e Gestão da Cadeia de Abastecimento. Edições Sílabo.

Christopher, M. (2005). Logistics and Supply Chain Management – Creating Value – Adding Networks. (3rd edition). Prentice Hall / Financial Times. Disponível em 12/06/2013, em: http://books.google.pt/books?isbn=0273681761

Dais, S (2014): "Industrie 4.0 – Anstoß, Vision, Vorgehen", in: Bauernhansl, T., M. ten Hompel, and B. Vogel-Heuser, eds., Industrie 4.0 in Produktion, Automatisierung und Logistik, Springer, Wiesbaden, 2014, pp. 625-634.

Deeds, D. L.; Decaloris, D.; Coombs, J. F. (1997). "The Impact of Firms-Specific Capabilities on the Amount of Capital Raised in an Initial Public Offering: evidence from biotechnology industry", Journal of Business Venturing, Volume 12, pp. 31-46.

Dobroruka, V. (2009). Aquisição de inteligência militar na Antiguidade: Alexandre e César, dois estudos de caso. Revista Militar N.º 2493.

Eiriz, Vasco (2004). "Planeamento Estratégico: Textos e Casos", Mestrado em Contabilidade e Administração ministrado pela Universidade do Minho e pelo Instituto Politécnico de Leiria, Leiria (Maio/Junho).

Fagundes, J., s.d. Economia Institucional: Custos de Transação e Impactos sobre Política de Defesa da Concorrência. s.l.:UFRJ.

Felman, M.; Gertler, M.; Wolfe, D. (2006). "University Technology Transfer and National Systems of Innovation: introduction to the special issue of industry and innovation", Industry and Innovation, Volume 13, N. º 4, pp. 359-370.

Felman, M.; Gertler, M.; Wolfe, D. (2006). "University Technology Transfer and National Systems of Innovation: introduction to the special issue of industry and innovation", Industry and Innovation, Volume 13, N. º 4, pp. 359-370.

Felman, Maryann; Gertler, Meric; Wolfe, David (2006). "University Technology Transfer and National Systems of Innovation: introduction to the special issue of industry and innovation", Industry and Innovation, Volume 13, N. º 4, pp. 359-370.

Foss, N., 1993. Theories of the firm: contractual and competence perspectives".. Journal of Economic Behavior and Organization, pp. 127-144.

Franco, M., Duarte, P. (2012). Continuous Health Care Units As Inter-Organizational Networks: A Phenomenological Study. Transylvanian Review Of Administrative Sciences, No. 37 E/2012, Pp. 55-79

GILBERT, BRETT ANITRA; MCDOUGALL, PATRICIA P.; AUDRETSCH (2008). "CLUSTERS, KNOWLEDGE SPILLOVERS AND NEW VENTURE PERFORMANCE: AN EMPIRICAL EXAMINATION", JOURNAL OF BUSINESS VENTURING, VOLUME 23, PP. 405-422.

GRANOVETTER, MARK (1973). "THE STRENGTH OF WEAK TIES", AMERICAN JOURNAL OF SOCIOLOGY, VOLUME 78, Nº 6, PP. 1360-1380.

HÅKANSSON, HÅKAN (1987). INDUSTRIAL TECHNOLOGICAL DEVELOPMENT – A NETWORK APPROACH, ROUTLEDGE, LONDON.

HANDFIELD, R. B. E BECHTEL, C. (2002). THE ROLE OF TRUST AND RELATIONSHIP STRUCTURE IN IMPROVING SUPPLY CHAIN RESPONSIVENESS. INDUSTRIAL MARKETING MANAGEMENT, 31, 367- 382.

HOANG, HA; ANTONCIC, BOSTJAN (2003). "NETWORK-BASED RESEARCH IN ENTREPRENEURSHIP: A CRITICAL REVIEW", JOURNAL OF BUSINESS VENTURING, VOLUME 18, PP. 165-187.

HUANG, HENG-CHIANG; CHANG, CHIA-WEN (2008). "EMBEDDED TIES AND THE ACQUISITION OF COMPETITIVE ADVANTAGE", JOURNAL OF INTELLECTUAL CAPITAL, VOLUME 9, N. º 1, PP. 105-121.

HUANG, HENG-CHIANG; CHANG, CHIA-WEN (2008). "EMBEDDED TIES AND THE ACQUISITION OF COMPETITIVE ADVANTAGE", JOURNAL OF INTELLECTUAL CAPITAL, VOLUME 9, N. º 1, PP. 105-121.

JAGDEV, H. S. E THOBEN, K. D. (2001). ANATOMY OF ENTERPRISE COLLABORATIONS. PRODUCTION PLANNING E CONTROL: THE MANAGEMENT OF OPERATIONS, 12(5), 437-451.

JANVIER-JAMES, A. M. (2012). A NEW INTRODUCTION TO SUPPLY CHAINS AND SUPPLY CHAIN MANAGEMENT: DEFINITIONS AND THEORIES PERSPECTIVE. INTERNATIONAL BUSINESS RESEARCH VOL. 5, NO. 1; JANUARY 2012.

KAGERMANN, H., W. WAHLSTER, AND J. HELBIG, (2013) RECOMMENDATIONS FOR IMPLEMENTING THE STRATEGIC INITIATIVE INDUSTRIE 4.0: FINAL REPORT OF THE INDUSTRIE 4.0 WORKING GROUP, FRANKFURT,

KATO, H. T. & MARGARIDO, M. A., 2000. ECONOMICA DOS CUSTOS DE TRANSAÇÃO (ECT): ANÁLISE DO CONFLITO DAS BANANAS. REVISTA DE ADMINISTRAÇÃO, OUTUBRO/DEZEMBRO, PP. 13-21.

KRACKHARDT, D.; STERN, R. N. (1988). "STRUCTURING OF INFORMATION ORGANIZATIONS AND THE MANAGEMENT OF CRISES", SOCIAL PSYCHOLOGY QUARTERLY, VOLUME 51, PP. 123-140.

LEITE, C. C., SOUZA, R. D., SILVA, S. W., JR, P. D., & OLIVEIRA, F. F. (2015). A LOGÍSTICA E A GESTÃO DA CADEIA DE SUPRIMENTOS: UM ESTUDO DE CASO DE UMA EMPRESA DA REGIÃO DO SUL DE MINAS GERAIS. XII SEGET SIMPÓSIO DE EXCELÊNCIA EM GESTÃO E TECNOLOGIA: OTIMIZAÇÃO DE RECURSOS E DESENVOLVIMENTO.

MALECKI, E. J. (1985). "INDUSTRIAL LOCATION AND CORPORATE ORGANIZATION IN HIGH TECHNOLGY INDUSTRIES", ECONOMIC GEOGRAPHY, VOLUME 61, PP. 345-369.

MAROUF, L. N. (2007). "SOCIAL NETWORKS AND KNOWLEDGE SHARING IN ORGANIZATIONS: A CASE STUDY", JOURNAL OF KNOWLEDGE MANAGEMENT, VOLUME 11, N. º 6, PP. 110-125.

MOSCHANDREAS, M., 1994. BUSINESS ECONOMICS. NEW YORK: THOMSON

MOURA, B. C. (2006). LOGÍSTICA – CONCEITOS E TENDÊNCIAS, (1ª EDIÇÃO). LISBOA. EDITOR CENTRO ATLÂNTICO, LDA.

NELSON, REED E. (1989). "THE STRENGTH OF STRONG TIES: SOCIAL NETWORKS AND INTERGROUP CONFLICT IN ORGANIZATIONS", ACADEMY OF MANAGEMENT JOURNAL, VOLUME 32, Nº 2, PP. 377-401.

OLIVEIRA, L. G., ALMEIDA, M. L., & SOUSA, A. P. (2013). LOGÍSTICA REVERSA APLICADA AO COMÉRCIO DE PNEUS: UM ESTUDO APLICADO NA RECICLANIP. SIMPÓSIO DE EXCELÊNCIA EM GESTÃO E TECNOLOGIA: GESTÃO E TECNOLOGIA PARA A COMPETITIVIDADE.

PARK, A., NAYYAR, G., & LOW, P. (2013). SUPPLY CHAIN PERSPECTIVES AND ISSUES: A LITERATURE REVIEW. FUNG GLOBAL INSTITUTE AND WORLD TRADE ORGANIZATION.

PAURA, G. L. (2012). FUNDAMENTOS DA LOGÍSTICA. PARANÁ: INSTITUTO FEDERAL DO PARANÁ.

PERCIVAL, JENNIFER C.; COZZARIN, BRIAN P. (2008). "COMPLEMENTARITIES AFFECTING THE RETURNS TO INNOVATION", INDUSTRY AND INNOVATION, VOLUME 15, N. º 4, PP. 371-392.

PYKA, ANDREAS; GILBERT, NIGEL G.; AHRWEILER, PETRA (2002). "SIMULATING INNOVATION NETWORKS", IN: PYKA, ANDREAS; KÜPPERS, GÜNTER (2002A). INNOVATION NETWORKS: THEORY AND PRACTICE, EDWARD ELGAR PUBLISHING, MASSACHUSETTS.

ROCHA, F. A. (2012). CONTROLO DE FLUXOS LOGÍSTICOS NUM ESTALEIRO DE APROVEITAMENTOS HIDROELÉTRICOS: REFORÇO DE POTÊNCIA DA BARRAGEM DE VENDA NOVA. PORTO: MESTRADO INTEGRADO EM ENGENHARIA CIVIL - 2011/2012 - DEPARTAMENTO DE ENGENHARIA CIVIL, FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO, DISSERTAÇÃO DE MESTRADO.

ROCHA, M. M. D., 2002. INTEGRAÇÃO VERTICAL E INCERTEZA. SÃO PAULO: UNIVERSIDADE DE SÃO PAULO.

RODRIGUES, R. C. (2007). ALEXANDRE, "O GRANDE" E A INFORMAÇÃO PARA O PLANEAMENTO ESTRATÉGICO. INF. & SOC.:EST, 17.

ROLDÃO, V. S. (2002). PLANEAMENTO E PROGRAMAÇÃO DAS OPERAÇÕES. LISBOA: MONITOR.

SERIO, L. C., SAMPAIO, M., & PEREIRA, S. F. (2006). A EVOLUÇÃO DOS CONCEITOS DE LOGÍSTICA: UM ESTUDO NA CADEIA AUTOMOBILÍSTICA NO BRASIL. SALVADOR.

SIMÕES, J. (2009). "A DINÂMICA DA CRIAÇÃO DE ORGANIZAÇÕES IMPULSIONADA POR INSTITUIÇÕES DE ENSINO SUPERIOR EM REDES DE INOVAÇÃO", DOUTORAMENTO EM GESTÃO, UNIVERSIDADE DA BEIRA INTERIOR, COVILHÃ.

STANK, T., KELLER, S. E DAUGHERTY, P. (2001). SUPPLY CHAIN COLLABORATION AND LOGISTICAL SERVICE PERFORMANCE. JOURNAL OF BUSINESS LOGISTICS, 22(1), 29-48.

SUIRE, RAPHAËL; VICENTE, JÉRÔME (2008). "THEÓRIE ÉCONOMIQUE DES CLUSTERS ET MANAGEMENT DES RÉSEAUX D'ENTREPRISES INNOVANTES", REVUE FRANÇAISE DE GESTION, VOLUME 184, PP. 119-136.

TSENG, Y.-Y., YUE, W. L., & TAYLOR, M. A. (2005). THE ROLE OF TRANSPORTATION IN LOGISTICS CHAIN . PROCEEDINGS OF THE EASTERN ASIA SOCIETY FOR TRANSPORTATION STUDIES, VOL. 5, PP. 1657 - 1672.

USAID: PROJECTO DELIVER . (2012). MANUAL DE LOGÍSTICA: UM GUIÃO PRÁTICO PARA A GESTÃO DA CADEIA DE ABASTECIMENTO DE PRODUTOS FARMACÊUTICOS. ARLINGTON,VA 22209 USA: JOHN SNOW, INC.

Veciana J.M. (1990). Ciencia e conocimiento cientifico: Ciencia pura y aplicada en relación en la economia de la empresa. Trabalho inédito. Facultat de Ciências Economiques i Empresarials

VECIANA, J. M. (2008). "LA INVESTIGACIÓN EN EL CAMPO DE LA CREACIÓN DE ORGANIZAÇÃOS Y PYMES: EVOLUCIÓN, TENDÊNCIAS Y PROBLEMAS", CURSO DE VERANO INTERNACIONAL UEX 2008: FUNCIÓN ORGANIZAÇÃORIAL: INVESTIGACIÓN Y APLICACIONES, UNIVERSIDAD DE ESTREMADURA

WEBER, EDWARD P.; KHADEMIAN, ANNE M. (2008). "WICKED PROBLEMS, KNOWLEDGE CHALLENGES, AND COLLABORATIVE CAPACITY BUILDERS IN NETWORK SETTINGS", PUBLIC ADMINISTRATION REVIEW, VOLUME 68, N. º 2, PP. 334-349.

WILLIAMSON, O. E., 1985. THE ECONOMICS INSTITUTIONS OF CAPITALISM. S.L.:THE FREE PRESS

The Importance of Sustainable Innovation When Defining Corporate Strategy

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Abstract: In an increasingly competitive and dynamic world where globalization, information and technology are commonly accepted as influential and determining factors of organizational culture and performance, it becomes imperative for organizations to stand out and gain an advantage over their competitors. This scenario transformation created a greater and more exquisite demand as concerns the average customer and it is now understood that a competitive advantage gained does not necessarily prevail over time. Therefore, organizations must be flexible and learn to adapt easily and rapidly to changes in order to create a sustainable position. Furthermore, the ability to be different, to be innovative, and to create unique products, services, experiences, or a combination of all three, may be viewed as a booster of competitive advantages. In this context: 1. When does innovation begin or should it begin? 2. Is innovation an organizational goal or a philosophy? 3. What makes an organization innovative? This study focuses on innovation as a precursor and defining agent in the development of a business model. First, a brainstorming session was conducted as an exploratory qualitative research effort, with eighteen participants studying innovation and technology management in Portugal (the participants were probed for their views on the three questions above). Additionally, a questionnaire was administered to Portuguese millennials (171 valid responses), with the goal of perceiving potential changes in the national culture that could impact the national innovation mindset. The results were quite surprising and reveal a significant change since the original questionnaire (led by Hofstede) was administered in Portugal.

Keywords: Innovation, Corporate Strategy, Organizational Culture, Philosophy, Sustainability

1. Introduction

"Innovation is widely regarded as a pinnacle success factor in a highly competitive and global economy." (Rajapathirana & Hui, 2018, p.44). The rapid development of new technologies as well as the globalization phenomena increase the necessity for companies to be flexible to market demands; thus companies' capability to stand-out, by being innovative is considered "the most crucial factor for competitive advantage in highly turbulent market condition." (Rajapathirana & Hui, 2018, p.45). Innovation as a mindset embedded in the organizations' ecosystem is the focus of this research. The main purpose is to consolidate concepts such as innovation and strategy, realizing which factors impact or determine the conditions for success. People are the foundation of any enterprise, people and knowledge are thus critical factors for a company's existence and survival – intellectual capital emerges associated with innovation and organizational performance. In this context, also organizational culture, and in general terms, culture, is a determinant factor as it influences the organizational dynamics and overall philosophy. In par with the literature review, it was considered pertinent to analyse not only applied innovation success cases, but also the perspectives of innovation-related trends for future generations. Therefore, a brainstorming session was organized with a group of students taking a master's degree in management, and an adapted version of the Values Survey Module 2013 Questionnaire (Hofstede & Minkov, 2013) was also conducted with Portuguese millennials, in order to perceive potential changes in the culture that could impact the national innovation mindset.

2. Literature review

2.1 Strategy and innovation

Strategy evolved through time, originated in classical Greece and evolving from a military concept into a business concept in our time (Freedman, 2013). Despite lacking a consensual definition, strategy is commonly called a "plan", a way to achieve a certain objective. Although correct, according to some authors it is an incomplete approach to this complex concept. Strategy needs to be thought of and also to emerge from

possible events that may come (Mintzberg, et al., 1998), requesting more than predictive skills. Thus, strategy involves the capability to adapt, to respond to the unexpected, and also to be able to understand the changes that surround us in order to predict what may come – this is the meeting point with innovation.

Innovation is a complex concept that Henderson (2017, p.1) simplifies as "the introduction of new ideas and methods". This proves to be a valuable asset to a firm in order to keep the customer's attention in a constantly changing world with volatile market needs – according to Gorodnichenko, et al. (2008), globalization pressures companies to innovate: the development of new technologies creates new opportunities and increases competition between firms in emerging market economies.

Innovation is thus resurfacing as a crucial and strategic factor in the differentiation of a company's processes, products or services. It is also perceived as a driving force for the development of a sustainable competitive advantage. Recent studies are emphasising the importance of considering innovation holistically. Chen, et al. (2018) present holistic innovation as being total and collaborative innovation driven by a strategic vision. The authors identify four core elements of holistic innovation, namely, strategic, total, open and collaborative innovation: the *strategic* element requires facing innovation not as a single activity, but as a mindset "embedded in the overall goal of enterprise development and the entire management process" (Chen, et al., 2018, p.5); the *total* elements inherent to total innovation management, consists in "innovation in all organizational sectors and all employees, and covers all time and space dimensions" (Chen, et al., 2018, p.5), which implies the effective integration of internal and external resources in order to "create an enterprise innovation ecosystem" (Chen, et al., 2018, p. 5); *open* innovation "focuses on the interaction between the internal and external knowledge of enterprises, emphasizing that enterprises should go beyond the existing closed innovation mode and achieve the goal of «acquiring knowledge from the outside» and «exporting knowledge» to make up for the lack of internal innovation resources, thereby improving innovation performance" (Chen, et al., 2018, p.6); lastly, the *collaborative* element is centred on knowledge – its acquisition, sharing, integration, production and, in general terms, its management, since knowledge is crucial for decision making and consequently, for the survival of companies in a constantly changing world. Thus, collaborative innovation "emphasizes the integrity of science and technology innovation; that is, the innovation ecosystem is an organic collection of elements rather than a simple summation, and its existence, objectives, and functions all show a unified integrity" (Chen, et al., 2018, p.6), and has a dynamic nature, "which means that the innovation ecosystem is constantly changing" (Chen, et al., 2018, p.6). Furthermore, it is important to mention that the four elements must not be seen independently, but "are interrelated and indispensable pillars within the helix of holistic innovation" (Chen, et al., 2018, p.5), which implies, once more, the incorporation of an innovation-oriented mindset in the organization's philosophy or culture.

The question follows of how to manage or determine a company's innovation performance. Aside from company management and identification of needed technology, "the human and structural adjustment of the organization is also gaining importance in innovation performance" (Dereli, 2015, p.1365). Kalkan, et al. (2014) reinforced the relation between an organization's capability to innovate and its intellectual capital or ability to utilize its knowledge resources. Also, according to Gogan, et al. (2016, p. 195), "the importance of the concept of intellectual capital in the age of knowledge becomes the new core of economic progress, since the influence of fixed assets and financial assets is reduced in comparison to the influence of intangible assets". In this context, three components may be identified, namely, human capital, which "refers to the characteristics and the intellectual qualities of the people from the company who have to react to market changes and customer needs" (Gogan, et al., 2016, p.196), structural capital, viewed as "the component of the organization which can be described as the organization's infrastructure and the organizational processes used to obtain products and services" (Gogan, et al., 2016, p.196), and relational capital, which "refers to the ability to establish relationships with stakeholders and the market in a sustainable and stable environment, the ability to establish interpersonal relationships and the ability to develop relationships based on trust" (Gogan, et al., 2016, p.196).

Intellectual capital is therefore considered as an important activity for organizational efficiency in the market and, consequently, for their ability to obtain sustainable competitive advantage (Gogan, et al., 2016).

2.2 Innovation and culture

It becomes imperative to know what is responsible for innovation. Is it something people can impose? Can it be solved by investing money in research and development? If it is as simple as that, why aren't all firms innovative? According to Shane (1993), the rate of innovation in a certain country can't simply be increased by

spending money in research and development, for innovation is highly influenced by social values. This author also claims that uncertainty avoidance and lack of power distance are important to innovation, and Andrijauskienė & Dumčiuvienė (2017) also state that power distance strongly influences innovation, but also focus on indulgence as an important dimension in the matter. On the other hand, Prim et al. (2016) defend that individualism, long-term orientation and indulgence are the dimensions with the most influence on innovation (not denying the impact that other dimensions may have on the innovation index of countries).

Culture isn't something unshakable: culture variants may change over time (Bentley, et al., 2004). This premise is what conditioned the survey conducted: it would be aimed at millennials. Literature divides itself in the age group which defines the millennial generations: Pew Research Center (2018) defines that millennials are born after 1980 and before 1997; Howe & Strauss (2007) state that millennials are born from 1982 to 2005 and McDonald (2015) defends that millennials are born in the last two decades of the twentieth century.

2.2.1 Hofstede insights - Portugal

Hofstede's model of six dimensions of national culture allows to trace the cultural organizational personality of different countries through six characteristics (Hofstede, 2011):

- Power Distance – how less powerful people accept that power is distributed unequally.
- Individualism – degree of interdependence among the members of the society.
- Masculinity – what motivates people to improve.
- Uncertainty Avoidance – do people feel threatened by new situations?
- Long Term Orientation – maintain link with the past in order to shape the future.
- Indulgence – degree of desire control by people.

Through the Hofstede Insights website in order to evaluate Portugal (ranked 31st in the world by the GII – Global Innovation Index in 2017) according to the six Hofstede dimensions, following Chakravorti, et al. (2017), two high-level digital competitive countries were chosen: Germany (also ranked 9th in the world by the GII in 2017) and the United Kingdom (also ranked 5th in the world by the GII in 2017). The results are shown in Figure 1.

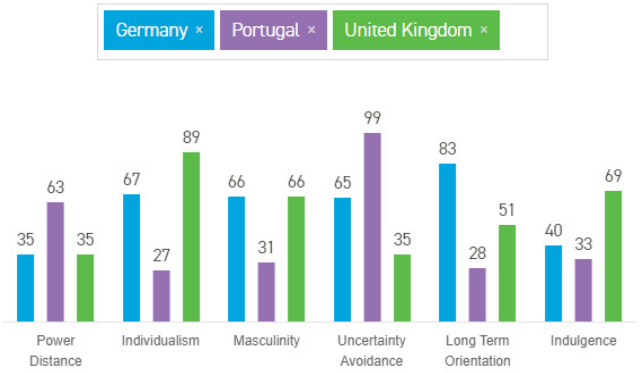

Figure 1: Hofstede's Dimensions - Germany, Portugal & United Kingdom

Source: Hofstede Insights Website – Compare Countries (2017)

Power Distance in Portugal is around 30 points higher than in Germany and the United Kingdom. This dimension reflects that people who are in "lower" positions admit privileges for their bosses - negative information is carefully delivered (in some cases even hidden), which may delay innovation, for it goes against an innovative mindset that should be established in organizations. Rinne, et al. (2012) state that a low power distance index influences innovation positively, for it promotes autonomy in decisions by employees who occupy lower positions in firms.

Individualism is much lower in Portugal when compared with Germany and the United Kingdom. This dimension is acknowledged as influencing innovation positively by Kaasa & Vadi (2008, p.9): "(...) in individualistic societies employees have more opportunities to try something new."

Regarding Portugal's index in masculinity, it marks 35 points less than masculinity in Germany and in the United Kingdom. Knowing that a low index of masculinity indicates that the dominant value in society is quality of life rather than the need to be the very best (Hofstede Insights, n.d.), it is possible to verify that the idea that "having enough to be happy" is what drives Portuguese people, not thriving to be better than anyone, if there is "space for everyone". As stated before, innovation becomes imperative when the need to stand out emerges. Thus, it is possible to verify that there may be a correlation between a low masculinity index and a low innovation index. Although it is applicable to Portugal, some authors state the opposite: Cox & Khan (2017) state that low masculinity is one of the characteristics that contribute to a higher innovation level. On the other hand, and also considering the study mentioned before, Andrijauskienė & Dumčiuvienė (2017) through regression analysis state that this dimension has no significant impact when analysing innovation.

Uncertainty Avoidance strikes the peak in Portugal's analysis: 99 out of 100 possible points, contrasting with 35 points in the United Kingdom and 65 points in Germany. According to many authors, a high index in uncertainty avoidance has a negative influence on innovation and the Hofstede Insights website states: "If there is a dimension that defines Portugal very clearly, it is Uncertainty Avoidance. (...) there is an emotional need for rules (...) innovation may be resisted, security is an important element in individual motivation."

However, once more, Andrijauskienė's regression analysis doesn't recognize an impact on innovation (Andrijauskienė & Dumčiuvienė, 2017).

Regarding Long-Term Orientation, Portugal scores 55 points less than Germany and 23 points less than the United Kingdom. According to Hofstede (2011), short-term oriented cultures tend to focus on the present following traditional guidelines. Hofstede Insights also states that societal change is seen with suspicion in short-term oriented cultures, and according to Prim's regressive analysis, long-term oriented cultures are positively correlated with innovation (Prim, et al., 2016).

In the Indulgence dimension, Portugal scores 33 points, close to Germany's 40 points and less than half of the United Kingdom score (69 points). In this dimension is the meeting point of the regression analysis made by Andrijauskienė & Dumčiuvienė (2017) and Prim, et al. (2016). In both studies indulgence is considered to have an important impact in innovation. According to Hofstede Insights, Portugal has a restraint culture which leads to cynicism and pessimism, and according to Arpaci (2014), more indulgent cultures tend to accept easily new technologies, which may influence the capacity to innovate (as confirmed by the regression analysis of Andrijauskienė & Dumčiuvienė (2017) and Prim, et al. (2016)).

2.3 Applied innovation cases

2.3.1 The impact of innovation on companies

Although innovation in Portugal has improved, the way forward is still long. However, there are companies that have truly managed to "go beyond" and think of innovation as one of their key missions, as is the case with *Stanton Chase* – a company that focuses on identifying, managing, and developing the talent of people and is dedicated exclusively to the provision of new and innovative solutions in Human Capital Management.

This is an international company, present in 46 countries with 73 offices and is one of the 10th largest international companies of Executive Search worldwide, because its processes and methodologies are extremely recognized for their great levels of effectiveness and success (Stanton Chase, 2017).

In addition to this example of Portuguese innovation success, others have become globally acknowledged for the last 40 years (Stanton Chase, 2017):

- *Via Verde*, developed by Brisa, which allows road traffic to occur with greater fluidity, thus avoiding many constraints on motorists;
- The first prepaid mobile phone cards that came to revolutionize the world of telecommunications and allowed the massification of electronic devices and devices, facilitating the whole process (the *Mimo* developed by *TMN*);
- The *Multibanco* system developed by *SIBS* with its range of services (withdrawals, services payment, transfers, etc.);

- *Critical*, a company in Coimbra specializing in the development of software solutions, in which its applications were even acquired by NASA to detect systems testing, detect errors and eradicate them;
- The featherweight gas bottle developed by *Galp*.

Portuguese universities have a significant impact on the creation of new companies based on the innovation pillar:

- *FASTinov* is part of the Faculty of Medicine of the University of Porto that promises to revolutionize the way doctors prescribe antibiotics. FASTinov has received approximately €2.6 million from the European Commission with the aim of launching a clinical diagnostic medical kit which, in a very synthetic way, will allow the susceptibility of bacteria to antibiotics in 60 minutes, allowing a greater speed and efficiency in the treatment of patients suffering from serious bacterial infections, without compromising their health conditions.
- *Veniam* is a spin-off from the University of Porto, IT and the University of Aveiro, which has innovated in transforming buses, cars, trucks and other vehicles into Wi-Fi access points that allow the Internet to be available to all citizens. The concept was tested in Porto, in the STCP fleet, and has already made available 4 million Internet sessions to more than 400,000 users; Veniam is now a part of international markets and the results are very satisfactory, particularly in Singapore and New York.

Unfortunately, history is not only written by strategy and innovation success, as we discuss below.

In 2015, *Nintendo* – an iconic and well-known Japanese company dedicated to the development of video games – faced a major crisis where it was accustomed to being a leader, due to the strong changes that affected the industry. The transformations in the video game market were so intense that the company was unable to cope with or compete with other e-gaming companies around the world, which meant that customers' needs were not met. That combined led to the loss of their fans' loyalty, resulting in a huge decrease in the number of game units sold, the loss of terrain to Sony and Microsoft in the traditional consoles segment and the threat of losing their proficiency in mobile gaming.

The President of the company was faced with a huge blow leading him to even consider the possibility of Nintendo being acquired by another major entertainment company (Kim, et al., 2011).

2.3.2 Innovation: the European Union and Portugal on a global scale comparison

The extremely fast pace of growth in the world means that companies are innovating and renewing in an almost instantaneous way, as the emergence of innovation for business success and economic growth is felt.

According to Eurostat metrics, the most innovative country in Europe is Switzerland and Portugal appears in the third group of most innovative countries.

Although Portugal has tried to stand out by betting heavily on innovation and entrepreneurship in recent years, much remains to be done: the results are not brilliant but don't disappoint. If the analysis is extended beyond the European Union, it is found that research and development investment is still far behind the main competing countries, in descending order, Israel, South Korea, China, Slovenia, Japan, Ireland and the USA, who see their companies investing more in this department. These data are curious because the proportion of business investment in total research and development is high in only two European countries. Portugal ranks in the last third of this list (Janeiro, 2017).

3. Methodology

Bibliographic research was conducted in order to clarify concepts such as "innovation" and "strategy". This research also aimed to connect both concepts in order to understand how far innovation should influence corporate strategy, as practical cases were also studied in which innovation influenced (positively and negatively) organizations' results.

As innovation was researched, it was understood that it was influenced by social values. Therefore, bibliographic research was made regarding Hofstede's six dimensions of national culture and in the Hofstede Insights website data was retrieved to compare Portugal with other countries.

Afterwards, in order to understand the way innovation is seen in a country with a medium technological level, an exploratory brainstorming session was conducted with eighteen individuals taking a master's degree in management at the University of Aveiro. This brainstorming session focused on three questions:

1. When does innovation begin or should it begin? This question aims to analyse the origin of innovation in an organizational context.
2. Is innovation an organizational goal or a philosophy? This question seeks to understand whether innovation is thought of as the main goal of an organization or as a mindset that should be implanted.
3. What makes an organization innovative? This question aims to know what an organization has to do in order to be innovative. This question was also replied to as follows: What leads organizations to innovation?

The brainstorming session analysis contains the common points that the eighteen participants registered, and is followed by quotes that sustain (or not) the answers given.

To add statistical relevance to this study, a survey was created by adapting the Values Survey Module (VSM) made by Geert Hofstede and Michael Minkov which enables researchers to obtain a certain group score in the six dimensions of national culture. To understand whether national culture is changing, the survey was administered online and answered by Portuguese millennials born from 1980 to 1999.

4. Field work

4.1 Brainstorming session

Following the connection between strategy and innovation, a brainstorming session was conducted and some of the common replies are shown and discussed as follows:

4.1.1 When does innovation begin or should it begin?

Focusing on the first part of the question, innovation is known to begin when the firm has to develop a new product/ service or improve an existing one in order to attract the customers' attention – product innovation, as defined by Boer & During (2001, p.84) is: "(...) development, production and commercialization of new products(...)". It was also acknowledged that innovation may appear when the firm needs to lower its costs in order to increase its profit margin – process innovation, which may also appear while a new product is being developed (Boer & During, 2001).

Following the second part of the question, regarding the exact moment when innovation should begin, the session indicates that there is not a moment in the firm's lifetime where innovation should appear - innovation must be in the mindset of the organization, flowing freely. According to IDEO's website (2018): "Building innovation capabilities that are sustainable doesn't happen overnight. Ultimately, it requires a company's leadership to make a bold commitment, and set up the right conditions for creativity to thrive."

4.1.2 Is innovation an organizational goal or a philosophy?

Both. Innovation is seen mainly as a philosophy for it is a tool to achieve the firm's goals and not the objective itself, although in specific cases it stands as an organizational goal – as example, IDEO, among other design and innovation consulting companies.

4.1.3 What makes an organization innovative?

This question was seen in two different ways – as what leads organizations to innovation and what an organization needs to do in order to be considered innovative.

Regarding the first interpretation, an organization becomes innovative when it wants to create competitive advantage by "standing out" in the market it operates. This may happen by innovating in product, service or process.

As to what an organization needs to do in order to be considered innovative, answers indicate that being able to understand what surrounds the organization is crucial – understanding the customers' necessities and the technological evolution.

Also, regarding this question it is understood that the responsibility of innovation is an act of the people inside the organization – an innovation mindset must be implemented, for innovation may come from people and from processes (Ovans, 2015): innovative people may innovate, but it is also possible to create processes that may help less innovative-oriented people to innovate.

4.2 Questionnaire – VSM 2013 adaptation

The VSM 2013 adaptation had 24 questions and we received 171 valid replies (please see appendices 1 and 2).

The data retrieved from the survey was transformed through a descriptive statistical analysis, into the six dimensions model following the form available on the website – the results follow as shown in Figure 2.

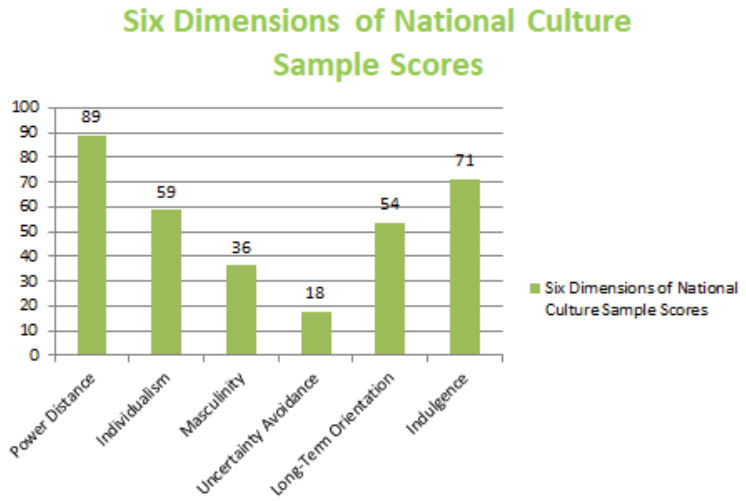

Figure 2: Six Dimensions of National Culture Sample Scores

Source: Own elaboration according to the survey performed

Comparing the scores of the sample with the scores registered in the Hofstede Insights website:

- Power Distance is much higher: 89 points versus 63 points;
- Individualism increased from 27 points to 59;
- Masculinity had a slight increase from 31 to 36 points;
- Uncertainty Avoidance strikes the biggest difference between the index on the Hofstede Insights website and the sample scores. From 99 points to 18 points;
- Long-Term Orientation increased from 28 points to 54 points;
- Finally, Indulgence also registered a considerable increase, from 33 to 71 points.

5. Conclusions

According to the literature, it is possible to understand that innovation and strategy are strongly linked in the twenty-first century. The globalization process created a more volatile world where a firm that might have been successful for many years, can be struggling today and may close in a few months. Therefore, innovation should be acknowledged as an important variable when aiming to achieve a sustainable competitive advantage. As Karabulut (2015, p.1338) stated, "an innovation strategy should be consistent to mission, vision, goals and strategies of a firm", additionally, "firms should be dedicated to invest in research and development, manufacture innovative products and achieve substantial performance to be competitive" (Karabulut, 2015, p.1338). Nonetheless, innovation is more than investing in research and development techniques, it is strongly influenced by the values that drive people inside the organization. Therefore, after studying Portugal in the Six Dimensions' model of Geert Hofstede, it is possible to state that:

- Power Distance in Portugal is strong and influences innovation negatively for it implies that bosses have too much control over their subordinates' tasks and these avoid the providing of negative information – how is it possible to innovate if negative points aren't dealt with? How is creativity possible if a whole department is run by a single mind?

- The low score in Portugal's Individualism might also be a negative influential dimension to innovation, for this dimension is correlated with innovation in some studies. The same follows for the low masculinity index registered in Portugal's score.
- Uncertainty Avoidance is the dimension that defines Portuguese culture the most, for it strikes the highest score of all dimensions. Uncertainty Avoidance is strongly linked to innovation: If changing something is scary, it is better to follow the old practices. However, what if the way things are made is not the best? It is almost an antonym of innovation.
- Regarding orientation, Portugal is considered a short-term oriented country. This may be negative for innovation as short-term oriented cultures don't embrace societal change (which is a sign of innovation).
- Portugal is also understood as a restraint country, which influences innovation negatively: more indulgent societies tend to accept change better.

The examples presented at length help to understand the central role that innovation increasingly occupies in a company's strategy. The situations described refer mostly to the Portuguese case, precisely because we have tried to understand how the country has dealt with such important issues as the development of new processes, technologies and products - in reality, though, the path is still long to "innovate innovation".

The brainstorming session showed that innovation is understood by Portuguese scholars as important to strategy.

Regarding innovation, the results of the VSM 2013 adapted questionnaire to Portuguese millennials show a positive behaviour when compared to the results registered by the whole country in the Hofstede Insights website. Although Power Distance has drastically increased, all other dimensions evolved positively according to the bibliographic research explored in the preceding topics, which may imply that societal change might be evolving positively and that Portuguese culture may become more innovation friendly. It is noteworthy that the Uncertainty Avoidance dimension presented a much lower index, which again means that it is a trend that may be changing and, consequently, may prove very advantageous for the innovation ecosystem of Portuguese organizations.

References

Andrijauskienė, M. & Dumčiuvienė, D. (2017) Hofstede's Cultural Dimensions and National Innovation Level. DIEM: Dubrovnik International Economic Meeting, Volume 3.

Arpaci, I. (2014) A comparative study of the effects of cultural differences on the adoption of mobile learning: Cross-country differences in mobile learning adoption. British Journal of Educational Technology, Volume 46.

Bentley, R. A., Hahn, M. W. & Shennan, S. J. (2004) Random drift and culture change. The Royal Society, Volume 271, pp. 1443-1450.

Boer, H. & During, W. E. (2001) Innovation, What Innovation? A Comparison between product, process and organizational innovation. International Journal of Technology Management, Volume 22:1/2/3, pp. 83-107.

Chakravorti, B., Bhalla, A. & Chaturvedi, R. S. (2017) 60 Countries' Digital Competitiveness, Indexed. Harvard Business Review, Issue Global Strategy.

Chen, J., Yin, X. & Mei, L. (2018) Holistic Innovation: An Emerging Innovation Paradigm. International Journal of Innovation Studies.

Cox, P. & Khan, R. (2017) Country Culture and National Innovation. Archives of Business Research, Volume 5, pp. 85-101.

Dereli, D. D. (2015) Innovation Management in Global Competition and Competitive Advantage. Procedia - Social and Behavioral Sciences, Volume 195, pp. 1365-1370.

Freedman, L. (2013) Strategy: A History. Oxford: Oxford University Press.

GII (2017) The Global Innovation Index 2017: Innovation Feeding the World. [Online]
Available at: https://www.globalinnovationindex.org/gii-2017-report#
[Accessed March 2018].

Gogan, L. M., Artene, A., Sarca, I. & Draghici, A. (2016) The Impact of Intellectual Capital on Organizational Performance. Procedia - Social and Behavioral Sciences, Volume 221, pp. 194-202.

Gorodnichenko, Y., Svejnar, J. & Terrell, K. (2008) Globalization and Innovation in Emerging Markets. IZA (Institute for the Study of Labor), Volume IZA DP No. 3299.

Henderson, T. (2017) Why Innovation Is Crucial To Your Organization's Long-Term Success. Forbes.

Hofstede Insights, n.d. Hofstede Insights: Compare Countries. [Online]
Available at: https://www.hofstede-insights.com/product/compare-countries/
[Accessed March 2018].

Hofstede, G. (2011) Dimensionalizing Cultures: The Hofstede Model in Context. Online Readings in Psychology and Culture, Volume 2(1).
Hofstede, G. & Minkov, M. (2013) VSM 2013: Values Survey Module 2013 Manual. [Online] Available at: https://geerthofstede.com/wp-content/uploads/2016/07/Manual-VSM-2013.pdf[Accessed March 2018].
Hofstede, G. & Minkov, M. (2013) VSM 2013: Values Survey Module 2013 Questionnaire. [Online] Available at: https://geerthofstede.com/wp-content/uploads/2016/07/VSM-2013-English-2013-08-25.pdf[Accessed March 2018].
Howe, N. & Strauss, W. (2007) The Next 20 Years: How Customer and Workforce Attitudes Will Evolve. Harvard Business Review.
IDEO (2018) Big Questions: What makes organizations more creatively competitive?. [Online] Available at: https://www.ideo.com/question/how-can-design-help-organizations-be-more-creatively-competitive[Acedido em March 2018].
Janeiro, P. (2017) O estado da inovação. Observador.
Kaasa, A. & Vadi, M. (2008) How does Culture contribute to Innovation? Evidence from European Countries, Tartu: Tartu University Press.
Kalkan, A., Bozkurt, Ö. Ç. & Arman, M. (2014) The Impacts of Intellectual Capital, Innovation and Organizational Strategy on Firm Performance. Procedia - Social and Behavioral Sciences, Volume 150, pp. 700-707.
Karabulut, A. T. (2015) Effects of Innovation Strategy on Firm Performance: A Study Conducted on Manufacturing Firms in Turkey. Procedia - Social and Behavioral Sciences, Volume 195, pp. 1338-1347.
Kim, S. et al. (2011) Nintendo's "Revolution". MITSloan Management.
McDonald, N. C. (2015) Are Millennials Really the "Go-Nowhere" Generation?. Journal of the American Planning Association, Volume 81:2, pp. 90-103.
Mintzberg, H., Ahlstrand, B. & Lampel, J. (1998) Strategy Safari: A Guided Tourthrough the Wilds of Strategic Management. New York: The Free Press.
Ovans, A. (2015) Is Innovation More About People or Process?. Harvard Business Review, Issue Organizational Culture.
Pew Research Center (2018) Topics: Millennials. [Online] Available at: http://www.pewresearch.org/topics/millennials/[Accessed March 2018].
Prim, A. L., Filho, L. S., Zamur, G. A. C. & Serio, L. C. D. (2016) The relationship between national culture dimensions and degree of innovation. International Journal of Innovation Management, Volume 21.
Rajapathirana, R. P. J. & Hui, Y. (2018) Relationship between innovation capability, innovation type, and firm performance. Journal of Innovation & Knowledge, Volume 3, pp. 44-55.
Rinne, T., Steel, G. D. & Fairweather, J. (2012) Hofstede and Shane Revisited: The Role of Power Distance and Individualism in National-Level Innovation Success. SAGE Journals, Volume 46:2, pp. 91-108.
Shane, S. (1993) Cultural influences on national rates of innovation. Journal of Business Venturing, Volume 8, pp. 59-73.
Stanton Chase (2017) Inovação Made in Portugal. [Online] Available at: http://www.stantonchase.pt/inovacao-made-in-portugal/[Accessed March 2018].
Universidade do Porto (2015) UP Inovação: Casos de Sucesso. [Online] Available at: https://upin.up.pt/pt-pt/content/casos-de-sucesso[Accessed March 2018].

Appendix 1: Survey (24 questions) administered to Portuguese millennials

Please think of an ideal job, disregarding your present job, if you have one. In choosing an ideal job, how important would it be to you to ... (please circle one answer in each line across):
1 = of utmost importance 2 = very important 3 = of moderate importance 4 = of little importance 5 = of very little or no importance

1. have sufficient time for your personal or home life
2. have a boss (direct superior) you can respect
3. get recognition for good performance
4. have security of employment
5. have pleasant people to work with
6. do work that is interesting
7. be consulted by your boss in decisions involving your work
8. live in a desirable area
9. have a job respected by your family and friends
10. have chances for promotion

In your private life, how important is each of the following to you: (please circle one answer in each line across):

11. keeping time free for fun
12. moderation: having few desires

13. doing a service to a friend
14. thrift (not spending more than needed)
15. How often do you feel nervous or tense? 1. always 2. usually 3. sometimes 4. seldom 5. never
16. Are you a happy person ? 1. always 2. usually 3. sometimes 4. seldom 5. never
17. Do other people or circumstances ever prevent you from doing what you really want to? 1. yes, always 2. yes, usually 3. sometimes 4. no, seldom 5. no, never
All in all, how would you describe your state of health these days? 1. very good 2. good 3. fair 4. poor 5. very poor
18. How proud are you to be a citizen of your country? 1. very proud 2. fairly proud 3. somewhat proud 4. not very proud 5. not proud at all
19. How often, in your experience, are subordinates afraid to contradict their boss (or students their teacher?) 1. never 2. seldom 3. sometimes 4. usually 5. always

To what extent do you agree or disagree with each of the following statements? (please circle one answer in each line across):

= strongly agree 2 = agree 3 = undecided 4 = disagree 5 = strongly disagree

20. One can be a good manager without having a precise answer to every question that a subordinate may raise about his or her work
21. Persistent efforts are the surest way to results
22. An organization structure in which certain subordinates have two bosses should be avoided at all cost
23. A company's or organization's rules should not be broken - not even when the employee thinks breaking the rule would be in the organization's best interest

Appendix 2: Data – calculations

The means were calculated for the responses given. E.g., for the first four questions [where Score = C2*B2 and Mean = SUM(D2:D6)/SUM(C2:C6)]:

Question	Answer	Replies	Score	Mean
1	1	101	101	1,578947
	2	50	100	
	3	14	42	
	4	3	12	
	5	3	15	
2	1	80	80	1,777778
	2	62	124	
	3	20	60	
	4	5	20	
	5	4	20	
3	1	111	111	1,497076
	2	46	92	
	3	8	24	
	4	1	4	
	5	5	25	
4	1	111	111	1,508772
	2	43	86	
	3	11	33	
	4	2	8	
	5	4	20	

Then the index country scores were calculated as follows (more information at: https://www.researchgate.net/post/How_can_we_compute_and_assign_constant_values_to_Hofstedes_Cultural_Dimensions)

Sample Index without **Constant**	Portugal's Index scores according to Hofstede Insights	Correction		Sample Index Scores FINAL
Power Distance Index	63	0	63	88,93937
25,93937				
=35(m07-m02)+25(m20-m23)+C(pd)				
Individualism Index	27	0	27	58,72515
31,72515				
=35(m04-m01)+35(m09-m06)+C(ic)				
Masculinity Index	31	0	31	36,32164
5,321637				
=35(m05-m03)+35(m08-m10)+C(mf)				
Uncertainty Avoidance Index	99	40,64386	58,35614	17,71229
-40,6439				
=40(m18-m15)+25(m21-m24)+C(ua)				
Long-Term Orientation Index	28	0	28	53,84795
25,84795				
=40(m13-m14)+25(m19-m22)+C(is)				
Indulgence Index	33	0	33	71,47953
38,47953				
=35(m12-m11)+40(m17-m16)+C(ir)				

Entrepreneurial Profile and the Level of Individual Entrepreneurship

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Abstract: The aim of this article is to confirm or reject assumptions about the existence of a relationship between the characteristics and abilities of an individual which are listed in the literature as characteristics of an effective entrepreneur, and the level of individual entrepreneurship in managerial practice. The paper is both theoretical and empirical in nature and consists of four main parts. The first part discusses the essence of entrepreneurship. Next, attention is focused on entrepreneurship understood as a complex personal competence and on the qualities characteristic of an effective entrepreneur as proposed in the literature. The third part presents the current state of knowledge relating to the influence of personality traits on an individual's level of entrepreneurship, citing the findings of other research in this area. Finally, the results obtained by the author as a result of the conducted pilot study are presented. This paper fully corresponds with the issues undertaken within the scope of the European Conference on Innovation and Entrepreneurship and contributes to expanding the knowledge relating to the existence of a relationship between entrepreneurial profile and the level of individual entrepreneurship. Moreover, it can also provide inspiration for conducting further empirical research in this area. This study was conducted within the research project "The impact of managerial intuitive potential on the effectiveness of decision making processes", financed by the National Science Centre, Poland (funds allocated on the basis of decision No. DEC-2014/13/D/HS4/01750).

Keywords: entrepreneur, entrepreneurship, individual entrepreneurship.

1. Introduction

Entrepreneurship is an extremely important and useful notion both at the level of individuals and at the level of teams, organizations, regions and countries (Oleksyn 2012, p. 23). For this reason, it is a subject that continues to attract the interest of management theoreticians and practitioners. Significant interest in entrepreneurship, however, has not resulted in the formulation of a universal definition of this concept.

According to differing approaches, it is defined as a process, as a type of behaviour, or as a set of personality traits characteristic of an entrepreneur. In the literature, extensive lists of attributes, skills, abilities and predispositions characteristic of an effective entrepreneur can be found. It seems reasonable to try and ascertain whether possessing such features translates into the level of a person's individual entrepreneurship (undertaking entrepreneurial activities in managerial practice). In order to find an answer to the above question, the author has conducted an empirical pilot study in this area.

The aim of this article is to confirm or reject assumptions about the existence of a relationship between the individual characteristics and abilities of an individual which are listed in the literature as characteristics of an effective entrepreneur, and the level of individual entrepreneurship in managerial practice. The paper is both theoretical and empirical in nature and consists of four main parts. The first part discusses the essence of entrepreneurship. Next, attention is focused on entrepreneurship understood as a complex personal competence and on the qualities characteristic of an effective entrepreneur as proposed in the literature. The third part presents the current state of knowledge relating to the influence of personality traits on an individual's level of entrepreneurship, citing the findings of other research in this area. Finally, the results obtained by the author as a result of the conducted pilot study are presented.

2. Literature review

2.1 The essence of entrepreneurship

Formulating a precise definition of entrepreneurship poses many problems. This is due to the fact that it is a multi-faceted and multi-dimensional concept. It can pertain to both individuals and teams, along with entire organizations and communities. In the literature there is no single, universal definition of the concept of entrepreneurship. Table 1 presents some selected definitions of entrepreneurship proposed by leading representatives of research in this field.

Table 1: Selected definitions of entrepreneurship

Author	Definition of entrepreneurship	Key aspects	Approach
J. Schumpeter	It is a process of creative destruction which results in new combinations of production factors, being the sources of entrepreneurial activities (Schumpeter 1990, p. 104).	– innovation, breaking the routine	– entrepreneurship treated as a process
J. Timmons	It is a way of thinking, reasoning and acting focused on seeking opportunities (Glinka 2008, p. 15).	– identification of opportunities	– entrepreneurship treated as a type of behaviour
W. Gartner	It is an act of creation, innovation, creating a new entity (Gartner 1992).	– innovation	– entrepreneurship treated as a process
J. Timmons and H. Stevenson	It is a process of creating and identifying opportunities and exploiting them regardless of the resources possessed. Entrepreneurship is a creative act of an entrepreneur, who starts or builds an enterprise by adopting an active attitude instead of passive observation (Timmons 1999, p. 218).	– generating and identifying opportunities	– entrepreneurship treated as a process
G.S. Mesch and D. Czamanski	It is an adaptive response to changes in the environment, mainly in the labour market (Mesch, Czamanski 1997, p. 597-610).	– adaptation to change	– entrepreneurship treated as a type of behaviour
N. Churchill	It is a process of discovering and shaping opportunities for creating new values through innovation, obtaining the necessary resources and managing the value creation process (Targalski, Falencik 2009, p. 87).	– identifying and shaping opportunities, – innovation	– entrepreneurship treated as a process
A.P. Wiatrak J. Wilkin	It is a set of traits, talents, skills,as well as the system of values, motivation and actual behaviour of a person referred to as an entrepreneur (Wiatrak 2001, p. 21; Wilkin 2008, pp. 57-66).	–the personality traits, predispositions and competences of an entrepreneur	– entrepreneurship treated as a complex personal competence

Source: own compilation.

Summarizing the definitions of entrepreneurship presented in Table 1, it can be noticed that this concept concerns a range of aspects, the most common and fundamental being innovation as well as the creation, identification and exploitation of opportunities. It can also be noted that entrepreneurship is approached in three basic ways:

- as a process (entrepreneurship is treated as a set of interrelated activities, the implementation of which is necessary to obtain a specific result),
- as a type of behaviour (entrepreneurship is perceived as a way of acting in a specific situation; behaving, acting or reacting to stimuli),
- as a set of personality traits (entrepreneurship is defined as a set of specific features, predispositions and abilities characteristic of an entrepreneur).

The understanding of entrepreneurship adopted in this study is one which defines the concept as a complex personal competence, according to which specific personality traits create the specific profile of an entrepreneur.

2.2 The profile of an effective entrepreneur

In the classic perspective, an entrepreneur is a person that is both the founder of a company and its manager, who bears the full risk and financial responsibility connected with running it. With the emergence of increasingly larger enterprises, the unity of these three functions has been disrupted; which can mean that one person founds the company, another manages the company, and still another shoulders the financial risk. The importance of entrepreneurs decreased in the 20th century due to the emergence of professional managers.

Therefore, the capitalism of the 1960s, 1970s and 1980s is called "managerial capitalism." The last two decades of the 20th century, however, saw a resurgence of entrepreneurship and a return to the classical understanding of an entrepreneur.

An effective entrepreneur is characterized by specific features that create a consistent profile. These qualities include the following (Oleksyn 2012, p. 12):

- having passions and interests (activeness),
- mindfulness, ability to notice opportunities,
- creativity,
- ability to assess and take risks,
- apt formulation of mission and vision,
- having a business idea,
- ability to reach the right people and bring them round to one's ideas,
- boldness and tenacity,
- intuition,
- flexibility.

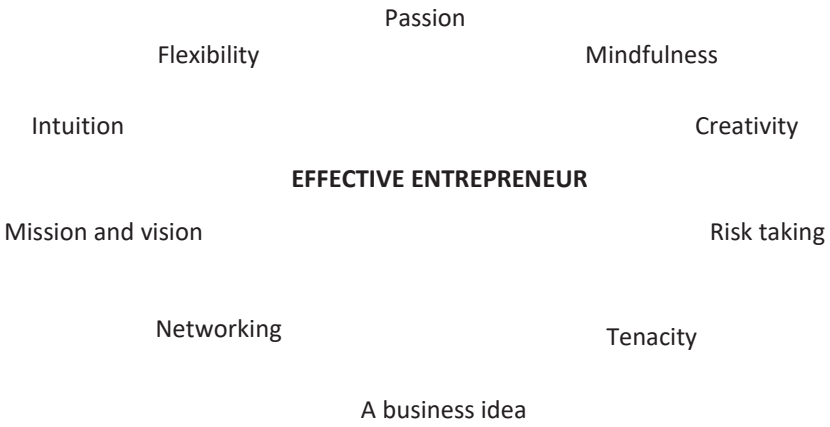

Figure 1: The features of an effective entrepreneur

Source: own compilation based on (Oleksyn 2012, p. 12).

An effective entrepreneur is primarily characterized by passion in their actions, especially when it comes to business operations. The entrepreneur is interested in the sector in which the company operates. Such a person has a positive attitude towards customers and products; hence they are able to become really committed and devote a lot of time to work.

Another important feature of an entrepreneur is mindfulness, also referred to as watchful concentration. This concerns the ability to identify opportunities that appear in the environment.

The next feature which is desirable in the profile of an effective entrepreneur is creativity. It should be emphasized, though, that entrepreneurs themselves do not have to be inventors. However, they should understand the importance of innovations and inventions for the effective functioning of an enterprise.

An entrepreneur's creativity is directly related to having a business idea. An effective entrepreneur must provide the company with a product that will find a sufficient number of buyers. However, it should be remembered that in this approach creativity must have a continuous character. This is because the success of a current business domain does not necessarily mean that it is going to be successful in the future. An entrepreneur's creativity is not limited to specifying the product and the business domain. It also involves the ability to formulate the appropriate mission and vision, as well as building a network of connections both within the company and in its environment.

As no business activity is risk-free, an important feature of an effective entrepreneur is their ability to assess and take risks. People with a strong need for security do not seem to be suitable for undertaking the role of entrepreneurs.

An important element from the point of view of the conduct of business operations is an appropriate, in terms of content, formulation of the mission and vision. If these objectives are defined accurately and honestly, they

unite all the employees around the process of their implementation while fulfilling a motivational and integrative function.

The ability to reach the right people (co-workers, business partners, representatives of the financial sector and the media) and bring them round to one's ideas often turns out to be a crucial feature of an effective entrepreneur. This feature is associated with a high level of social skills, including communication skills, empathy, negotiation skills, tact, patience, and a sense of timing (Poissant, Godefroy 1993, p. 164).

Success in running a business requires time and resistance to failure. Therefore, an entrepreneur should be psychologically resilient, persistent, patient and tenacious.

An entrepreneur's intuition is a factor that largely determines the success of a business. This is because not everything can be measured, calculated and predicted. Sometimes an entrepreneur's conviction about the rightness of decisions made without the support of rational arguments determines their company's advantage in the market.

The final feature of an effective entrepreneur is flexibility, which is essential both in formulating goals and finding ways to achieve them.

2.3 The qualities of an effective entrepreneur in relation to managerial practice

Over the last three decades, many researchers have attempted to determine the impact of selected personality traits on entrepreneurial activities. Table 2 presents selected results of research in this area.

Table 2: Selected empirical studies into the relationship between specific personality traits and the level of individual entrepreneurship

Author and year	Trait/ability/predisposition	Relationship
D. Hull, J. Bosley, G. Udell 1980 C.K. Kay 1986 G. Hills, G.T. Lumpkin, R.P. Singh 1997 S.Y. Lee, R. Florida, Z.J. Acs 2004 A. Ardichvili, R. Cordozo, R. Sourav 2003 D. Dimov 2007 L. Kirzner 2009 J. Heinonen, U. Hytti, P. Stenholm 2011 N. Nicolaou and S. Shane 2015	Creativity	• D. Hull: the author stated that entrepreneurs are characterized by a higher level of creativity than non-entrepreneurs (Hull, Bosley, Udell 1980), • C.K. Kay: according to the author, creativity plays a key role in an entrepreneur's decision-making process (Kay 1986), • G. Hills: research conducted by the author showed that 90% of respondents consider creativity as an important feature in the process of identifying opportunities (Hills, Lumpkin, Singh 1997), • S.Y. Lee: the author proved that people who start a business are characterized by a relatively high level of creativity (Lee, Florida, Acs 2004), • A. Ardichvili, D. Dimov, L. Kirzner, J. Heinonen: summarizing their research, the authors concluded that creative people are more capable of recognizing business opportunities (Ardichvili, Cardozo, Sourav 2003; Dimov 2007; Kirzner 2009; Heinonen, Hytti, Stenholm 2011), • N. Nicolaou and S. Shane: the authors identified the existence of a relationship between having a creative personality and undertaking entrepreneurial activities and starting a business. In addition, they also found a linear relationship between a creative personality and the ability to identify opportunities. According to the researchers, some individuals have a predisposition to enhance their creative personality and at the same time to be entrepreneurs. It should be emphasized that such predispositions are primarily genetically determined (Nicolaou , Shane 2015).
C.P. Neck and C.C. Manz 1992, 1994 N.J. Kruger and P.R. Dickson 1994	Optimism	• N.J. Kruger and P.R. Dickson showed that optimism affects the effectiveness of one's actions. Optimism in this case relates to the ability to achieve ambitious goals rather than being identified with a propensity for taking risks (Kruger, Dickson 1994), • C.P. Neck and C.C. Manz observed that an entrepreneur's effectiveness influences their optimism and results in a greater tendency to see opportunities rather than threats in a given situation (Neck, Manz 1992, 1996).
G. Hills 1997	Networking	On the basis of his research, the author proved that entrepreneurs who have an extensive network of connections with other businesses are able to identify significantly more opportunities than entrepreneurs operating individually (Hills, Lumpkin, Singh 1997).

Author and year	Trait/ability/predisposition	Relationship
W.H. Stewart and P.L. Roth 2004	Risk propensity	Based on their research, the authors formulated a conclusion that there is a relationship between risk propensity and undertaking entrepreneurial behaviours (Stewart, Roth 2004).
H. Zhao and S. Seibert 2006	Conscientiousness and openness to experience	The authors proved that a relationship exists between two personality traits and the level of individual entrepreneurship. These traits are conscientiousness, understood as hard work and motivation in the pursuit of goal accomplishment; and openness to experience, defined as intellectual curiosity, seeking new experiences and exploring novel ideas (Zhao, Seibert 2006).
W.H. Stewart, P.L. Roth 2007	Achievement motivation	In the course of empirical research, the existence of a relationship between a person's internal achievement motivation and their individual entrepreneurship was confirmed (Stewart, Roth 2007).

Source: own compilation.

Summing up the list of empirical studies presented in Table 2 concerning the existence of a relationship between certain personality traits, abilities and predispositions of individuals and the level of their individual entrepreneurship, it can be noticed that although extensive lists of qualities characteristic of an effective entrepreneur have been compiled in the literature, in practice the relationship has only been empirically verified between selected features and the level of entrepreneurship. The relationship between individual entrepreneurship and the level of a person's creativity is the best documented. The authors showed that people with a higher level of creativity are more effective as regards starting a business and making decisions while conducting business operations, as well as generating, identifying and seizing opportunities which appear in the environment. Other features whose impact on an individual's level of entrepreneurship has been verified are an entrepreneur's optimism, network of connections, risk propensity, conscientiousness, openness to experience, and achievement motivation.

3. Research methodology

The aim of this article was to identify the relationship between the personality traits defined in the literature as characteristic of an effective entrepreneur and the level of a person's individual entrepreneurship. In order to verify the above research problem, a pilot empirical study was conducted.

The research involved 48 managers representing all levels of management (the entire management team of one company operating in the food industry) and made use of the survey method. The questionnaire consisted of two principal parts: one part designed to determine the intensity of the personality traits and predispositions typical of an effective entrepreneur, and the second part designed to diagnose the level of individual entrepreneurship. In the first part of the questionnaire the respondents were asked to assess whether and to what extent they possessed the personality features selected by the author. The list comprised 17 traits and abilities, which were evaluated on a scale from 1 to 5. The second part contained a tool for measuring individual entrepreneurship in the form of a test developed by W. Dyduch (Dyduch 2008, p. 55).

The test consisted of 10 questions. For each of the questions the respondent could choose one of three possible answers. In total, each respondent could score between 26 and 100 points. The interpretation of the test results was as follows: the higher the score, the greater the respondent's inclination to undertake entrepreneurial behaviours.

In order to identify the existence of a relationship between having certain personality traits characteristic of a typical entrepreneur and the level of individual entrepreneurship, the Pearson linear correlation coefficient was used to determine the level of linear relationships between the random variables. The value of the correlation coefficient falls within the closed interval [-1, 1]. The higher its absolute value is, the stronger the linear relationship between variables. A value of 0 means that there is no linear relationship between the variables; a value of 1 is interpreted as a positive relationship between the analysed variables; while a value of -1 indicates the existence of a negative relationship between the examined features. In order to verify any potential regularities, one of the most popular and most frequently used statistical methods, analysis of variance (ANOVA), was also used.

4. Empirical research results

An analysis of the results obtained did not reveal the existence of a relationship between the average score for all the assessed features that make up the profile of an effective entrepreneur and the level of a person's

individual entrepreneurship. However, relationships were observed between certain specific features and individual entrepreneurship. The statistical analyses proved that there are weak relationships (correlation strength 0.2-0.4) between 4 out of the 17 assessed qualities and predispositions, and individual entrepreneurship. The four features are the following:

- independence in decision-making (decision readiness – the ability to make decisions even when insufficient information is available),
- proactiveness and strong motivation to achieve goals,
- risk propensity,
- ambition.

It can be noticed that the results obtained partially confirm the findings previously obtained by other researchers. W.H. Stewart and P.L. Roth identified a relationship between the propensity to take risks and the entrepreneurial behaviour of an individual (2004). In subsequent research the same authors also showed the existence of a relationship between internal motivation to achieve goals and the level of individual entrepreneurship (2007). The characteristics whose influence on engaging in entrepreneurial behaviour has not been confirmed in earlier research include independence in making decisions, proactiveness and ambition.

Independence in decision-making is connected with readiness to make decisions in every, even the most extreme, circumstances. Ambition is associated with setting goals that force an individual to develop and push certain boundaries. Finally, proactiveness means a willingness to act and tackle new challenges.

The research also discovered some correlations between the ratings assigned to individual features. The higher the respondents assessed the level of their self-esteem, the higher they rated their propensity for taking risks.

A similar relationship occurred between enthusiasm and dedication to work, and ambition.

5. Conclusions

Entrepreneurship is a complex and ambiguous concept. It is defined as the fourth factor of production, a process, a complex personal competence, an attitude or behaviour. It is often postulated that not only entrepreneurs and enterprises, but also employees or even whole societies could be entrepreneurial. That is why the need to develop entrepreneurship is increasingly emphasised, and this development should occur in different places and at different levels.

One of the most popular approaches to entrepreneurship is that which perceives it as a set of traits, abilities and predispositions of an individual. In the literature, the authors present extensive lists of the qualities and abilities of an effective entrepreneur. However, only in the case of a few of those features has their real impact on individual entrepreneurship been verified. In this article, the author attempted to determine the relationship between the features and predispositions of an effective entrepreneur indicated in the literature and a person's level of individual entrepreneurship. The following conclusions can be drawn from the pilot study conducted:

1. No relationship has been found between the set of features forming the profile of an effective entrepreneur (the average rating for all the features included in the profile) and the level of individual entrepreneurship,
2. Weak relationships were identified between four personal characteristics and a person's level of entrepreneurship. These features were decision readiness (connected with independence in making decisions and the ability to make decisions even in conditions of uncertainty); proactiveness and strong internal motivation to achieve goals; a propensity for taking risks; and ambition. A higher degree of these features was reflected in a respondent's higher level of individual entrepreneurship,
3. Relationships between the assessments of certain features were identified. A higher rating given to the self-esteem trait was accompanied by a higher assessment of the risk propensity level. A similar relationship occurred between the assessment of enthusiasm and dedication of work, and ambition,
4. It would seem desirable and cognitively interesting to conduct in-depth empirical research in this area, the results of which could be applied in managerial practice. The findings of such research could make it possible to construct a hierarchy of the attributes and abilities of an effective entrepreneur. In view

of P. Drucker's assertion that entrepreneurship is a way of behaviour, a discipline that can be practised and learnt [Drucker 1992, pp. 29-30], it can be assumed that such a hierarchy of qualities and predispositions would enable entrepreneurs to focus on developing and enhancing those features that have the greatest impact on individual entrepreneurship.

References

Ardichvili A., Cardozo R., Sourav R. (2003), A theory of entrepreneurial opportunity identification and development, „Journal of Business Venturing", 18, 105–123.

Dimov D. (2007), Beyond the single person, single insight attribution in understanding entrepreneurial opportunities, „Enterpreneurship Theory and Practice", 31, 713–731.

Drucker P.F. (1992), Innowacjaiprzedsiębiorczość, PWE, Warszawa.

Dyduch W. (2008), Pomiarprzedsiębiorczościorganizacyjnej, WydawnictwoAkademiiEkonomicznejim.KarolaAdamieckiego w Katowicach, Katowice.

Gartner W. (1992), "A Conceptual Framework for Decsrubing the Phenomenon of New Venture Creation", Academy of Management Review, nr. 4.

Glinka B. (2008), Kulturoweuwarunkowaniaprzedsiębiorczości w Polsce, PWE, Warszawa.

Heinonen J., Hytti U., Stenholm P. (2011), The role of creativity in opportunity search and business idea creation, „Journal of Education and Training"., 53 (8), 659–672.

Hills G., Lumpkin G.T., Singh R.P. (1997), Opportunity recognition: perceptions and behaviors of entrepreneurs.Frontiers of Entrepreneurship Research, Babson College, Wellesley, MA, 203–218.

Hull D., Bosley J., Udell G. (1980), Renewing the hunt for the Heffalump: identifying potential entrepreneurs by personality characteristics, „Journal of Small Business Management", 18,11–18.

Kay C.J., (1986), The Identification of Catalysts Preceding Decision Making as Described by Innovators and Entrepreneurs, University of San Francisco, San Francisco.

Kirzner I.M. (2009), "The alert and creative entrepreneur: a clarification", Small Business Economics, 32, 145–152.

Krueger N.J., Dickson P.R. (1994), "How believing in ourselves increases risk taking: perceived self-efficacy and opportunity recognition", Decision Sciences, 25, 385–400.

Lee S.Y., Florida R., Acs Z.J. (2004), "Creativity and entrepreneurship: a regional analysis of new firm formation", Regional Studies, 38, 879–891.

Mesch G.S., Czamanski D. (197), "Occupational closure and immigrant entrepreneurship: Russian Jews in Israel", Journal of Socio-economics, 26(6).

Neck C.P., Manz C.C. (1992), "Thought self-leadership: the influence of self-talk and mental imagery on performance", Journal of Organizational Behavior, 13, 681–699.

Neck C.P., Manz C.C. (1996), "Thought self-leadership: the impact of mental strategies training on employee cognition, behavior, and affect", Journal of Organizational Behavior, 17, 445–467.

Nicolaou N., Shane S. (2015), "Creative personality, opportunity recognition and the tendency to start businesses: A study of their genetic predispositions", Journal of Business Venturing, 30 (2015) 407–419.

Oleksyn T. (2012), "Przedsiębiorczość̨jakokategoriazłożona. Jakjąrozwijać?", ProblemyZarządzania, vol. 10, nr 1 (36).

Poissant C.A., Godefroy C. (1993), Miliarderzy,Wydawnictwo Medium, Warszawa.

Schumpeter J.A. (1990), Teoriarozwojugospodarczego, PWN, Warszawa.

Stewart Jr. W.H., Roth P.L. (2004,) "Data quality affects meta-analytic conclusions: a response to Miner and Raju concerning entrepreneurial risk propensity", Journal of Applied Psychology, 89, 14–21.

Stewart Jr. W.H., Roth P.L. (2007), "A meta-analysis of achievement motivation. Differences between entrepreneurs and managers", Journal of Small Business Management, 45,401–421.

Timmons J.A. (1999), New Venture Creation, Irvin/McGraw-Hill.

Wiatrak A.P. (2001), Przedsiębiorczość̨zespołowa (pojęcia, zakres, formyiuwarunkowania), [in:] B Kożuch (ed.), Małeiśrednieprzedsiębiorstwa w gospodarceregionu, WydawnictwoUniwersytetu w Białymstoku, Białystok.

Wilkin J. (2008), Przedsiebiorstwo-rynek-społeczeństwo. Przeglądkoncepcjiteoretycznych, [in:] E. Leś (ed.), Gospodarkaspołecznaiprzedsiębiorstwospołeczne. Wprowadzenie do problematyki, Wydawnictwo UniwersytetuWarszawskiego, Warszawa.

Zhao H., Seibert S. (2006), "The Big Five personality dimensions and entrepreneurial status: a meta-analytic review",Journal of Applied Psychology, 91 (2), 259–271.

The Role of Informal Micro-Entrepreneurs in the Development of a Rural Border Region

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Abstract: The informal sector plays an important role in developing economies and peripheral rural regions, particularly in areas near borders. Businesses in the informal economy are flexible, adapting quickly to changing market demand and supply situations. This sector also generates employment, helps diversify economic activities, provides raw materials to local producers and helps alleviate poverty. Informal businesses are attractive to workers and companies worldwide because these firms typically require relatively little capital, offer greater independence and flexibility and provide opportunities for economic independence and better wages, as well as the most important advantage of evading regulations and taxation. Many entrepreneurs select the informal sector purely as a result of structural disadvantages arising from these individuals' gender, income, education, class, ethnicity or religion. Self-employed workers are considered by experts more likely to operate in the informal economy when these workers live in peripheral rural regions. The present study thus sought to identify the motivations of informal micro-enterprises and their role in the development of a rural border region in Portugal, analysing the perspective of micro-entrepreneurs, customers and local government. Qualitative data analysis was carried out on in-depth, semi-structured interviews with 9 informal entrepreneurs from 3 different sectors (i.e. agro-food, agriculture and handicrafts) and 8 regular clients in a northern border region of Portugal. The content analysis of interviews was done with QSR International's NVivo Version 11 software. The results suggest that more than 75% of the informal entrepreneurs interviewed are innovative and independent and that they are passionate about their enterprises. They do not want to formalise their business because they do not see any advantage in doing so. In addition, customers and local government officials see these businesses as boosting economic development in their region. The findings contribute to a deeper understanding of entrepreneurs' motivations to avoid legalising their micro-businesses and clients' perception of these enterprises. The results imply that researchers need to examine how national and local government policymakers can create laws that stimulate micro-entrepreneurs' transition from the informal to formal economy, including further dissemination of the benefits of formalising micro-businesses, especially in rural border regions.

Keywords: micro-entrepreneurs, informal economy, economic impact, rural development, border region

1. Introduction

For many years, scholars have struggled to achieve a consensus on why some entrepreneurs avoid making their business ventures entirely legitimate and instead operate informal enterprises. These businesses are either not constituted as a legal entity independent of the owner, do not keep formal accounts and/or are not registered with the authorities, including for tax purposes (International Labour Organisation, 2012). The generally accepted working definition of an entrepreneur is somebody actively involved in starting a business or the owner and/or manager of a firm (Reynolds *et al*., 2002). Therefore, Williams (2015: 5) states that: "[Informal entrepreneurs are] those starting a business or are the owner/manager of a business who engage in monetary transactions not declared to the state for tax, benefit and/or labour law purposes when they should be declared but which are legal in all other respects". The only illicit aspect of their activity consequently is that, when trading licit goods and/or services, some or all of these entrepreneurs' monetary transactions are undeclared.

In recent years, many studies have focused on the informal economy, with the majority concentrating on developing or emerging economies in which this phenomenon is far more common (Babbitt, Brown and Mazaheri, 2015; Adom, 2016; Williams and Shahid, 2016; Eijdenberg and Borner, 2017). In addition, researchers have investigated differences based on gender, reaching the conclusion that women are more likely to engage in informal entrepreneurship activities (Franck, 2012; Babbitt *et al.,* 2015; Quagrainie, 2016; Ratten, 2016; Marques *et al.*, 2017). Thus far, few studies have been conducted in developed economies and

especially in rural border regions. In order to contribute to bridging this research gap, the present study sought to identify the motivations of informal micro-entrepreneurs and their role in the development of a rural border region in Portugal, by analysing the perspectives of these micro-entrepreneurs, their customers and local government officials.

This paper is structured as follows. Section two reviews the literature on informal entrepreneurship and its impact on regional development. Section three outlines the research methodology, after which section four presents the results. Section five offers the study's conclusions, policy implications and limitations.

2. Literature review

Informal entrepreneurship is a globally represented characteristic of entrepreneurial activity, mainly differentiated from other forms of entrepreneurship by occurring outside of official regulations and/or laws while being accepted and tolerated to different degrees by various groups in societies (Welter *et al*., 2015).

The term 'informal economy' was first introduced at the beginning of the 1970s, although much evidence indicates that this type of activity existed prior to that time (Webb *et al*., 2014). Informal economies play a key role in business activities worldwide (Babbitt *et al*., 2015; Al-Mataani *et al*., 2017) but to a different degree in every country (Saunoris and Sajny, 2017). This topic has recently received increasing attention from researchers (Ratten, 2016; Eijdenberg and Borner, 2017).

The growing literature on the informal economy has sought to define informal economic activities in order to differentiate them from formal activities (Al-Mataani *et al.,* 2017). Scholars have argued that this term describes 'an endeavour occurring outside of formal institutional prescriptions but within the norms, values, and beliefs of informal institutions' (Williams *et al*., 2016a: 775). Nonetheless, the distinction between formal and informal economies is still fuzzy (Welter *et al*., 2015), and close connections can exist between the two types of activities (Peberdy, 2000). One persistent belief is that informal entrepreneurship is a survival strategy (Adom, 2016), but this perception has begun to change because emerging research has advanced the notion that many entrepreneurs voluntarily choose to operate entirely or partly within the informal economy to avoid the formal economy (Adom, 2016). Informal entrepreneurship activities carried out on a 'cash-in-hand' basis may be seen as adding to individuals' income from their formal activities or may represent the only income available for a household or family (Welter *et al*., 2015).

2.1 Explanatory theories

The neo-liberal approach to economics treats informal entrepreneurship as a result of rational individuals' voluntary choice to operate in the informal economy because of overly heavy regulations (Williams and Martinez, 2014; Williams *et al*., 2016b). Entrepreneurs have to elect to operate informally or formally, and this decision is influenced by countless factors (Siqueira *et al*., 2014). To run a formal business often requires entrepreneurs to register their firms, and this act is associated with various costs (Siqueira *et al.*, 2014).

Registration contributes to government institutions' awareness of these enterprises and, subsequently, to the need to meet regulatory requirements and pay taxes (Siqueira *et al.*, 2014). In contrast, the political economy perspective argues that informal entrepreneurship is a result of too little government intervention, which excludes entrepreneurs from the formal economy (Williams and Martinez, 2014; Williams *et al*., 2016b).

However, only a few scholars currently view informal entrepreneurship as either a necessity or an exit option (Williams *et al*., 2016b). Instead, most researchers feel 'that a nuanced, context-bound understanding of informal entrepreneurs' rationales is required which recognises how this varies across various socio-demographic, firm-level and regional populations' (Williams and Martinez, 2014: 235).

Micro-entrepreneurship can be defined as businesses with a maximum of 9 employees, which play an important role in Europe's economy (Klöppel and Stummer, 2015). Although micro-entrepreneurs do not have sufficient resources to modernise, they usually have a medium-term strategic vision and developed organisational skills. Their businesses are frequently profitable, and these individuals sometimes make an effort to formalise their activities. This is in contrast to entrepreneurs who engage in survival activities, possess limited planning and organisational capacities and cannot afford to formalise their businesses (Zuin, 2004).

Researchers have demonstrated that economic growth in less developed areas results from micro-entrepreneurs' business activities and industriousness (Gosenpud and Vanevenhoven, 2011). For example, micro-entrepreneurs in India use the informal economy to increase their income, earning nearly twice that of other informal employees (Gurtoo, 2009). A large number of people in these regions fall into this category, especially as poor women use small businesses as a livelihood strategy (Mukherjee, 2016). Nonetheless, women's informal micro-entrepreneurship is not necessarily linked to poverty or exclusion from the labour market. Franck (2012) discovered that women are motivated by their own and their families' future outcomes. Women's competitive behaviour is also a significant variable in the growth of micro activities (Quagraine, 2016). Overall, Williams *et al*. (2016b: 322) found that 'the major determinants of the level of informality of micro-enterprises are the characteristics of the entrepreneur and enterprise, rather than their motives and the wider formal and informal institutional environment'.

2.2 Informal entrepreneurship and regional development

Border regions are normally the most disadvantaged areas given their peripheral geographic and economic position, but they also offer the advantage of exploiting variations in prices and goods between the countries in question (Xheneti *et al.*, 2013). Scholars have failed to reach a consensus about whether informal activities in these regions foster development or inhibit the evolution of dynamic cross-border networks (Xheneti *et al.,* 2013). However, informal entrepreneurship activities along borders clearly offer excellent opportunities to learn how to trade, which can develop into more substantial businesses in the formal economy over time (Xheneti *et al.*, 2013).

Entrepreneurs' transactions can remain in the informal economy to escape excessive transaction costs, but, as a result, these businesses do not contribute to gross domestic products (Saunoris and Sajny, 2017).

Nonetheless, informal entrepreneurship plays a central part in lowering poverty levels and functions as a substitute for the formal sector when entry barriers are excessively high (Babbitt *et al.*, 2015). The informal economy can have both positive and negative impacts on local and regional economies (Llanes and Barbour, 2007), and, in developing economies, this sector has an unfavourable effect on economic development and growth. Thus, many governments have sought to stimulate registration and formalisation (Williams *et al*., 2016a).

Regarding the positive and negative impacts of informal entrepreneurship, academics and policymakers largely agree that negative impacts outweigh positive impacts and, therefore, that interventions are required to reduce informal entrepreneurship (Williams, 2015). Table 1 summarises the main negative and positive impacts of informal entrepreneurship on different stakeholders.

Table 1: Negative and positive impacts of informal entrepreneurship on different stakeholders

Stakeholders	Negative Impacts	Positive Impacts
Informal Entrepreneurs	• Lack of access to credit and financial services partly due to limited credit histories • Difficulty in expanding businesses that cannot be openly advertised • Higher barriers to entry into the formal market due to an inability to provide employment histories that back up their skills	• Source of income to reduce poverty • Flexibility in where, when and how to work, which is especially important to women who remain responsible for childcare • Reduction of barriers to entry into the workforce because the majority of informal activities start with close social relationships
Formal Entrepreneurs	• Unfair competitive advantages for informal versus formal entrepreneurs	• Escape route for entrepreneurs from corrupt public sector officials • Exit strategy in contexts in which the regulatory burden stifles business development
Customers	• Lack of legal resources if poor work is done without insurance coverage • No guarantee that the work conducted has followed health and safety regulations	• More affordable products or services can be offered to or asked for by customers if payment is made in cash and no receipts change hands
Local and National Governments	• Loss of revenue for the central state in terms of non-payment of taxes	• Income from informal entrepreneurship spent in the formal economy boosts demand for formal goods and services and contributes to 'official' local and regional economic growth

Source: Based in Williams (2006), Williams and Nadin (2012) and Llanes and Barbour (2013).

2.3 Conceptual research model

Based on the present research's objective and the above literature review, a conceptual research model was proposed (see Figure 1). This study sought to identify the motivations of informal micro-entrepreneurs and their role in the development of a rural border region in Portugal, by analysing the perspective of micro-entrepreneurs, customers and local government officials.

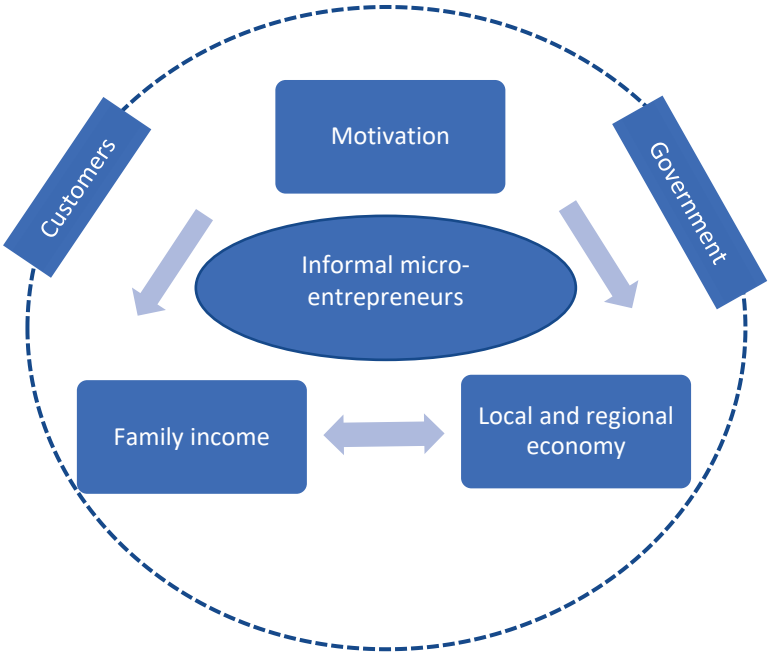

Figure 1: Conceptual model proposed

3. Methodology

The current research, therefore, used qualitative methods to conduct a case study of informal entrepreneurship. Qualitative data analysis was carried out on in-depth semi-structured interviews with 9 informal entrepreneurs in 3 different sectors (i.e. agro-food, agriculture and handicrafts), 8 regular clients and 1 local government official in a northern border region of Portugal. Data were collected on 13 April 2018, during a witch festival held on a Friday the thirteenth.

Qualitative data analysis is a continuous, inductive process that involves immersion into interview transcripts and the application of coding categories. This process is based on data reduction and presentation and the extraction and verification of conclusions (Miles *et al*., 2014). In the present study, the first phase of coding was used to reduce the raw data into generic categories based on the research objectives, existing literature and recurrent themes. The data were then analysed further in order to identify patterns and relationships among the coding categories.

The primary method applied was discourse analysis using QSR International's NVivo Version 11 software to conduct qualitative analysis and build a theoretical framework. This method facilitated a close examination of the transcripts for linguistic patterns, while NVivo provided a means of storing, retrieving, categorising and encoding the transcripts (Wetherell *et al*., 2001; Gibbs *et al*., 2002). The analysis focused on the interviewees' words and actions, as well as documentation about these individuals' activities, to gain an in-depth understanding of the research topic. The relevant literature recommends the use of tools that facilitate computer-assisted analysis of qualitative data because of the benefits in terms of accuracy and validity, which can be difficult to achieve with manual methods (Lindsay, 2004). Excerpts from the data are presented in the results and discussion sections below to allow these human actors to speak for themselves whenever possible (Maykut *et al.*, 1994).

4. Results

4.1 Sample characterisation

The sample included nine informal entrepreneurs, 66.67% of whom are female and 33.33% male. Relative to their age, interviewees were between 30 and 67 years old, with an average age of 42.22 years old and a standard deviation of 10.2 years old. The most representative age groups were those between 30 and 39 years old, and interviewees between 40 and 49 years old, each representing 44.44% of the sample. Regarding educational qualifications, 33.33% of the informal entrepreneurs had econdary education. Two groups – those with a university degree and those who had completed the third cycle of mandatory secondary education – were quite representative of the sample as both were 22.22%. Except for one interviewee, who was single, all were married, and 77.78% had children. All informal entrepreneurs had their main office at home, where they carried out activities in three different sectors (i.e. agro-food, agriculture and handicrafts).

Entrepreneurial passion is defined as a set of intense positive feelings that are consciously accessible and experienced through involvement in entrepreneurial activities associated with roles that are significant to entrepreneurs. This passion also involves a strong inclination to engage in activities that the entrepreneurs like and consider important and in which they invest time and energy. All the informal entrepreneurs interviewed consider their passion the most important dimension of their individual entrepreneurial orientation, followed by innovation and autonomy. More than 80% of these individuals started their informal business out of necessity, and all reported that, after starting their business, they doubled their household income.

4.2 Motivations to legalise their businesses

When asked what motivated them to create an informal business, the interviewees cited financial reasons, with one person mentioning that 'what I earned was not enough to feed a household' (InfEnt1). Others asserted that their business is about providing 'an additional boost to the household income' (InfEnt7).

However, other motivations were also mentioned such as the possibility of 'creating [their] own job' (InfEnt2), being able to manage their 'time and having no boss in [their] business' (InfEnt9), as well as 'promoting the best of Portugal' (InfEnt6).

When the interviewees were asked to assign a degree of importance to a set of motivations considered determining factors in the formalisation of businesses, these individuals emphasised access to social security benefits and the possibility of growing as an entrepreneur. Although these informal entrepreneurs assigned slightly less value to other factors, they also mentioned that formalisation would make it easier for them to sell to public institutions and other organisations that require invoices, to control their accounting more effectively or to hire employees with access to the Institute of Employment and Training and other sources of support. The interviewees attributed the least importance to gaining access to bank financing.

4.3 Effects of business on household income

When asked about the effects of their business on household income, the informal entrepreneurs were almost unanimous in reporting 'a very positive impact of having more money to buy things for [their] home, [and] food and other goods' (InfEnt1). In certain cases, the interviewees contribute to ensuring their spouse is not the only 'that brings money home. ... [They] also contribute with [their] work' (InfEnt9) to guarantee 'higher household income, greater purchasing power and increased equity' (InfEnt2).

Based on an analysis of the socio-demographic data provided, all these entrepreneurs improved their financial situation by creating their business. Almost everyone underlined that they were in a difficult financial situation (i.e. less than 5,000 euros a year) and that their business turned out to be a reasonably good source of revenue, with an annual increase in income in all cases. Most of these entrepreneurs' businesses were started out of necessity, and only one entrepreneur saw it as an opportunity.

4.4 Effects of businesses on local and regional economy

The informal entrepreneurs interviewed started by pointing out that 'informal businesses are very important for this region. ... We have many people in the region working in the agro-food sector' (InfEnt1). Concerning the effects of their businesses on the local and regional economy, three types of effects were highlighted. First, the interviewees emphasised that the region's products are recognised by those outside the area as 'it helps that the potatoes and the county has become famous and attracts a lot of people' (InfEnt8). These

entrepreneurs refer to their businesses as a way to ensure 'work that people of the region can be proud of because there are not many people making handmade linen towels' (InfEnt9).

Second, their activities enable more money to circulate, which in turn has led to 'having more money to buy goods. [We are] helping the local economy with [a greater] flow of money' (InfEnt1). Last, they point out that their businesses promote self-employment. We 'were able to live in Montalegre without having to emigrate' (InfEnt3). One interviewee said, 'people survive from the sales made. Otherwise they would be forced to emigrate' (InfEnt5). Thus, these informal entrepreneurs contribute significantly to keeping people in the region and diminishing the rural exodus to large cities or to other countries.

4.5 Effects of this type of business on region from clients' perspective

An analysis of the interviewed clients' perspectives on the effect of informal businesses on local and regional economy revealed a unanimous agreement on three types of outcomes. First, the financial situation of the entrepreneurs' families has improved. One client stated:

> *It enables people to create better financial conditions for themselves, providing higher household income by selling these products. They end up earning money, and, at the end of the month, it is more money that comes in and that people have available. (Client4)*

Second, the interviewees strongly emphasised that the main, most decisive effect on the region is that informal businesses 'help keep families here in Montalegre' (Client6). Another client added, 'they don't have to emigrate or leave the region' (Client8). Last, customers point to another fundamental effect on the local and regional economy, namely, that 'it also promotes regional products' (Client2). The informal entrepreneurs thus take the local products and brands further, promoting them and drawing customers' attention to the best merchandise, as well as publicising the region's specificities, such as gastronomy, culture, traditions and practices.

The local government supports and promotes all kinds of witch festivals and gastronomic and agro-food fairs throughout the year. The official interviewed reported that:

> *They attract lots of customers to witch festivals and agro-food fairs, who buy, sleep and eat in the region, [and] spend their income … . Many families in the region live year-round on sales revenues from these festivities and fairs. Most of them have informal businesses. (Local Government Official)*

Customers and local government officials, therefore, see these informal businesses as boosters of economic development in this region.

5. Conclusions

This study sought to identify the motivations of informal micro-entrepreneurs and their role in the development of a rural border region in Portugal, by analysing the perspectives of micro-entrepreneurs, customers and local government officials. The findings suggest that more than 75% of the region's informal entrepreneurs are innovative and independent and that they have a passion for their business. They avoid formalising their activities because they see no advantages in doing so. Customers and local government officials perceive these businesses as boosting the region's economic development. These results contribute to a fuller understanding of some entrepreneurs' motivations not to legalise their micro-businesses and their customers and local government officials' perceptions of these businesses and their importance to the local economy.

Despite the significance of informal entrepreneurship in local economies, especially in low-density rural areas and border regions, officials should consider and discuss measures and programmes that can help transform some informal businesses into formal ones. Researchers need to examine how national and local policymakers can create laws that stimulate micro-entrepreneurs' transition from the informal to formal economy, including further disseminating the benefits of formalising micro-businesses, especially in rural border regions. The questions that remain include which policy measures are most effective and which sequences and combinations of measures are currently most successful and thus need to be evaluated.

Clearly, governments need to move away from deterring informal entrepreneurship and towards the use of incentives and indirect controls if formalisation of informal entrepreneurship is to occur. According to Williams (2015), various policy measures are required for different types of informal entrepreneurs. In other words, a tailor-made approach to formalising informal entrepreneurship is required to tackle the specific barriers to formalisation confronted by different sectors, cultures and regions. A variety of stakeholders in each region must be involved in the planning and implementing of policy measures (i.e. informal micro-entrepreneurs, customers, formal entrepreneurs and local government officials).

This research's results present some limitations in that the sample's size and qualitative analysis methods mean the findings cannot be applied to the entire informal sector. Future investigations may want, first, to use questionnaires to test a more empirically robust model. Second, researchers need to verify whether significant differences exist in the informal economy, taking into account sectors, genders, cultures and regions. Third, further studies could apply the same research methods in other border regions. Last, other research may want to examine the programmes and policies that encourage micro-entrepreneurs' transition from the informal to formal economy.

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References

Adom, K. (2016) "Tackling informal entrepreneurship in Ghana: A critical analysis of the dualist/modernist policy approach, some evidence from Accra", International Journal of Entrepreneurship and Small Business, Vol 28, No. 2-3, pp 216-233.

Al-Mataani, R., Wainwright, T. and Demirel, P. (2017) "Hidden Entrepreneurs: Informal Practices within the Formal Economy", European Management Review, Vol 14, No. 4, pp 361-376.

Babbitt, L.G., Brown, D. and Mazaheri, N. (2015) "Gender, Entrepreneurship, and the Formal–Informal Dilemma: Evidence from Indonesia", World Development, Vol 72, pp 163-174.

Dobovšek, B. and Slak, B. (2017) "Economic crisis and "white informal economy" – a slippery slope", International Journal of Sociology and Social Policy, Vol 37, No. 7-8, pp 468-476.

Eijdenberg, E.L. and Borner, K. (2017) "The Performance of Subsistence Entrepreneurs in Tanzania's Informal Economy", Journal of Development Entrepreneurship, Vol 22, No. 1, 22 pp.

Franck, A.K. (2012) "Factors motivating women's informal micro-entrepreneurship: Experiences from Penang, Malaysia", International Journal of Gender and Entrepreneurship, Vol 4, No. 1, pp 65-78.

Gibbs, G.R., Friese, S. and Mangabeira, W.C. (2002) "The use of new technology in qualitative research. Introduction to Issue 3 (2) of FQS", Forum Qualitative Sozialforschung/Forum: Qualitative Social Research, Vol 3, No. 2.

Gosenpud, J. and Vanevenhoven, J. (2011) "Using tools from strategic management to help micro-entrepreneurs in developing countries adapt to a dynamic and changing business environment", Journal of Applied Business Research, Vol 27, No. 5, pp 1-14.

Gurtoo, A. (2009) "Policy support for informal sector entrepreneurship: Micro-enterprises in India", Journal of Development Entrepreneurship, Vol 14, No. 2, pp 181-194.

Klöppel, R. and Stummer, H. (2015) "Micro-entrepreneurs today - Results of a survey of owner-entrepreneurs regarding subjective success factors in German micro-enterprises", International Journal of Economics and Business Research, Vol 9, No. 1, pp 37-53.

Lindsay, V.J. (2004) "Computer-assisted qualitative data analysis: application in an export study", Handbook of Qualitative Research Methods for International Business, pp. 486-506.

Llanes, M. and Barbour, A. (2007) Self-Employed and Micro-Entrepreneurs: Informal Trading and the Journey Towards Formalization, Community Links, London.

Marques, C. S., Leal, C. T., Santos, G., Marques, C. P. and Alves, R. (2017) "Why do some women micro-entrepreneurs decide to formalise their businesses?", International Journal Entrepreneurship and Small Business, Vol 30, No. 2, pp 241-258.

Maykut, P., Maykut, P.S. and Morehouse, R. (1994) Beginning Qualitative Research: A philosophic and Practical Guide, Vol. 6, Psychology Press.

Miles, M.B., Huberman, A.M. and Saldana, J. (2014) Qualitative Data Analysis: A Method Sourcebook, Sage Publications.

Mukherjee, S. (2016) "Contributing and constraining factors faced by women entrepreneurs in the informal sector: a study of Mumbai Metropolitan", International Journal of Entrepreneurship and Small Business, Vol 28, No. 2-3, pp 290-309.

Ogando, A. C., Roever, S. and Rogan, M. (2017) "Gender and informal livelihoods: Coping strategies and perceptions of waste pickers in Sub-Saharan Africa and Latin America", International Journal of Sociology and Social Policy, Vol. 37, No. 7-8, pp 435-451.

Peberdy, S. (2000) "Mobile entrepreneurship: Informal sector crossborder trade and street trade in South Africa", Development Southern Africa, Vol 17, No. 2, pp 201-219.
Pfau-Effingger, B. (2017) "Informal employment in the poor European periphery", International Journal of Sociology and Social Policy, Vol 37, No. 7-8, pp 387-399.
Quagrainie, F. A. (2016) "Institutional approach and competitive behaviours of informal Ghanaian women entrepreneurs", International Journal of Entrepreneurship and Small Business, Vol. 28, No. 2-3, pp 323-338.
Ram, M, Edwards, P., Trevor, J and Villares-Varela, M. (2017) "From the informal economy to the meaning of informality: Developing theory on firms and their workers", International Journal of Sociology and Social Policy, Vol 37, No. 7-8, pp 361-373.
Ratten, V. (2016) "Female entrepreneurship and the role of customer knowledge development, innovation outcome expectations and culture on intentions to start informal business ventures", International Journal of Entrepreneurship and Small Business, Vol 27, No. 2-3, pp 262-272.
Saitta, P. (2017) "Practices of subjectivity: the informal economies and the subaltern rebellion", International Journal of Sociology and Social Policy, Vol 37, No. 7-8, pp 400-416.
Saunoris, J. W. and Sajny, A. (2017) "Entrepreneurship and economic freedom: cross country evidence from formal and informal sectors", Entrepreneurship & Regional Development, Vol 29, No. 3-4, pp 292-316.
Shapland, J. and Heyes, J. (2017). "How close are formal and informal work?", International Journal of Sociology and Social Policy, Vol 37, No. 7-8, pp 374-386.
Siqueira, A. C. O., Webb, J. W. & Bruton, G. D. (2014). Informal Entrepreneurship and Industry Conditions. Entrepreneurship: Theory and Practice, 40(1), 177-200.
Webb, J. W., Ireland, R. D. and Ketchen, D. J. (2014) "Toward a greater understanding of entrepreneurship and strategy in the informal economy", Strategic Entrepreneurship Journal, Vol 8, No. 1, pp 1-15.
Welter, F., Smallbone, D. and Pobol, A. (2015) "Entrepreneurial activity in the informal economy: a missing piece of the entrepreneurship jigsaw puzzle", Entrepreneurship & Regional Development: An International Journal, Vol 27, No. 5-6, pp 292-306.
Wetherell, M., Taylor, S. and Yates, S.J. (Eds) (2001) Discourse as Data: A Guide for Analysis, Sage.
Williams, C.C. (2015) "Informal Sector Entrepreneurship", A background paper for the OECD Centre for Entrepreneurship, SMEs and Local Development. Available at https://www.oecd.org/employment/leed/Background-Paper-PB-Informal-Entrepreneurship-final.pdf.
Williams, C. C. and Martinez, A. (2014) "Entrepreneurship in the informal economy: A product of too much or too little state intervention?", The International Journal of Entrepreneurship and Innovation, Vol 15, No. 4, pp 227-237.
Williams, C. C. and Shahid, M. S. (2016) "Informal entrepreneurship and institutional theory: Explaining the varying degrees of (in)formalization of entrepreneurs in Pakistan", Entrepreneurship & Regional Development: An International Journal, Vol. 28, No.1-2, pp 1-25.
Williams, C. C., Martinez-Perez, A. and Kedir, A. M. (2016a) "Informal Entrepreneurship in Developing Economies: The Impacts of Starting Up Unregistered on Firm Performance", Entrepreneurship Theory and Practice, Vol 41, No. 5, pp 773-799.
Williams, C. C., Shahid, M. S. and Martinez, A. (2016b) "Determinants of the Level of Informality of Informal Micro-Enterprises: Some Evidence from the City of Lahore, Pakistan", World Development, Vol 84, pp 312-325.
Williams, C.C. (2006) The Hidden Enterprise Culture: entrepreneurship in the underground economy, Cheltenham: Edward Elgar.
Williams, C.C. and S. Nadin (2012) "Tackling the hidden enterprise culture: government policies to support the formalization of informal entrepreneurship", Entrepreneurship and Regional Development, Vol 24, No.9-10, pp 895–915.
Xheneti, M., Smallbone, D. and Welter, F. (2012) "EU enlargement effects on cross-border informal entrepreneurial activities. European Urban and Regional Studies", Vol 20, No. 3, pp 314-328.
Zuin, V. (2004) Business Strategies of Informal Micro-Entrepreneurs in Lima, Peru. International Institute for Labour Studies, Geneva.

Enlivening HEIs as Creative, Humanised and Innovative Environments

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Abstract: The purpose of this research is to focus on the importance of distributed leadership in Universities and Higher Education Institutions (HEIs). The research question is whether there a significant finding in self-reported ratings of leadership styles of those respondents that are studying Management. The study aims to further discover whether students are encouraged to become responsible and proactive citizens, to develop their skills set, specifically shared leadership and higher-level skills to inspire creation knowledge, sharing and distribution thereof. Contemporary organizations need active and responsible individuals who are capable to make decisions swiftly and responsibly. Leadership influences innovative results and education plays a dynamic role in preparing graduates. Critical reflection of extant literature indicates a need for a culture of leadership and innovation to promote organizational sustainability in the globalised world. This study debates the need for HEIs to prepare the graduate for both organizations and society as a whole. This active collaboration should be the very essence of both universities and the industry in order for these to achieve responsible sustainability. Learning and innovation further depend on leadership efficacy. The self-efficacy construct highlights the importance of tacit knowledge because it leads to analysis and reflection on the unique capacity that individuals have to share complex and tacit knowledge. Self-efficacy is considered as the essential component for prepared organizational learning. This study follows the pragmatic paradigm methodology. Primary data collection is currently being gathered via the web-based questionnaire link which was made available on the UKZN notice system. The questionnaire has 35 items with a Likert scale of five response options. The purposeful sample method was used and the population entails the undergraduate and postgraduate students in the College of Law and Business, University of KwaZulu-Natal, South Africa. Limitations include the design of the study and the reliance on the quantitative data as the only method of primary data collection. This study is of added value for scholars and organizations in the innovation economy.

Keywords: Efficacy, Knowledge creation, Learning, Performance, Shared Leadership, Sustainability

1. Introduction

Responsible leadership embraces shared leadership among individuals in teams and distributed leadership in the organization as a whole, especially in the education sector. Currently, it is necessary to demystify the mystery that beholds the present HEI environment. This environment is the place wherein learning, teaching and endorsing the concepts of knowledge management takes place, as well as organization learning, complexity theory and a plethora of new models, concepts and ideas should be transmitted according to a holistic paradigm (Jasimuddin, 2008). The objectives of this study are to analyse the importance of responsible leadership education in universities HEIs to increase organizational sustainability; to ascertain the responsible leadership education effects on the continuous management learning of students in actual organizational business settings; to determine the rich implications to the organizational (re)creation of human bodies in the context of organized labour. The structure of this paper includes an introduction, a reflection of the constructs of responsible leadership, humanisation, self-efficacy, learning and distributed leadership. At the time of article submission, the primary data collection was still ongoing for this study. This relevance of this data is to determine the self-reported findings from the sample of undergraduate and postgraduate students about their leadership style. Conclusions and recommendations are provided based on the extant literature.

2. Responsible leadership education in universities HEIs to increase organizational sustainability

There are several definitions of responsible leadership and here a few are included that it is the “art of motivating, communicating, empowering and convincing people to engage with a new vision of sustainable development and the necessary change that this implies. Leadership is based on moral authority. Moral authority requires convictions, character and talent” (The Globally Responsible Leadership Initiative, GRLI, 2008, p.4). According to Mirvis (2010, p.10), Maak (2007) posits that responsible leadership entails, “building, cultivating and sustaining trustful relationships to different stakeholders both inside and outside the organization, and in coordinating responsible action to achieve a meaningful commonly shared business vision”. Pless (2007) maintains responsible leadership as a set of ethical principles, values-based relationships

between leaders and stakeholders. These are connected a shared sense of meaning and purpose. Inducing higher levels of commitment and motivation so as to achieve value creation and social change.

Furthermore, Mirvis (2010) postulates that Nike, Body Shop and Novo Nordisk are two examples of companies that exercise best practice in responsible leadership, a paradigm that should be nestled in a global context and across all sectors. Responsible leadership entails the development of a culture with beliefs and practices, from individual mindsets to collective paradigm changes that support responsible leadership. Universities are, in essence, institutions that generate and share knowledge. Likewise, a knowledge facilitator is the quintessence of the knowledge worker. In addition to sharing and generating knowledge, as a knowledge worker, the teaching faculty member also has the role to encourage the creation of new knowledge among students. The educator, in addition to transmitting specific content, performs the role of teaching individuals to 'think critically'. Several scholars support the argument that education is the centre of social strategic investment (Freire, 1978; Jasimuddin, 2005). Therefore, HEIs should achieve fundamental objectives to prepare the graduate by developing the person to be in tune with various contexts. There is a need for knowledge sharing and creation, networking and leadership as being the relevant criteria in an educational establishment and in any other organizations (Senge, 1990; Soliman and Spooner, 2000; Schonstrom, 2005). Additionally, any educational institution obliges those who teach the minds of tomorrow be champions of knowledge themselves (Schonstrom, 2005). This study argues that HEIs can prosper if they are able to apply the rhetoric they are keen to promote in the wider community (Schonstrom, 2005). Hence, universities should become a knowing organization instead of a knowledge sharer (Rowley, 2000).

Many Universities still currently follow hierarchical processes and systems in accordance with the mind-set of the scientific management paradigm (Martins, et al., 2013). Thus, a contradiction seems to be evident between the fact that some universities teach and encourage new mind-sets and management paradigms while still displaying a tendency to follow the Newtonian paradigm in their own managerial practices, organizational structure and culture. This juxtaposing situation can be discouraging towards the intended vision and mission that universities are supposed to adhere to as being institutions that encourage students to apply the knowledge gained in the organizations they are working with (Beijerse, 1999). If the role of university faculty is to share and provide knowledge, students should transform this knowledge into tacit knowledge. Nevertheless, the hurdle lies in whether universities practice this or not. Morrison (2010) further corroborates that complexity theory facilitates school leaders and managers to initiate conditions for organizational learning to occur and which is based on developing self-organization to deal with change. This self-organising replaces commanding particular actions and behaviours. In this way, command and control mechanisms can be substituted with budding, self-organization.

The conduit of sustainability necessarily encompasses the notions of responsible leadership, responsible education and ensuring that there is a commitment to humanising organizations. Morrison (2010, p. 384) and Fullan (2001, 2005) posit that '[educational] leadership and management are, at heart, deontological, valuative, humanistic and moral enterprises'. The notion of responsible education urges a reflection on humanisation. In this regard, according to Freire (1972b), praxis is essential to humanisation. Freire postulates praxis which is the notion of the dialogical reflection and action for social transformation. According to Freire, transcendental praxis is conscientization, or critical consciousness. Just as Freire viewed transformative leadership should create bonds with school, home, work, family and the community, the same should occur with responsible education in our current new age society of innovation. As a way of opposing the dominant and authoritarian approach to pedagogy, Freire critiqued the notion of banking. This type of education dissuades questioning because only the teacher knows and students have to passively listen and receive the content of the teacher's narration. Freire espoused a form of liberating education. This type of education was built on the idea of presenting problems instead of merely providing answers.

Dialogue is the foundation for educational communication and the fundamental goal is to develop critical consciousness. It is this dialogue and interaction with others in a world of constant change (Roberts, 2015, 2000), this intersubjective exchange that occurs between the self, nature (through its material aspect) as well as organizations (the social, structural, policies, practices and procedures) that enable individuals to actively partake in their pursuit of gaining knowledge and understanding. Freire further posits that the individual's active involvement is a practical illustration of becoming a subject instead of an object of history: "the individuals becomes a being who can, with others, play a part in transforming the social world" (Roberts, 2005, p. 383).

Freire's (1998a) philosophy of education is inexorably linked with the notion that individuals are imbued with autonomy and freedom to live as disciplined beings with power, with an ethical and responsible commitment towards the development of the self which is in a constant work in progress, characteristics which arise from the individuals' ability to develop a critical consciousness. Freire (1998a, p. 53) further depicts this competence as the aptitude to "spiritualize" the world in progress that individuals live in. Through knowledge and power, transformative leadership achieves its goals and strategies. Critical education, according to Freire, denotes the relationship between learning and teaching as '(w)hoever teaches learns in the act of teaching, and whoever learns teaches in the act of learning' (Freire, 1998a, p. 31). Therefore, transformative leaders lead by and through the leadership of those that they lead. Moreover, Freire appreciates that, in the individual's development as a knower, reason and emotions influence individuals (Freire, 1997a, 1998b; Roberts, 2010; Weiner, 2003). Freire also opined that, in view of the fact that education is constantly an ethical and political process (Freire, 1972a, 1972b, 1976, 1985; Roberts, 2000), policy development at the tertiary level education, is based on this premise. Indeed, this gives rise to limitations both in the view individuals have of themselves as well as their view of both the nature and purpose of education, which is frequently diminished to merely skills and method.

"Without hope there is no way we can even start thinking about education" (Freire, 2007a, p. 87). Freire (1994) maintains that the root of both hope and education are ontologically identical revealing a close bond between the two. Webb (2010) further posits that Freire maintains hope is an "essential component" (Freire, 1998a, p. 69) for human existence. Furthermore, Weber (2010) sustains that education evokes and guides hope. Hope and knowledge enthuse the individual with the capability to delight in desires, dreams, emotions (Freire, 1993; 2007a; 2007b). Furthermore, Freire (2007b, pp. 82–83) corroborates that hope instils individuals with values of humility, trust, courage, perseverance and serenity.

In this regard, the United Nations Principles for Responsible Management Education (PRME) include six principles:

1. Purpose (We will develop the capabilities of students to be future generators of sustainable value for business and society at large and to work for an inclusive and sustainable global economy)
2. Values (We will incorporate into our academic activities and curricula the values of global social responsibility as portrayed in international initiatives such as the United Nations Global Compact)
3. Method (We will create educational frameworks, materials, processes and environments that enable effective learning experiences for responsible leadership)
4. Research (We will engage in conceptual and empirical research that advances our understanding about the role, dynamics, and impact of corporations in the creation of sustainable social, environmental and economic value)
5. Partnership (We will interact with managers of business corporations to extend our knowledge of their challenges in meeting social and environmental responsibilities and to explore jointly effective approaches to meeting these challenges)
6. Dialogue (We will facilitate and support dialogue and debate among educators, students, business, government, consumers, media, civil society organizations and other interested groups and stakeholders on critical issues related to global responsibility and sustainability)

Source: www.unprme.org

Based on the abovementioned principles, Universities and HEIs should provide their students with a balance between technical and soft skills that will empower these individuals to achieve positive organizational outcomes in the leadership process, spreading from the organization in particular to society at large.

Therefore, it is perceived that leadership behaviours have a noteworthy effect on innovation outcomes.

Contemporary organizations, being flatter than the traditional hierarchy, need autonomous knowledge workers to enhance their relational capital by engaging their whole new skills set with and through individuals.

Herein arises the potential for distributed leadership. Innovation and creativity arise in an environment where contemporary work and tasks are less repetitive. Human, emotional and spiritual capitals and competencies, new age in nature, enable organizations to develop cognitive thinking models and their collective, interactive

and participative learning capabilities. Leadership programmes at HEIS are defied to change direction in order to encourage partnership and network building; these programmes need to incorporate innovation and entrepreneurial principles. Continuous effort is necessary in revamping HEI leadership programmes to prepare graduates for industry.

Responsible leadership embraces shared leadership among individuals in teams and distributed leadership in the organization as a whole, especially in the education sector. According to Mirvis (2010, p.14), their holistic view of responsible leadership entails 'me, we and us', the individual leader, the responsible organization and the larger environment of stakeholders. Responsible leaders look both inside-out of the organization in order to channel its capabilities (according to the RBV of the firm that Penrose and Barney postulate) as well as outside-in in order to appropriately gauge the external environment. The stakeholder theory as Freeman (1984) proposed is relevant here as opposed to Milton Friedman's profit theory.

The constructs of responsible business leadership entail three perspectives namely, traditional (modernist), contemporary (relational) and horizon (holistic) which depict different approaches, Mirvis (2010). The horizon or holistic approach is indeed the most apt in creating a mind-set to achieving responsible leadership education. This approach equips individuals with social skills which nurture organizational sustainability through partnering with local environments. Ethical values are focused on as wealth creation is indeed achieved holistically and equitably.

In analysis of the report on HEIs from the twelve OECD member countries, Johnston (2007, p. 48) highlights "(t)he study showed that there is a need to institutionally integrate sustainable development into all the different functions of an HEI and to make an institutional commitment through a sustainability agenda". The report further emphasises that the various vision statements featured a concern with staff as an employer in HEIs and not explicitly concerned with the role of teaching. Responsible leadership education in universities will lead to an increase in organizational sustainability because HEIs can establish and promote strong ties with surrounding communities. This partnering can occur in several ways, i) skilled graduates become employable in the region thus HEIs are engendering human capital as well as promoting opportunities for further learning and development education opportunities which enable sustainable development of this region; ii) HEIs supply expertise which arises from research and consultancy; iii) activities to promote good-practice management and development activities and other good citizen programmes held on-campus; iv) local economic community development (Johnston, 2007).

Pearce et al. (2013, p. 247) corroborate with Gitsham et al. (2009) that "(r)ecent scandals involving executive leadership have significantly contributed to the topic of sustainability becoming one of the most important concerns of the management literature in the twenty-first century. The antithesis of sustainability is embodied in executive exploitation for short-term gains at the expense of other stakeholders, i.e. unsustainability".

These anti-social activities are unethical and damage sustainability. Leaders play a fundamental role in upholding ethical principles in the organization. Leadership styles can be a predictor of anti-citizenship behaviours in teams (Pearce and Sims, 2002; Giacalone and Greenberg, 1997). Shared leadership promotes health and responsible behaviour in teams which, therefore lessens anti-social behaviour (Pearce, 1997).

Martins et al. (2017, p. 226) concluded that "different learning loops (feedback and feedforward) are in action because they connect and capitalize on learning (…) leading to exploitation and exploration, thereby opening the way for ambidextrous learning. (…) This implies a mind, both at the individual and group level which is freer from preconceptions, more enthusiastic and (…) committed to furnish organizations with various capitals, namely, intellectual, personal, relational and social. In this way, HEIs in general and universities in specific should be more aware of this malleability in order to contribute to the shift in both organizational and social paradigms. These paradigms can be nurtured through learning, specifically which is future facing (feedforward) and based on efficiency as well as on that learning which is more effective in nature (feedback).

3. The effects of responsible leadership education on the continuous management learning of students in actual organizational business settings.

PRME principles have positive effects in providing skilled graduates instilled with a mind-set focused on ethics, social innovation and corporate responsibility. In view of the fact that individuals perform an array of roles in

the current information society, education entails acquiring knowledge and also developing individual, social and professional skills and competencies in order to galvanise, become attune to and embrace the knowledge that students hold. Furthermore, Blanco et al. (2012) support the idea that students should be intelligent and creative in applying their competencies to boost performance. Indeed, leadership can be associated with varies spheres, the educational system, the work environment, the social networking system. Furthermore, since competencies transcend knowledge and know-how, leadership is also concomitant to competency and skills building.

The self-efficacy construct highlights the importance of tacit knowledge because it leads to analysis and reflection on the unique capacity that individuals have to share complex and tacit knowledge. Self-efficacy is considered as the essential component for prepared organizational learning. Bandura (1977) postulates that environmental and individual factors influence individual performance. An individual's past performance has an effect on self-efficacy as a result of observing how others carry out similar actions and through the individual's independent cognitive processing. Hence, self-efficacy is a fundamental strategic factor in accomplishing high performance levels (Bandura, 1986). Additionally, self-efficacy theory provides a conceptual framework applied in various schools of thought to perceive the relationship between organizational performance and the behaviour of individuals'.

Anderson et al. (2008) substantiate that learning and innovation depend on leadership efficacy, whereas Mumford et al. (2002) emphasise the leader's characteristics. Moreover, Anderson et al. (2008) explain that leadership efficacy result from behaviours that are unconventional and challenging in nature. Accordingly, Mumford et al. (2002) agree that innovation arises from creative thinking skills as well as from the capabilities and experience that are technical and organizational in nature. Furthermore, a nexus arises between learning, creativity, innovation, leadership and the cycles of knowledge creation. Indeed, explicit knowledge is the outcome of the collaborative efforts between explicit and tacit knowledge. Moreover, "the contemporary world does not adhere to fortuitous situations and innovation does not result from isolated geniuses but instead from activists inherent in organizations" (Martins, et al. 2016, pp. 159).

Continuous training, learning and development of employees is essential to ensure that individuals are competent in actual organizational business settings. Furthermore, Hecker and Birla (2008) corroborate that developing a culture of leadership development enables sustainable innovation for organizations arising from an increase in its knowledge base as well as developing individuals as leaders at all levels. This development arises from empowering individuals through autonomy, responsibility and power. Simultaneously, new age leadership behaviours give rise to innovative results.

The leadership self-efficacy construct and its association with learning are eminent in promoting high levels of employee engagement and satisfaction thus raising levels of individual and organizational performance. This is due to the fundamental assumption that opposing leadership behaviours encourage distinct aspects of organizational learning. In an attempt to analyse the importance of responsible leadership education in universities (HEIs) in order to increase organizational sustainability, the literature informs us that business leaders are confronted with social woes, Mirvis (2010). This concern arises from various domains ranging from changes affecting basic standard of living, health, education, climate which impact all stakeholders of the organization, private and public, individual, group and community.

Our current society and economy call for the responsible leadership paradigm that is imbued with values. This paradigm appeals to a shift in mind-set. Therefore, individuals and organizations should move away from traditional ways of thinking to the interpersonal mind-set which nurtures relations and enhances social capital.

Furthermore, in this regard, social innovation and responsibility embrace a holistic approach which enables the organization to make responsible profit while harmonising all stakeholders, internal and external. Martins et al. (2017, p. 140) concur that "(i)n order for organizational learning to occur it is imperative that a culture of creativity and innovation prevail in the organization (…) [a]culture of innovation and creativity is the cornerstone for unlearning those obsolete organizational practices. Internalization of knowledge is the essence of learning because that is where the abundance of information flows and where group and/or teamwork can flourish. In view of it being tacit knowledge, its integration and institutionalization is dependent on preliminary work which lies at the level of Internalization (…). The level of Internalization should be supported by a specific

leadership which is associated with humanizing organizational values (…). The link is accentuated between the constructs of leadership self-efficacy and learning through Internalization".

The context of HEIs entails creativity and innovation; this can only be possible within the context of the complexity theory if the organization fosters its employees with elements of freedom, creativity, risk-taking, communication, feedback and self-organization. In this way, notwithstanding the fact that complexity theory does not take into accommodate emotions, Morrison (2010); Goldstein (2000); Houchin and MacLean (2005), HEIs will allow for humanistic principles to prosper on the 'edge of chaos' Morrison (2010, p. 384).

4. The rich implications to the organizational (re)creation of human bodies in the context of organized labour

Innovation and technology spark the constant need to develop skills in the workforce in order to ensure productivity and sustainability. "(T)he need to upgrade skills applies not only to young people in schools, universities and training institutions, but also to the current generation of workers" (International Labour Office Geneva (2011, p.12). Europe 2020 is the target for skills development; similarly the BRICS countries have development challenges.

Renesch (2006, p. 26) concurs with Gray (2002) on the notion that we are currently "working and living in a deformed Western modernity which has been gradually de-humanizing capitalism". Furthermore, in contemporary organizations, dialogue, discourse and debate are substituted by a digital culture. Hence the need to embark on the journey to individual humaneness and also to humanise organizations at large.

According to the International Labour Office Geneva (2011) report, key elements such as social dialogue as well as collective bargaining prompt a wider allegiance to a learning culture through education and training at various levels, organization, sector and national. These elements are important to encourage investing in the development of skills and knowledge. In 2008, the International Labour Conference appealed for a "holistic approach to skills development" (International Labour Office Geneva, 2011, p. 18). This approach embraces a range of skills, namely,

1. continuous and seamless pathways of learning which are inclusive of age, gender as well as education levels;
2. development of core skills that include literacy, numeracy, communication skills, teamwork, problem-solving skills and learning ability;
3. development of higher-level skills that include professional, technical and human resource skills which ensure individuals are aware of, receptive to and competent for (with the portability of skills) high-quality jobs;
4. portability of skills which are based on core skills so that individuals can apply knowledge and experience to new occupations and industries; and
5. employability based on core skills, motivation, access to training opportunity, ability to take on continuous learning opportunities and support for doing so as well as recognition of acquired skills.

These abovementioned elements further intensify renewal of training programmes. Furthermore, these key elements are actively involved to guarantee productivity gains are equitably and resourcefully disseminated.

Moreover, "countries use a variety of coordination mechanisms: national inter-ministerial bodies; sector-based bodies bringing together training institutions and providers with employers' and workers' representatives; and decentralized local bodies" (International Labour Office Geneva, 2011, p. 20) and above all organizations need to (re)create human bodies in the context of organized labour. The "effective utilization of skills in the workplace both depends on and contributes to conditions conducive to innovation and enterprise development; effective labour market orientation and mediation services; and well-informed decisions about education and training policies".

The current business and economic agenda reveals dysfunctions between labour market demands and the position that HEIs have adopted. In reality, the challenge lies in bridging the gap between what industry is looking for in the graduate. This is translated into a harmonious blend of hard and soft skills, namely, subject specific knowledge and skills on the one hand and, on the other hand, personal, social, relational, spiritual and

emotional skills. For this reason, there is a need for HEIs to prepare the graduate for organizations and for society as a whole. This effective collaboration should be the very essence of both universities and the industry in order for these to achieve responsible sustainability.

Nemanich and Vera (2009) corroborate that transformational leadership behaviours fosters a learning culture and exploratory innovation that enthuse individuals in organizations to challenge that learning which is institutionalized. Indeed, individuals should embrace thinking processes that are generative and exploratory (Sosik et al., 1997). In contrast, transactional leadership behaviours are concurrent with exploitative innovation. These depend on the *status quo* of competencies, products and services (Jansen et al., 2004).

Spillane (2005) maintains that distributed leadership is about leadership practice. In addition, MacBeath (2005) corroborates that distributed leadership is dependent on trust and embodies the mutual response arising from the leadership potential of other individuals. Therefore, distributed leadership fosters consultation and consensus as opposed to command and control. These characteristics oppose and challenge traditional models of organizations.

Currie and Lockett (2011) support that Gibb (1954) postulated the distributed leadership construct which remained latent awaiting Brown and Hosking (1986) to revive it again. Distributed leadership, according to Harris and Chapman (2002) is a traditional organizational theory framework that entails a sequence of tasks.

On the other hand, Spillane et al. (2001, p. 25) advocate a juxtaposing approach and view distributed leadership as 'the execution of leadership tasks is often distributed among multiple leaders'.

Distributed leadership encompasses three main principles, namely, (i) leadership as a flourishing group/network feature of interacting individuals; (ii) approachability to the boundaries of leadership defining who has a role both within and beyond the organization; and (iii) multiplicities of expertise are distributed across the many, as opposed to the few. As a result, distributed leadership is characterised as collaborative, dynamic, inclusive, relational as well as context specific. In view of this nature, distributed leadership entails a system perspective that surpasses organizational levels, roles and boundaries.

Spillane et al. (2001) further argue that distributed leadership is a thinking and acting process that occurs in a specific context, centred on a process which entails individual practitioners' perceptions and their theories in use (Argyris and Schon, 1978). Consequently, in education institutions, leadership is regarded as thinking and acting in a particular situation to support facilitation and learning in order to foster graduates that will be future employees instilled with capabilities to put into practice the harmonious articulation of the hard and soft skillset.

5. Method

This study follows the ontological subjectivist view and an epistemology of the interpretive and radical humanist paradigms, Saunders et al. (2009). The link of the web-based questionnaire was made available on 18 July 2017, via the University of KwaZulu-Natal (UKZN) notice system after obtaining the Ethical Clearance and the Consent Letter for this study as well as the Gatekeeper's Letter. The primary data collection is still ongoing given the delay in obtaining the Ethical Clearance.

The questionnaire is based on the managerial grid concept developed by Blake and Mouton (1964), has 35 items with a Likert scale of five response options and aims to ascertain the self-reported leadership style of respondents. The purposeful sample method is used and the population entails the undergraduate and postgraduate students in the College of Law and Business, UKZN, South Africa. The primary research data will be managed and analysed according to the statistical processing method - SPSS version 25. Analyses will include means, standard deviations and correlations for the variables measured in this study.

6. Discussion and Conclusion

The research aims to determine whether there a significant finding in self-reported ratings of leadership styles of those respondents that are studying Management. Objective one of this study was to analyse the importance of responsible leadership education in universities HEIs to increase organizational sustainability.

The literature shows that just as Freire viewed transformative leadership should create bonds with school, home, work, family and the community, the same should occur with responsible education in our current new age society of innovation. Mirvis (2010) postulates that responsible leadership is a business paradigm that should be nestled in a global context and across all sectors.

Objective two was to ascertain the responsible leadership education effects on the continuous management learning of students in actual organizational business settings. A culture of new age leadership development enables sustainable innovation for organizations develops from an increase in its knowledge base as well as developing individuals as leaders at all levels, Hecker and Birla (2008). Responsible leadership education in universities will lead to an increase in organizational sustainability because HEIs can establish and promote strong ties with surrounding communities (Johnston, 2007).

Objective three was to determine the rich implications to the organizational (re)creation of human bodies in the context of organized labour. The current digital culture urges the need to encourage the journey to individual humaneness and also to humanisation of organizations at large, Renesch (2006).

References

Anderson, D. A., Krajewski, H. T., Goffin, R. D. and Jackson, D. N. (2008) "A Leadership Self-Efficacy Taxonomy and Its Relation to Effective Leadership," *The Leadership Quarterly*, vol. 195, pp. 595–608.

Argyris, C. and Schön, D. (1978) *Organizational Learning: A Theory of Action Perspective.* Reading, Mass: Addison Wesley.

Bandura, A. (1986) *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs: Prentice-Hall.

Bandura, A. (1997) *Self-efficacy: The Exercise of Control*. New York: Freeman.

Beckett, K. S. (2013) "Paulo Freire and the Concept of Education," *Educational Philosophy and Theory*, Vol. 45, pp. 49–62.

Beijerse, R. (1999) "Questions in Knowledge Management: Defining and Conceptualizing a Phenomenon," *Journal of Knowledge Management*, Vol. 3, pp. 94–110.

Blanco, P., Jové, M. C. and Reverter, J. (2012) "Paradigma Estratégico Para El Desarrollo De Habilidades Competenciales. Estudio Descriptivo Sobre La Variabilidad En La Percepción De Habilidades Competenciales De 40 Alumnos De Educación Física En Fase De Formación Inicial," ["Strategic Paradigm for Competency and Skills Development. A Descriptive Study About the Different Perceptions Towards Skills and Competencies Among 40 Students of The Physical Education Undergraduate Degree Programme"] *Educación XX1*, Vol. 15, pp. 231-248.

Currie, G., and Lockett, A. (2011) "Distributing Leadership in Health and Social Care: Concertive, Conjoint or Collective?" *International Journal of Management Reviews*, 13, pp. 286–300.

Freire, P. (1972a) *Cultural Action for Freedom.* Harmondsworth: Penguin.

Freire, P. (1972b) *Pedagogy of the Oppressed.* Harmondsworth: Penguin.

Freire, P. (1976) A Few Notes About The Word 'Conscientization'. In R. Dale, G. Esland, and M. MacDonald (Eds.), *Schooling and Capitalism* (pp. 224–227), London: Routledge.

Freire, P. (1985) *The Politics of Education.* New York: Bergin and Garvey.

Freire, P. (2007a) *Daring to Dream.* Boulder, CO: Paradigm.

Freire, P. (2007b) *Pedagogy of The Heart.* New York: Continuum.

Freire, P. (1978) *Pedagogy in Process.* London: Writers and Readers Publishing Cooperative.

Freire, P. (1993) *Pedagogy of The City.* New York: Continuum.

Freire, P. (1994) *Pedagogy of Hope.* London: Continuum.

Freire, P. (1998) *Pedagogy of Freedom*. New York: Rowman and Littlefield.

Freire, P. (1998b)*Teachers as Cultural Workers: Letters to Those Who Dare Teach. Boulder*. CO: Westview

Giacalone, R.A. and Greenberg, J. (Eds) (1997) *Anti-Social Behavior in Organizations*. Newbury Park, CA: Sage Publications.

Gibb, C. A. (1954) *Leadership*. In G. Lindzey, ed. Handbook of Social Psychology, chapter 2 (pp. 877–917), Reading, MA: Addison-Wesley.

Gitsham, M., Lenssen, G., Quinn, L., Bettignies, H-C., Oliver-Evans, C., Zhexembayeva, N., Fontrodona, J., Garcia Lombardia, P., Pillsbury, M., Van Wassenhove, L., Roper, J., Glavas, A. and Cooperrider, D. (2009) *Developing the Global Leader of Tomorrow, UN PRME (Principles for Responsible Management Development)*. Berkhamstead: Ashridge and EABIS.

Goldstein, J. A. (2000) "Emergence: A Construct Amid a Thicket of Conceptual Snares," *Emergence*, Vol. 2, pp. 5–22.

Gray, J. (2002) "The End Of Globalization," Resurgence, 212 available at: www.resurgence.org/resurgence/issues/gray212.htm (accessed 24.05.17)

Hecker, L. and Birla R. K. (2008) "Intangible Factors Leading to Success in Research: Strategy, Innovation and Leadership," *Journal of Cardiovascular Trans. Research*, Vol. 1, pp. 85–92.

Houchin K. and MacLean, D. (2005) "Complexity Theory and Strategic Change: An Empirically Informed Critique," *British Journal of Management*, Vol. 16, pp. 149–66.

http://www.up.ac.za/media/shared/Legacy/ems.zp11798./Documents/2013-alcrl-position-paper.zp36923.pdf (accessed 24.05. 2017).

International Labour Office Geneva (2011) *A Skilled Workforce for Strong, Sustainable and Balanced Growth. A G20 Training Strategy*. November. Geneva.

Jashapara, A. (2003) "Cognition, culture and competition: an empirical test of the learning organization," *The Learning Organization*, Vol. 10, pp. 31-50.

Jasimuddin S. M., Klein J. H. and Connell, C. (2005) "The Paradox of Using Tacit and Explicit Knowledge: Strategies to Face Dilemmas," *Management Decision*, Vol. 43, pp. 102–112.

Jasimuddin, S. M. (2008) "A Holistic View of Knowledge Management Strategy," *Journal of Knowledge Management*, Vol. 12, pp. 57–66, 2008.

Johnston A. (2007) *Higher Education for Sustainable Development*. *Final Report of International Action Research Project.* OECD from Forum for the Future.

Laužackas, R. Tūtlys, V. and Spūdyte, I. (2009) "Evolution of Competence Concept In Lithuania: From VET Reform To Development of National Qualifications System," *Journal of European Industrial Training*, Vol. 33, pp. 800-816, 2009.

Maak, T. (2007) "Responsible Leadership, Stakeholder Engagement, and the Emergence of Social Capital," *Journal of Business Ethics*, 74, 329-343.

MacBeath, J. (2005) "Leadership as Distributed: A Matter Of Practice," *School Leadership and Management*, Vol. 25, pp. 349-66.

Martins, A., Martins, I. and Pereira, O. (2013) Organizational Flexibility Through Human Capital Development, in: Buckley, S., Jakovljevic, M. (Eds.), Knowledge Management Innovations for Interdisciplinary Education: Organizational Applications. Hershey, PA: Information Science Reference, pp. 51-65.

Martins, A., Martins, I. and Pereira, O. (2017) Embracing Innovation and Creativity through the Capacity of Unlearning, in: de Pablos, P., Tennyson, R. (Eds.), *Handbook of Research on Human Resources Strategies for the New Millennial Workforce*. Hershey, PA: IGI Global publisher of the Business Science Reference, pp. 128-147.

Martins, A., Martins, I. and Pereira, O. (2017) Feedback and Feedforward Dynamics: Nexus of Organizational Learning and Leadership Self-efficacy, in: Wang, Victor, C. X. (Ed.), *Encyclopaedia of Strategic Leadership and Management*. Hershey, PA: IGI Global publisher of the Business Science Reference, pp. 208-233, 2017.

Martins, I., Martins, A. and Pereira, O. (2016) On Trust, Knowledge Sharing and Innovation, in: Khosrow-Pour, M. (Eds.) *Business Intelligence: Concepts, Methodologies, Tools, and Applications*. Hershey, PA: IGI Global publisher of the Business Science Reference, pp. 1293-1313.

Mirvis, P. (2010) Responsible leadership emerging. Individual, Organizational and Collective Frontiers. University of Pretoria, available at:

Morrison, K. (2010) "Complexity Theory, School Leadership and Management: Questions For Theory and Practice," *Educational Management Administration and Leadership*, Vol. 38, pp. 374–393, 2010.

Mumford, M. D., Scott, G. M., Gaddis, B. and Strange, J. M. (2002) "Leading Creative People: Orchestrating Expertise and Relationship," *The Leadership Quarterly*, Vol. 13, pp. 705-750.

Nemanich, L. A. and Vera, D. (2009) "Transformational Leadership and Ambidexterity In The Context of an Acquisition," *The Leadership Quarterly*, Vol. 20, pp. 19–33.

Pearce, C., Manz, C. and Akanno, S. (2013) "Searching For The Holy Grail Of Management Development And Sustainability: Is Shared Leadership Development The Answer," *Journal of Management Development*, Vol. 32, pp. 247-257.

Pearce, C.L. and Sims Jr, H.P. (2002) "Vertical Versus Shared Leadership as Predictors of the Effectiveness of Change Management Teams: An Examination of Aversive, Directive, Transactional, Transformational, and Empowering Leader Behaviors," *Group Dynamics*, Vol. 6, pp, 172-97.

Pless, N. M. (2007) "Understanding responsible leadership: role identity and motivational drivers," *Journal of Ethics*, Vol. 74, pp. 437-456, 2007.

Press.

Renesch, J. (2006) "Humanizing Work: Surviving in the Culture of Technology," *Foresight*, Vol. 8, pp. 26-36.

Roberts, P. (2015) "Paulo Freire and Utopian Education," *Review of Education, Pedagogy, and Cultural Studies*, Vol. 37, pp. 376-392.

Rowley, J. (2000) "From Learning Organization To Knowledge Entrepreneur," *Journal of Knowledge Management*, Vol. 4, pp. 7–15.

Saunders, M., Lewis, P. and A. (2009) Thornhill. *Research Methods for Business Students*. 5th ed. London: Prentice Hall.

Schonstrom, M. (2005) "Creating Knowledge Networks: Lessons From Practice," *Journal of Knowledge Management*, Vol. 9, pp. 17–29.

Senge, P. (1990) *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York, NY: Doubleday.

Soliman, F. and Spooner, K. (2000) "Strategies for Implementing Knowledge Management: Role of Human Resource Management," Journal of Knowledge Management, Vol. 4, pp. 337–345.

Sosik, J. J., Avolio, B. J. and Kahai, S. S. (1997) "Effects of Leadership Style and Anonymity On Group Potency and Effectiveness in a Group Decision Support System Environment," *Journal of Applied Psychology*, Vol. 82, 89–103.

Spillane, J. P. (2005) "Distributed Leadership," *The Educational Forum*, Vol. 69, pp. 143-150.

Stefani, L. (2013) "Intellectual Leadership in Higher Education: Renewing The Role of the University Professor, By Bruce Macfarlane," *Higher Education Research and Development*, Vol. 32, pp. 334-336.

The Globally Responsible Leadership Initiative (2008) Bruxelles: GRLI Foundation of Public Interest.

Weiner, E. J. (2003) "Secretary Paulo Freire and the Democratization Of Power: Toward A Theory Of Transformative Leadership," Educ*ational Philosophy and Theory*, Vol. 35, pp. 89-106.

Methodology of Innovation Generation as an Instrument for Effective Management of Technological Innovations

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Abstract: The source of many innovations is research activity carried out at specialised R&D organisations. Innovations are developed there with a focus on implementation in business practice. The first stage of the innovation process at an R&D organisation comprises generation of a set of possible innovative ideas and projects. The extreme importance of this stage results from the need to select for development only innovative ideas with chances for scientific and commercial success. Their proper selection strongly determines quality and usefulness of developed innovative solutions, possibilities of their practical implementation, and effective use of available resources. The literature review indicates some tools, including IT applications supporting the project ideas generation. The paper's authors, on the basis of their experience in generating, developing, and implementing innovations, while taking into account approaches applied by scholars and practitioners, propose a methodology of innovation generation that would enable determination and choice of innovations that have potential for the highest effectiveness for development in an R&D organisation. A key element of the methodology is an original project generator. The initial project ideas, coming mainly from results of scientific investigations, orders from industry, and results of foresight research, are gathered in the project generator. Its application assumes use of methods, co-developed by the paper's authors, enabling proper analysis of project ideas, including technology assessment, in respect of implementation maturity, commercial and innovation potential, and executive potential assessment including human, financial, organisational, and infrastructural potential necessary for project execution. Application of the methodology of innovation generation, including the designed IT tool, enables identification of new potential research projects and selection of those with the highest chances of success. The selected projects concern innovations, considered as significant due to their scientific and technological values, and possible economic and social benefits. The paper presents an original methodology of innovation generation and an example of its practical application at the Institute for Sustainable Technologies – National Research Institute, Radom, Poland, which is an R&D organisation involved in technology development and implementation in the field of machine construction and maintenance.

Keywords: technological innovations, project generator, R&D organisation, foresight, technology assessment, executive potential assessment.

1. Introduction

Innovations are regarded as key factors contributing to economic development at both the macro level of a country or region and the micro level of businesses. An effective innovation process is necessary for innovations to have impact on operation of enterprises.

Experience of the authors, involved in processes of innovation generation, realisation, and implementation (Mazurkiewicz, 2009; Mazurkiewicz and Poteralska, 2015), implies an appropriate choice of potential projects so as to ensure successful development of innovations characterised by application potential is a considerable difficulty. Ideas for potential innovations may come from a variety of sources including continued development of innovations prepared in a research organisation, progress of science, needs of an economy, cooperation proposals submitted by research organisations or direct industrial orders. An ordered and effective analysis of ideas for potential innovations and selection of those whose development and implementation stand chances of being successful is of the essence. Such an approach allows for significant savings as only undertakings of substantial chances of success are realised. Thorough-going and comprehensive analysis of innovations to be developed, even time and expense-consuming, always costs distinctly less than the realisation of a project that will end with a failure or will have to be discontinued.

The importance of the stage of innovation generation points to the need to apply tools supporting its effective realisation. An analysis of existing tools to support generation of innovations (Bąk, et al., 2012) shows tools developed to aid development of solutions as part of research projects constitute a majority. These are predominantly tool solutions which provide operational, chiefly IT support for management of research and development processes. The authors, while acknowledging the weight of operational support for processes of innovation generation, propose to aid them by employing systemic methodological tools. Since innovations commonly spring from efforts by specialised research organisations and the authors, working for a research

institute, have extensive experience in this area, a proposal suited to conditions prevailing at research organisations is advanced in this paper.

Based on a literature review and our own practical experience, a methodology of innovation generation is developed for the purposes of supporting the stage of innovation generation at a research organisation and aiding collaboration of such an organisation with its scientific and industrial partners. The methodology is applied to support the process of generating topics for future-oriented research projects concerning technological innovations defined as new or substantially modified products and processes, characterised by innovativeness and market demand on one hand and the executive potential required to develop them being available at an organisation on the other hand. The methodology is dedicated for use in the process of generating forward-looking research projects. Application of the methodology assumes the use of methods, co-developed by the paper's authors, supporting generation of project ideas, including foresight; methods enabling proper analysis of project ideas in the course of their development, including technology assessment, in respect of implementation maturity, commercial and innovation potential, and executive potential assessment comprising human, financial, organisational, and infrastructural potential necessary for project execution.

An original tool – the "Innovative project generator" (Mazurkiewicz and Poteralska 2017) including an IT application as its operational element – has been developed and implemented as part of the methodology in order to effectively support the stage of innovation generation. The project generator is a new methodological idea based on the assumption of a close cooperation of an R&D organisation with potential industrial partners consisting in gathering information about research needs of an economic milieu and suggested innovative undertakings. It serves to monitor the process of generating and conduct of research undertakings. The monitoring process is enabled by use of systematically collected information about innovative research undertakings being prepared or showing potential.

2. Methodology of innovation generation

The methodology of innovation generation is part of a broader methodology of supporting generation and realisation of technological innovations at a research organisation developed with a view to aiding the process of technological innovation development that encompasses the following stages: generation of research problems that results in selection of topics for innovative undertakings, development of innovations from the conception to the stage of technical documentation, prototype, and finished product, where practical employment of results is possible, and the final stage of innovation development, that is, implementation to economic practice (Fig. 1).

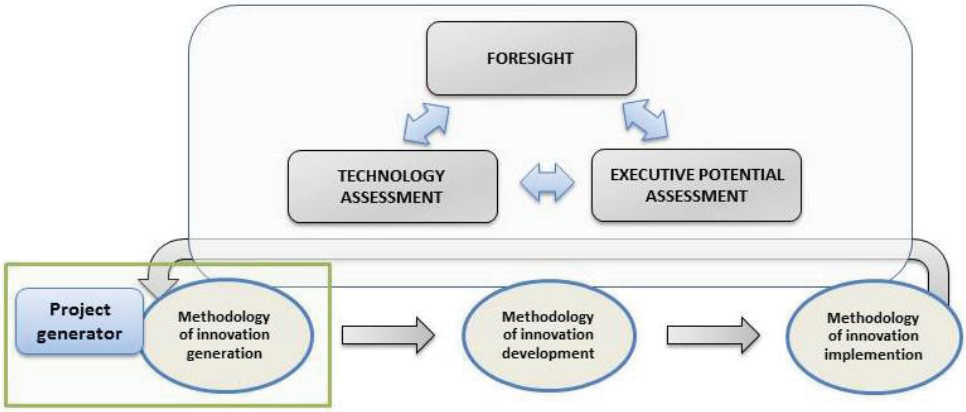

Figure 1: Overall diagram of the methodology of supporting processes of generation and realisation of technological innovations at a research organisation

This article presents the methodology of innovation generation (Fig. 2). Its idea assumes application of methods of foresight, technology assessment, and executive potential assessment in order to compile a set of proposals for future-oriented technological innovations as the starting point for decision-making related to realisation of research and implementation undertakings at a research organisation.

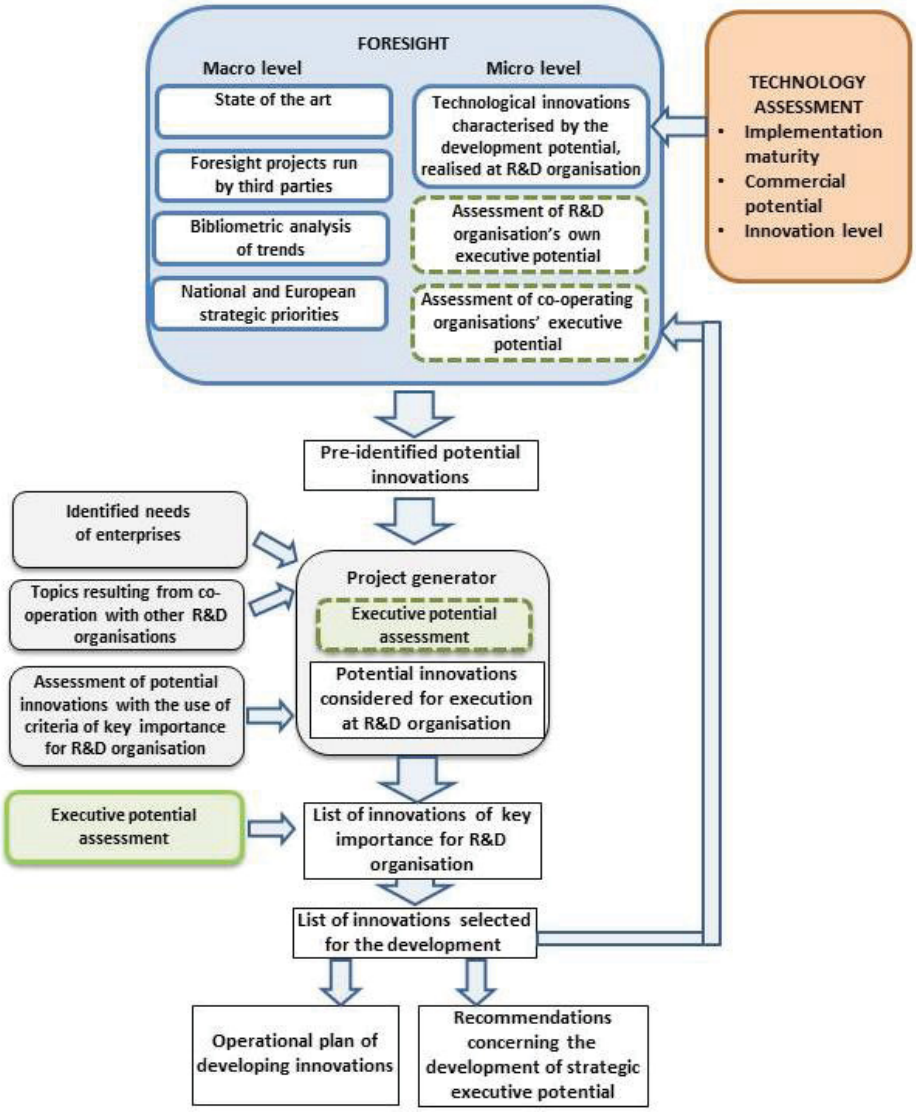

Figure 2: Methodology of innovation generation of a research organisation using the project generator

Source: Poteralska 2018.

The first stage of the innovation process involves looking for ideas or concepts. This generation of innovative solutions can be successfully aided with foresight (with both plentiful descriptions in the literature and universal applications in practice) which is utilised in the process of generating forward-looking research directions and technologies (Cuhls, 2003; Giesecke S., 2007; Cadiou, 2003) and helps to identify emergent development trends and weak signals as well as explore potential for their continued development and future significance (Saer et al, 2017). Foresight is a tool generating future-oriented topics for research and technological innovations, out of which priority tasks are selected that can be developed by an organisation with a given potential. Researchers and practitioners point out foresight is an acknowledged tool for decision-makers and managers to systematically explore, create, and test both possible and desirable visions of the future for the purpose of supporting decision-making processes at level of both institutions, regions, countries and supranationally, with particular focus on decisions concerning innovations (Georghiou, 2003; Hines, 2002; van der Duin, 2006; Masini and Samset,1975). Utilisation of foresight methods (Georghiou et al., 2008; Miles and Keenan 2003; UNIDO, 2005; Porter, 2010; Popper and Korte, 2004) aids decision-making processes as it somehow enforces anticipation of possible threats and opportunities and addressing ways of taking advantage of emerging opportunities or dealing with expected difficulties (Giaoutzi and Sapio, 2013; Georghiou, 2003).

As part of the methodology, foresight serves initial identification of innovations potentially capable of being developed by a research organisation. In connection with foresight undertakings at a research organisation, macro analyses are conducted including reviews of state of the art and analysis of foresight projects realised

by national and international entities, as well as micro analyses of technological innovations already developed by a research organisation. An authorial set is applied of quantitative and qualitative methods of research organisations' corporate foresight (Sacio-Szymańska et al., 2015; Poteralska, 2012; Poteralska and Łabędzka, 2015, Poteralska, 2017).

Micro analyses are aided with technology assessment. Technological solutions that have been developed and addressed as part of foresight by a research organisation are evaluated for the possibility of creating future innovative solutions. To this end, solutions developed at the organisation are assessed for implementation maturity, commercial potential, and innovativeness. Modules of a complex system of technology assessment, prepared under leadership of these authors (Mazurkiewicz et al., 2015; Mazurkiewicz and Poteralska, 2012), are employed in the process of evaluating technological solutions. The system is part of an area of technology assessment for business requirements indicated in the literature and focussing on technical and economic aspects that coexists side by side with the mainstream technology assessment, where technology assessment addressing the social perspective (impact of technology on society) is preponderant (Tran and Daim, 2008; Mazurkiewicz and Poteralska, 2014). The complex technology assessment may be used to carry out the so-called laboratory technology assessment (Van Den Ende et al, 1998), one of four forms of technology assessment distinguished considering the criterion of institutional perspective and consisting in technology assessments by researchers themselves and utilisation of the results as a guide in the process of technology development. Technological solutions evaluated by means of the complex technology assessment system, characterised by both innovativeness and market demand, are seen as potential sources of more technological innovations to be analysed with the aid of foresight methods.

Commencement of innovative undertakings generated is conditioned by existence of necessary executive potential, own or of cooperating institutions (Teece et al., 1994; Stabryła 2004; Pacholski, 2012; Schoemaker, 1993). Executive potential is understood as a state of an organisation's strategic and operational resources and competences that enables realisation of actions and supports the organisation's development in future (Poteralska, 2018). A preliminary assessment of executive potential of a research organisation where innovations are developed and of its collaborating entities is also conducted as part of foresight.

Foresight results in a list of pre-identified innovations that can be developed by a research organisation. The foresight results are but one of the sources of innovation, however. Another source of technological innovations and topics for potential projects lies in innovations developed at a research organisation before, proposals stemming from industry requirements, and cooperation with research organisations. They are addressed in the project generator together with innovation proposals generated by foresight. Potential innovation proposals gathered in the generator are reassessed for executive potential available at the research organisation as far as executive and application capabilities of a project and selection of partners for project realisation and of parties interested in its results are concerned considering knowledge in a given field, experience with realisation of research projects, high standing in a sector and standards of innovation and competences supplementing an organisation's resources, financial credibility, etc. The method of key technologies is then applied as part of pre-identification of technological innovations for the purposes of a research organisation from among potential innovations generated in a given area. Key criteria are selected for an organisation to this end that may encompass, for instance, scientific and technological significance, compliance with strategic directions of a research organisation's activities, as well as economic and social benefits from applying innovations. The key criteria are addressed to select potential innovations considered for realisation by a research organisation. In respect of individual technological innovations selected by means of the key criteria, a detailed assessment is conducted of executive potential available to a research organisation. This is designed to verify whether a research organisation has the material, financial, human and organisational executive potential required to realise the pre-identified technological innovations and to implement them to the economy. The material executive potential, especially the research infrastructure and human potential, is of key importance to a research organisation's executive potential since it determines the possibility of realising work at a research organisation. Material and human executive potentials are prerequisite to decisions to realise specific innovations. Financial and organisational potential are added aspects. With reference to the particular innovations, potential sources of financing their development are indicated that include: international projects, national projects, commercial contracts, research organisation's own financial resources, and an enterprise's financial commitment. In addition, availability of organisational executive potential necessary to realise identified innovations is analysed. The analyses enable a diagnosis if a research organisation has the potential needed to develop innovations, to what extent the organisation's

executive potential must be expanded or modernised to allow for work in a given area to be conducted, and to indicate directions for expansion of the strategic executive potential required to ensure the research organisation's competitive standing in future. Results of this stage help to compile a final list of technological innovations. Innovative solutions which are effective in application and commercial terms are recommended for realisation, for which executive potential for effective realisation and implementation is available at a research organisation or, if necessary, where an organisation's own potential can be supplemented with expert knowledge or research apparatus from external entities.

The final results of the methodology comprise: recommendations to management structures of a research organisation including a list of technological innovations, an operational plan for realisation of selected technological innovations, and proposed areas of expansion of executive potential.

A generated list of technological innovations accepted for realisation encompasses proposals for research and implementation undertakings for which executive potential for effective realisation is available at a research organisation or, if necessary, where an organisation's own potential can be supplemented with expert knowledge or research apparatus from external entities.

Application of this methodology also supports making of strategic decisions to select research directions for an organisation and develop its executive potential within a specified time-frame as well as operational decisions related to work on a selected group of technological innovations.

3. Algorithm of applying the innovative project generator

The project generator is the operational module of the authorial methodology of innovation generation. (Fig. 3).

Initiatives carry different status dependent on progress of work to start a research undertaking. The project proposals and various types of research and innovation undertakings, aimed at economic applications, generated, among others, as a result of using foresight methods, business meetings with industry representatives, study visits, scientific conferences and specialist publications, research as well as development and application needs observed or discussed in the scientific and industrial environment, are collected in a specialised database of proprietary computer applications in the folder "New projects." At short-term intervals, the proposals collected are analysed in terms of executive and application capabilities, including, among others, confirming willingness of an interested research group, industrial entity or a group of industrial entities to cooperate on a given project. A letter of intent constitutes grounds for future activities and determines subsequent tasks to be performed, i.e. recognition of performance capabilities, staff, equipment, infrastructure, time, and financial capabilities (the project gets the status: "Important"). In case of failure to meet one of the above-mentioned factors at a satisfactory level, the possibility is considered of supplementing identified deficiencies in the structure of external substantive and organisational connections.

Instruments of financing viable in a given undertaking are then analysed. These include above all: direct financing of the task from funds of an industrial beneficiary or financing through available regional and national research funding programmes, as well as a research organisation's own means. Continued interest of a third party in a joint undertaking and matching of potential financial instruments to its unique nature are prerequisite to changing a project's status to "Priority." Tasks that did not meet the requirements but can still be fulfiled in future are sent to the folder "Reserve." On the other hand, those projects that do not show prospects for implementation in a foreseeable period of time are collected in the folder "Archive of projects".

Priority projects for which an implementation formula was chosen are prepared on formally and substantively in accordance with the requirements of the procedure for their implementation. For projects with direct industrial financing, or joint funding by an R&D organisation and economic entity, and those that have been finalised as a result of competitive tendering for national or international funds, a feasibility study, and required contracts that include matters of confidentiality, intellectual property, a schedule of financing and implementation, as well as partial and final acceptance conditions are prepared. Obtaining co-financing makes it possible to start an innovative project's execution.

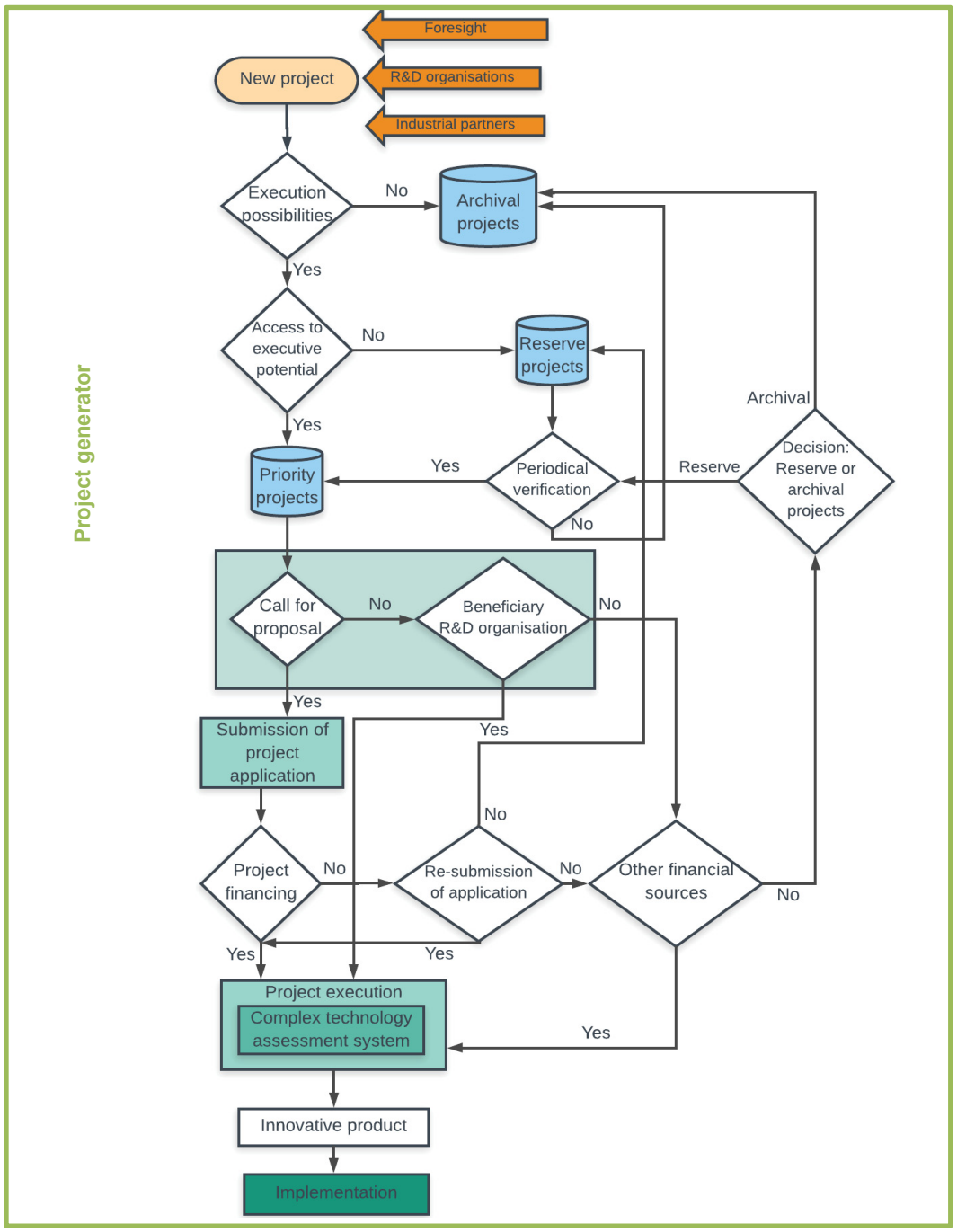

Figure 3: Algorithm for use of the project generation

Source: Mazurkiewicz, 2018

4. An instance of application of the innovation generation methodology

The methodology has been verified in the practice of supporting generation of technological innovations at the Institute for Sustainable Technologies – National Research Institute, Radom, Poland, in the field of machine construction and maintenance including: surface engineering, mechatronics, and optomechatronics, control systems, environment-friendly technologies, technical and environment safety technologies, and special production. An implementation of the methodology to solutions in the field of mechatronics, chiefly including optomechatronics, is presented in this paper.

The technological solutions developed as part of the Strategic Programme “Innovative Systems of Technical Support for Sustainable Development of Economy” coordinated by the authors provided the source for proposals of subsequent innovations and research undertakings collected in the project generator. Demand and orders of enterprises and project proposals generated by collaboration with science organisations, as well

as results of successive foresight iterations by the research organisation at regular three years' intervals, which involved generation and monitoring of priority research directions in order to support ongoing operational efforts, constituted some more sources of innovation. In effect of the undertaking, research and development priorities for 2015–2018 were updated. The updated priorities were taken into account as potential future research and implementation undertakings in the project generator, which is illustrated for the example of the research area of mechatronics (Fig. 4).

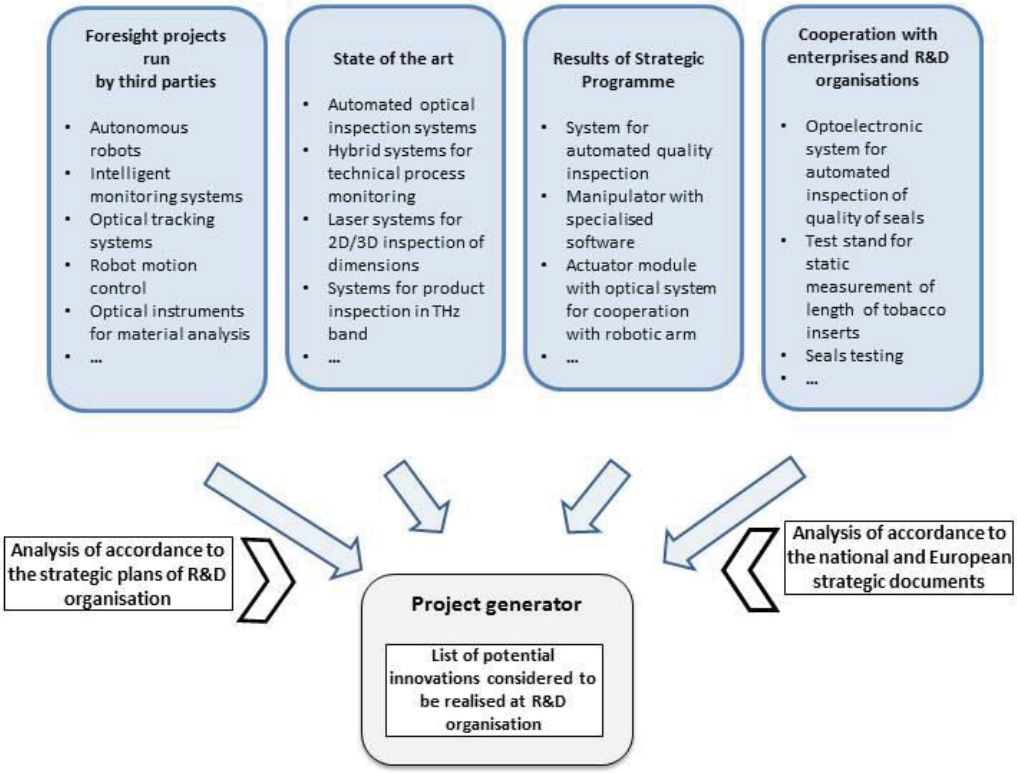

Figure 4: Sources of topics for potential technological innovations in the instance of optomechatronics

The project proposals gathered in the generator were subject to initial evaluation for executive potential required for their realisation. Projects aligned with strategic directions of the research organisation's activities, with the necessary executive potential and interest of external entities in place, were considered as future-oriented undertakings aimed at developing technological innovations. In order to support processes of innovation identification, development, and implementation, an authorial methodology of supporting generation and realisation of technological innovations was submitted. It integrates application of the following tools: foresight, technology assessment, and executive potential assessment, whose individual utility in supporting realisation of innovation processes has been demonstrated as part of undertakings at the research organisation.

The proposed topics of research and implementation undertakings generated in this way were collected in the project generator. They were assessed by means of the criteria of key importance for the Institute for Sustainable Technologies – National Research Institute: scientific and technological significance and accordance with strategic directions of the research organisation's activities. In addition, an analysis was undertaken which of them could bring commercial, economic, and social benefits. Topics of interest to industrial partners and with chances of working on innovations jointly with or ordered by such partners were addressed first of all.

Available executive potential is a major aspect influencing selection of technological innovations scheduled for development at the organisation. Material executive potential, especially the research infrastructure in place, and human potential are of key importance as part of the executive potential, since they determine feasibility of efforts in such a specialist area of science and practice as optomechatronics. The analysis proved the material executive potential necessary for realisation of the generated optomechatronics innovations is available at the research organisation. It was also found, however, realisation of work in these areas of

research that would enhance their standard in line with development trends in science and technology would require additional equipment with infrastructure of parameters adequate to world-class standards. This signals the need to expand the strategic executive potential.

Presence of material and human executive potential was a prerequisite to decisions to realise specific innovations. Additional aspects related to financial and organisational potential. Potential sources of financing development of individual innovations were indicated, including: international projects, national projects, commercial contracts, research organisation's own financial resources, and financial commitment of enterprises. The analysis also showed organisational executive potential necessary to realise identified innovations was in place at the research organisation. It is insufficient, though, for all the undertakings considered. It needs to be developed.

The generated list of technological innovations accepted for the development includes proposals for research and implementation projects for which an executive potential is available in the research organisation to carry them out effectively, or if necessary, there is the possibility to supplement their own expertise by using expert knowledge or using external research equipment. An example of such an innovation is a device for quality control of shaft sealers. The process of its development is presented in Fig. 5.

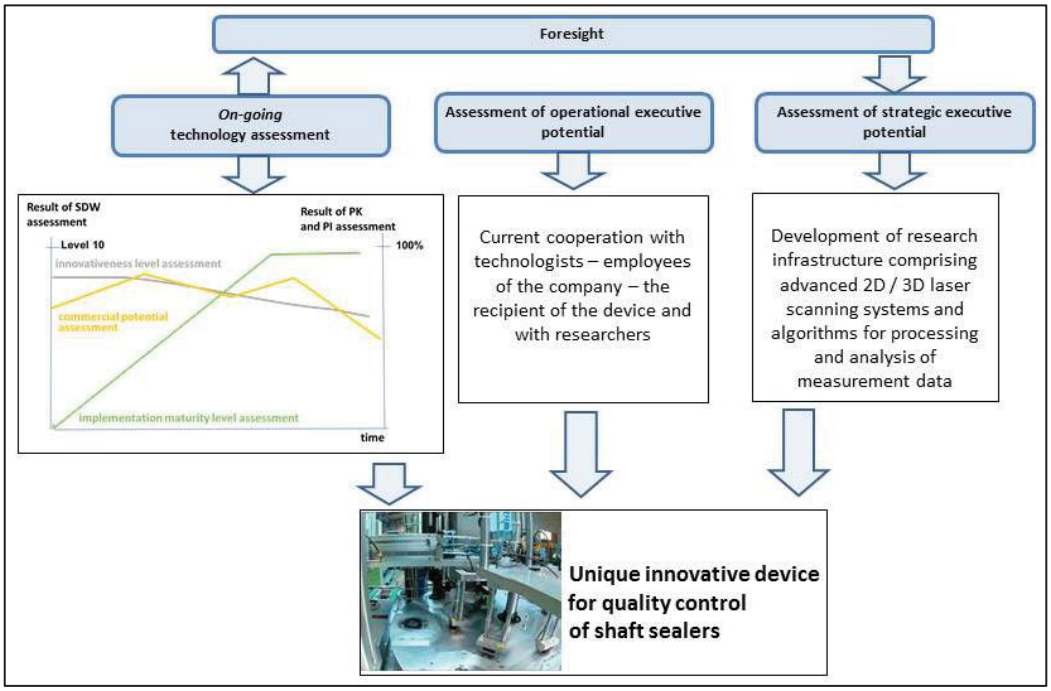

Figure 5: Process of the innovation development

The process of innovation development is monitored through a systematic technology assessment comprising implementation maturity, commercial potential, and innovativeness. *On-going* technology assessment is carried out in parallel with the assessment of operational executive potential. It enables on-going support for the process of innovation development and making operational decisions regarding, for example, strengthening a specific type of potential. Furthermore, in case of significant problems with the development of the innovation, for instance, the lack of a possibility to supplement the executive potential, it enables making a decision to stop further work on the innovation. Apart from the assessment of the executive operational potential, the strategic executive potential is also assessed, which is aimed at indicating the areas where it needs to be expanded to make it possible to undertake the generated research projects. On the other hand, results of *on-going* technology assessment are used for the needs of generating new project ideas, as technologies characterised by innovativeness and market demand are treated as one of sources for future projects.

The number of potential innovative projects in the field of optomechatronics generated with the use of a project generator shows a dynamic upward trend. Among them, a limited number of the most promising ideas are selected. 32 out of 120 proposals for potential technological innovations collected in the project generator

in the period from 2015 to 2018 were qualified for the stage of realisation. Relatively many, even cognitively interesting topics for innovative undertakings were abandoned as necessary executive potential was absent from the research organisation and its cooperating entities or because the proposed solutions exhibited insufficiently low levels of innovative or commercial potential, among other reasons that could be identified due to the application of the proposed project generator and the algorithm of its application.

5. Conclusion

The proposed methodology of innovation generation is a tool supporting the decision-making process concerning generation of undertakings aimed at development and implementation of innovative technological solutions including those in cooperation with industry. Application of the methodology aids management of the innovation generation process by means of foresight, technology assessment and executive potential assessment and by including the project generator, a tool solution that supports innovation generation operationally. The methodology is a major part of a complex system of technological innovation generation and realisation support at a research organisation, developed with leading contributions of the paper's authors, including stages of innovation generation as well as development and implementation.

The proposed methodology, in comparison to the existing tools supporting generation of innovations, provides, not only operational, mainly IT support for management of research and development processes as other currently applied systems, but also provides a comprehensive system support enabling the selection of the best innovative ideas analysed while taking into account numerous aspects, e.g., implementation maturity, commercial potential, and innovativeness. One of the main advantages of the methodology consists in taking into account a wide spectrum of sources of innovations, including, among others, the needs of enterprises, ideas resulting from cooperation with research organisations and universities, and innovations currently under development. The process of generating innovations while taking into account innovation ideas from various sources is carried out with the use of foresight methodology. Another important advantage of the methodology consists in applying in the process of generating project ideas, apart from foresight and other future research methods, also technology assessment and executive potential assessment, which increases the chance to select for the development only ideas with considerable chances for success. Application of the methodology enables a multidimensional approach to the issue of generating project ideas and aids operational decision-making processes by supporting the process of selecting innovative technological solutions that can be developed successfully at a research organisation and stand chances of being utilised in the economy. Application of the methodology additionally supports the generation of a research organisation's directions of development in the most promising and forward-looking areas of research, thus aiding strategic management of an organisation.

The instance of a model implementation of the methodology to optomechatronics solutions introduced in this article reaffirms utility and effectiveness of its application for the purposes of supporting innovation generation processes and initiation of new undertakings at a research organisation.

References

Bąk M., Bednarz A., Kulawczuk P., Szcześniak A., Bednarz P., Danielczuk M., Światowe funkcjonalne programy i narzędzia do inicjowania, planowania i wdrażania projektów B+R, ŁÓDZKI EXPLORER B+R, Łódź-Warszawa 2012.

Cadiou Y., From key-technologies to key-competencies. Scientific and technological competencies at the regional level related to the French "Key-Technologies" exercises, The Second International Conference on Technology Foresight, Tokyo, 2003.

Cuhls K., Government Foresight Activities in Germany: The Futur Process, Institute for Systems and Innovation Research, Karlsruhe, 2003.

Georghiou L., Evaluating Foresight and Lessons for Its Future Impact., paper presented at The Second International Conference on Technology Foresight, 27–28.02.2003, Tokyo.

Georghiou L., Harper J. C., Keenan M., Miles I., Popper R., The Handbook of Technology Foresight, Concepts and Practice, Edward Elgar, UK, 2008.

Giaoutzi M., Sapio B., In Search of Foresight Methodologies: Riddle or Necessity, in: M. Giaoutzi, B. Sapio (ed.), Recent Developments in Foresight Technology. Complex Networks and Dynamic Systems 1, Springer Science+Business Media, New York, 2013.

Giesecke S., Futur – The German Research Dialogue, Foresight Brief No. 1, The European Foresight Monitoring Network EFMN, 2007.

Hines A., A practitioner's view of the future of futures studies, Futures 34 (3–4), 2002, pp. 337–347.

Masini E., Samset K., Recommendations of the WFSF General Assembly. WFSF Newsletter, 1975.

Mazurkiewicz A. (ed.), Final report. Program Wieloletni „Doskonalenie systemów rozwoju innowacyjności w produkcji i eksploatacji w latach 2004–2008", ITeE – PIB, Radom 2009.
Mazurkiewicz A., Barriers and challenges of R&D organisations in the field of technological innovation development and implementation, Proceedings of the International Conference on Entrepreneurship, Business and Technology (ICEBUT) 2018.
Mazurkiewicz A., Poteralska B., Technology transfer barriers and challenges faced by R&D organisations. Procedia Engineering, vol. 182, 2017, s. 457–465
Mazurkiewicz A., Belina B., Poteralska B., Giesko T., Karsznia W., Universal methodology for the innovative technologies assessment, in: Dameri R. P., Beltrametti L. (ed.) Proceedings of the 10th European Conference on Innovation and Entrepreneurship, Academic Conferences and Publishing International Limited, Reading, UK, 2015.
Mazurkiewicz A., Poteralska B. (ed.), Final report. Program Strategiczny „Innowacyjne systemy wspomagania technicznego zrównoważonego rozwoju gospodarki", ITeE – PIB, Radom 2015.
Mazurkiewicz A., Poteralska B. Application of the complex technology assessment system for product development, Galbraith B. (ed.) Proceedings of the 9th European Conference on Innovation and Entrepreneurship, Academic Conferences and Publishing International Limited, Reading, UK, 2014.
Mazurkiewicz A., Poteralska B. System of a complex assessment of technological innovative solutions. Problemy Eksploatacji 4/2012.
Miles I., Keenan M., Overview of methods used in foresight. The Technology Foresight for Organisers Training Course, Ankara, 2003.
Pacholski L., Human Factors and Well-balanced Improvement of Engineering, in: P. Vink (ed.), Advances in Social and Organizational Factors, Taylor & Francis Group, Boca Raton, 2012.
Popper R., Korte W., XTREME EUFORIA: Combining Foresight Methods, EU-US Seminar: New Technology Foresight, Forecasting & Assessment Methods, Sewilla 13–14.05.2004.
Porter A.L., Technology Foresight: Types and Methods, International Journal of Foresight and Innovation Policy, Vol. 6, nr 1/2/3, 2010.
Poteralska B., Decision support system in the area of generating innovative research projects of the future. Procedia Engineering, Elsevier, Vol. 182, 2017, pp. 587-593.
Poteralska B., Application of foresight methods for the determination of priority research directions of the future, myForesight Malaysia's National Foresight Magazine, nr 1/2012.
Poteralska B., Łabędzka J., Technological foresight-based methodology for research directions identification, Ekonomika i Organizacja Przedsiębiorstwa, nr 10/2015, Wydawnictwo Instytutu Organizacji i Zarządzania w Przemyśle „ORGMASZ", 2015, pp. 3-16.
Poteralska B., Metodyka wspomagania rozwoju innowacji technologicznych w jednostce badawczej, Biblioteka Problemów Budowy i Eksploatacji Maszyn, KBM PAN, ITeE-PIB, Radom, 2018, pp. 241.
Sacio-Szymańska A., Mazurkiewicz A., Poteralska B., Corporate foresight at the strategic research institutes, Business: Theory and Practice / Verslas: Teorija ir Praktika, Vol 16, nr 3, 2015, pp. 316-325.
Saer D., Hancock T., Talwar R., The Value of Foresight as the front end to innovation. ISPIM Innovation Watch Article, http://fastfuture.com/wp-content/uploads/2012/04/Fast-Future-ISPIM-Innovation-Watch-Article-04_04_12-v2.pdf (25.01.2017).
Schoemaker A.R., Strategic Assets and Organizational Rent. "Strategic Management Journal" nr 1, 1993.
Stabryła A., Bilans sprawnościowy jako narzędzie oceny potencjału strategicznego firmy, w: Zarzadzanie strategiczne w praktyce i teorii. Prace Naukowe Akademii Ekonomicznej we Wrocławiu, 2004, nr 1025.
Teece D.J., Pisano G., Shuen A., Firm Capabilities, Resources and the Concept of Strategy, "Economic Analysis and Policy Working Paper", University of California, Berkeley, 1994.
Tran T., Daim T. A taxonomic review of methods and tools applied in technology assessment. Technological Forecasting & Social Change 75, 2008, pp. 1396-1405.
United Nations Industrial Development Organisation, Technology Foresight Manual – Organisation and Methods, Vol. 1, Vienna 2005.
Van Den Ende J., Mulder K., Knot M., Moors E., Vergragt P., Traditional and Modern Technology Assessment: Toward a Toolkit, Technological Forecasting and Social Change, vol. 58, 1998, pp. 5–21.
Van der Duin P., Qualitative futures research for innovation. Eburon Academic Publishers, Delft, Holland, 2006.

Entrepreneurship and Innovation Factors Influencing Economic Development: European versus Non-European Countries

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Abstract: With secondary data obtained from the Global Entrepreneurship Monitor, Global Competitiveness Index and Organisation for Economic Co-operation and Development databases for 27 European countries and 13 non-European countries, this study aims to understand which factors of entrepreneurship and innovation, through the quadruple helix model, influence economic development. For the data treatment, SPSS software was used to perform a set of tests that led to the results obtained. The results show that the Society dimension presents statistically significant differences, with a higher average for non-European countries, and the other dimensions did not present statistically significant differences. It is hoped that this research may contribute to existing scientific literature, helping to clarify the image of entrepreneurship and innovation in economic development, as well as a mean to help define policies and strategies that foster innovation and entrepreneurship, with a view to a sustained increase in the level of economic development.

Keywords: Innovation, Entrepreneurship, Economic Development, Quadruple Helix

1. Introduction

Political agendas have been dominated in recent years by macroeconomic reasoning, which clearly favoured austerity. As economies recover from the severe recession they plunge into, there is widespread recognition that long-term growth depends on decidedly microeconomic concerns such as innovation and entrepreneurship (Feldman, et al., 2016). According Dang e Pheng (2015), economic development is considered a multifaceted and complex process that includes interactions between different long-term objectives and policies. The literature (e.g., Galvão, et al., 2017) argues that both innovation and entrepreneurship have a central contribution to the economic development of nations.

According to some authors (e.g., Ramadani, et al., 2013; Feldman, 2004) innovation is at the heart of the economy of the 21st century. It brings new technologies and products that enable global challenges to be met, generating allowing a sustained increase in productivity, as well as the creation of new jobs, with the ultimate aim of improving the quality of life of citizens.

In the latest years, innovation and entrepreneurship have gained great evidence (Amorós et al., 2012; Audretsch & Peña-Legazkue, 2012; Sánchez, 2013; Casadella & Uzunidis, 2017; Lee, 2017; Acs, et. al., 2016; Liñán and Fernandez-Serrano, 2014; Audretsch, et al., 2008; Acs and Varga, 2005), being perceived as true drivers of economic development, so it is considered pertinent to investigate the relations between these three concepts. For this, the model Quadruple Helix (QH) (Industry, Government, University and Society) will be applied to two samples from countries (European countries and non-European countries). To the traditional QH model it was considered appropriate to add control variables, of a macroeconomic nature, with a view to measuring the endogenous characteristics of the economies.

In the literature it is noted that the large part of the authors (e.g., Carayannis & Campbell, 2009; Cavallini et al., 2016; Flour, Ferreira, & Gouveia, 2016) uses the model Triple Helix (TH) (Industry, Government, university) neglecting the influence of society (QH) in the process of economic development. At the same time, it is noted that investigations are scarce in the literature that use control variables, representative of the endogenous characteristics of the countries, in order to gauge their motivation on the operation of the model. It should also be noted that this study has a supranational character, covering a considerable sample of countries, coming to fill a gap in the literature since much of the investigations have as an object of study an economy or region (e.g., Brem, & Radziwon, 2017; Pugh, 2017; Yi, & Jun, 2018; Lew, Khan, & Cozzio, 2018). In order to contribute to bridging these identified gaps, the aim of this work is to understand the importance of innovation and entrepreneurship in economic development, by comparing European and non-European countries, checking whether there is one or more dimensions of the QH model that stand out significantly

against the rest. Moreover, it will also be looked at whether the control variables have an influence on the functioning of the QH model.

This model will be built using secondary data for innovation and entrepreneurship, collected on international reference platforms (GEM, GCI and OECD). For data processing, the SPSS 22.0 software was used and several multivariate statistical tests were applied.

2. Literature review

2.1 The Role of Entrepreneurship and Innovation in Economic Development

Many authors have been studying, in different perspectives, the contribution of entrepreneurship to the economic growth and development of countries (e.g., Lee, 2017; Liñán and Fernandez-Serrano, 2014; Audretsch, et al., 2008; Acs and Varga, 2005), there is a significant increase in the literature that recognizes its important contribution (e.g., Acs, et. al., 2016). In fact, high levels of entrepreneurship translate directly into high levels of economic development, as entrepreneurs create new businesses, generate jobs, intensify competition and introduce technological innovations increase productivity (Acs, 2006). According to Dang and Pheng (2015), although theories of economic development are plentiful, many have so far neglected the role of entrepreneurship.

Entrepreneurship is a global phenomenon that has attracted the interest of governments and the most diverse institutions, both private and public, with the aim of promoting a culture and an entrepreneurial society.

For Schumpeter (1934), the entrepreneur is seen as an agent of imbalances in the market, fostering the process of "creative destruction", by which new companies introduce new products or methods of production, destroying existing ones. This same author, in1942, also argues that companies are resistant to change and therefore individuals with innovative ideas found new companies to continue their ideas. This was one of the first authors to relate entrepreneurship and innovation to economic development.

In the last two decades, and especially in recent years, with the onset of the economic and financial crisis that devastated most of the world's economies, associating a great availability of information and an authentic revolution in knowledge, theoretical thinking revived the concept of entrepreneurship, linking it with the concepts of innovation and economic development (Rüdiger et al., 2014; Libecap & Hoskinson, 2011; Audretsch, 1995).

Crecente-Romero, Giménez-Baldazo e Rivera-Galicia (2016) argues that entrepreneurship contributes positively to the economic development of countries, through the creation of new companies (startups), which in turn leads to the creation of new jobs and investment.

The literature shows the role of the entrepreneur as an actor capable of identifying and exploiting new business opportunities created endogenously by the deliberate accumulation of knowledge (e.g., Van Stel, et al., 2014; Braunerhjelm, et al., 2010; Audretsch and Keilbach 2008). For authors like Audretsch and Fritsch (2003) or Landström and Johannisson (2001) the innovation is generated and implemented by entrepreneurs with specific personalities who wish to achieve power and independence with the will to conquer and the joy of creating.

For Amorós e Bosma (2014) entrepreneurship has a significant impact on economic development and social welfare if there is concerted action by a wide range of actors in society, including policy makers, academics, entrepreneurs and the general population.

In addition to entrepreneurship, innovation is being studied for several years as one of the promoters of territorial development (Schumpeter, 2000; Acs& Audretsch, 2005).

Schumpeter (1934) extols the "entrepreneur as innovator," being a key figure in the conduct of the economic development process. Thus innovative entrepreneurship, which is based on the development of new products, sold on the market until another innovation makes them obsolete, fuels a process of "creative destruction" (Schumpeter, 1942), causing disturbances in a balanced economic system, which determines new business opportunities (Feldman, Hadjimichael, Lanahan, & Kemeny, 2016).

Innovation is far from being a recent phenomenon, and is inherent to human development. In fact, starting from Schumpeter's theory of "creative destruction" (1942), many empirical studies have argued that innovation is one of the most significant economic development factors (Fang & Chiu, 2017; Pradhan, Arvin, Hall & Nair, 2016; Romanenko & Chaplay, 2016; Kebebe, Duncan, Klerkx, Boer & Oosting, 2015; Kireeva, 2015; Ramadani, Gërguri, Rexhepi & Abduli, 2013; Bradford & Wolfe, 2013; Prystrom, 2012; Guellec & van Pottelsberghe de la Potterie, 2001; Engelbrecht, 1997; Coe & Helpman, 1995; Lichtenberg, 1993).

According to González-Pernía, et al., (2012), in recent years, there has been a greater concern with territorial competitiveness and development. Developmental theory has altered its focus, giving greater emphasis to endogenous developmental factors, to the detriment of exogenous developmental factors (e.g., Audretsch and Belitski, 2013; Álvarez, et al., 2014). Thus, the prosperity of an economy results from its ability to compete in the global marketplace (Murphy and Stajano, 2006). Schwab (2013) argues that a country's competitiveness is globally accepted as the main driver for sustaining prosperity and increasing the well-being of its citizens.

As stated by Veeraraghavan (2009): “Innovation and entrepreneurship are two sides of a coin. While there is a need for the innovations to occur which should be facilitated and even encouraged deliberately by entrepreneurs, it is equally important for them to create opportunities and environment to realize those innovations. There is no single, but a combination of factors such as market opportunity, family background in entrepreneurship, a new idea with business potential, the prospect of challenge offered by Entrepreneurship, as well as long cherished dreams and desire, that lead to successful entrepreneurship.”

2.2 The Quadruple Helix Model

The Society, a differentiating dimension of the quadruple helix model, arises since the triple helix model is not sensitive enough to express democracy. This perspective allows the territories to follow non-traditional innovation paths, namely non-technological improvements, service creation and exploration of creativity.

Most quadruple helix approaches focus on citizen-generated innovation and entrepreneurship. Social inclusion, user centrality and creativity are central concepts in the process of knowledge production. Economic development occurs through the innovation of products and services, provided by companies and the government, oriented to the satisfaction of citizens' needs (Park, 2014).

Both the triple helix and quadruple helix concept are based on the idea that innovation is the result of an interactive process, involving the different spheres of actors, each contributing to economic development, with its institutional functionl (Cavallini et al., 2016). The contribution to innovation is through the sharing of knowledge and the transfer of know-how. As society becomes more interactive, knowledge acquires a central role and there is an increase in the number and scope of the spheres, which participate in the creation of innovation (Cavallini et al., 2016).

The quadruple helix model is an evolution of the triple helix model, according to which the interaction between the three helices originates new knowledge, technology, products and services, in accordance with the needs of society (Etzkowitz and Klofsten 2005; Etzkowitz and Leydesdorff 2000).

This model argues that government provides the regulatory framework and financial support for the definition of innovation strategies and policies; universities and industry provide the necessary conditions for an integrated ecosystem of innovation; civil society, on the one hand, uses knowledge and innovation in the form of goods and services, on the other hand, it becomes an active part of the innovation system, that is, innovation co-producers, with information and communication technologies (ICT) are a facilitator of this same participation (Cavallini et al., 2016). Civil society still participates in the innovation process, constantly demanding a better quality of the goods and services it acquires (Afonso et al., 2012).

For Khan and Al-Ansari (2005) the long-term growth of innovation must integrate the citizens' perspective based on the media and culture. Batzordea (2010), argues that the development of modern economies requires cooperation between all economic actors, in particular the social partners and civil society.

2.3 Conceptual Model

According to the literature review developed throughout this chapter, the conceptual research model was constructed, which will serve as a basis for the pursuit of empirical research, being mirrored in Figure 1.

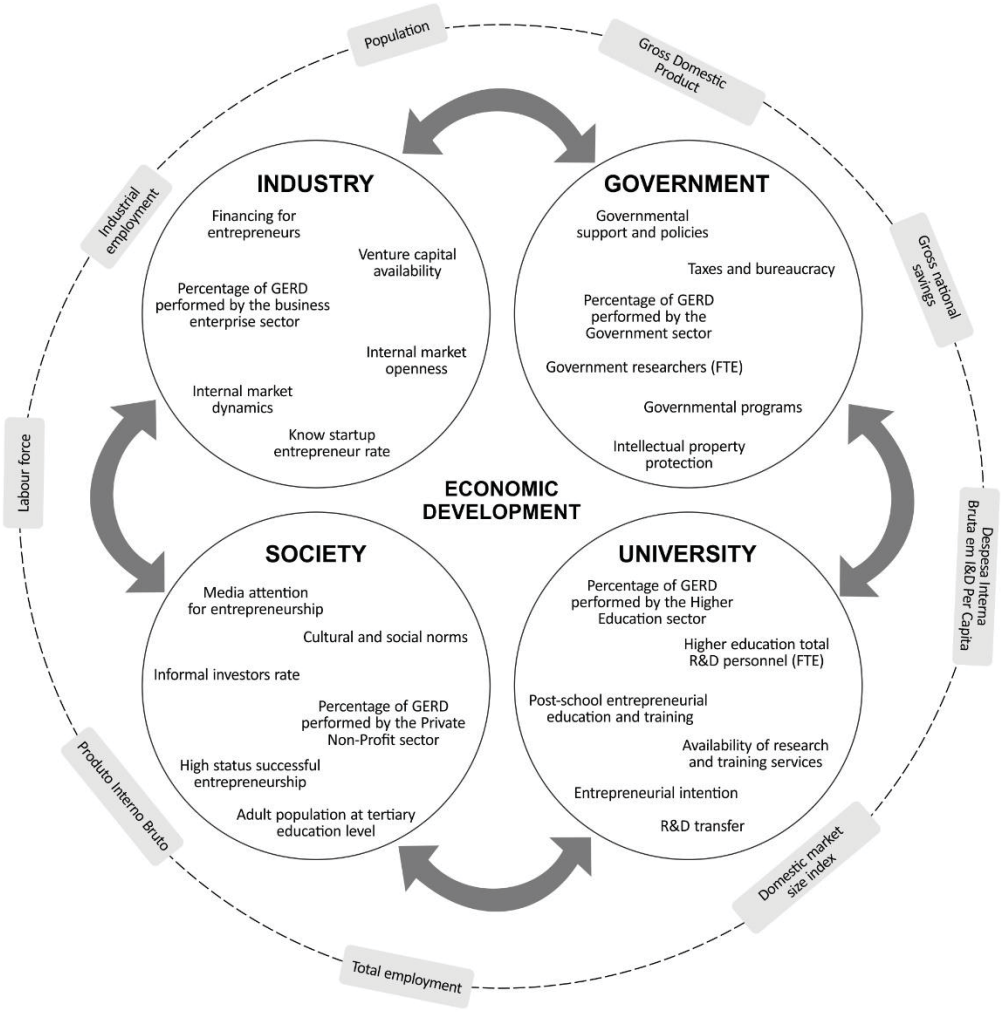

Figure 1: Conceptual Model

3. Methodology

The empirical aspect of this research is based on the use of the quantitative method, since a broad set of quantitative variables, innovation and entrepreneurship will be surveyed for the period 2007-2015. In addition to quantitative, this study will be prepared using secondary data, since the variables will be collected on several international reference platforms, namely in the GEM, OECD and ICG. After the quantitative data were compiled, the countries whose data were available for the largest number of variables were selected, and those that did not have sufficient data were eliminated from the sample. This gave rise to a sample of 40 countries, 27 of which are European and 13 are distributed across the rest of the world (Table 1).

Table 1: List of European and non-European countries under study

European	Germany, Austria, Belgium, Denmark, Slovakia, Slovenia, Spain, Estonia, France, Finland, Greece, Holland, Hungary, Ireland, Iceland, Italy, Latvia, Luxembourg, Norway, Poland, Portugal, United Kingdom, Czech Republic, Romania, Russia, Sweden, Switzerland.
Non-European	South Africa, Australia, Argentina, Canada, Chile, China, South Korea, United States of America, Israel, Japan, Mexico, Singapore, Turkey,

As can be seen in Table 2, for this investigation, six variables were selected to measure each of the dimensions of the quadruple helix model (Industry, Government, University and Civil Society). In addition to these variables, nine control variables were selected. The present variables were collected from the GEM, GCI and

OECD databases for the period 2007-2015, given that this year alone there was uniformity in the data available.

Table 2: Variables to use

Industry	**Government**
GEM: Internal market dynamics; Internal market openness; Financing for entrepreneurs; Entrepreneurial knowledge rate. **OECD**: Percentage of gross domestic expenditure on R&D by the business sector. **GCI**: Capital risk available	**GEM:** Government support and policies; Taxes and bureaucracy; Government programs. **OCDE:** Percentage of gross domestic expenditure on R&D by the government sector; Governmental researchers. **GCI:** Intellectual property
University	**Society**
GEM: Education and higher education for entrepreneurship; R&D transfer; Entrepreneurial Intention. **OECD:** Percentage of gross domestic expenditure in R&D, carried out by the Higher Education sector; Total R&D staff, full-time equivalent, in tertiary education **GCI:** Research and training services available	**GEM:** Cultural and social norms; Media attention to entrepreneurship; Informal investor rate; Status of successful entrepreneurship. **OECD:** Adult population with higher education; Percentage of gross domestic expenditure on R&D carried out by the non-profit private sector
Control Variables	
OECD: Gross domestic expenditure on R & D; Gross domestic expenditure on R&D per capita; Gross Domestic Product; Population; Total Employment; Industrial employment; Workforce. **GCI:** Gross national savings; Index of the size of the internal market.	

For the development of this research, in order to perform the analysis and interpretation of the data, SPSS 22.0 software was used, which allowed the application of different statistical tests.

4. Results

4.1 Internal Consistency Analysis of dimensions

Given that the variables being studied are measured at different scales, it is necessary to standardize the measurement scales, by standardizing the variables.

According to Table 3, the value of Cronbach's alpha is higher than the value of 0.80 for the Government dimension, for which we can consider the appropriate data as one-dimensional, is higher than the value of 0.70 for the University dimension, for which we can consider the data acceptable as one-dimensional, and for the other two dimensions is higher or is close to the value of 0.60, so they can also be considered minimally acceptable as one-dimensional. Therefore, we can concept variables to measure all dimensions under study.

Table 3: Internal consistency statistics

	Cronbach Alfa	N of Items
Industry a)	0,677	5
Government b)	0,902	4
University c)	0,730	3
Society	0,532	6

1. without the item “Zscore: Know Startup Entrepreneur Rate”;
2. without the items “Zscore: Percentage of Gross domestic expenditure on R&D (GERD) performed by the Government Sector” e “Zscore: Government researchers (FTE)”
3. without the items “Zscore: Entrepreneurial Intention”, “Zscore: Percentage of Gross domestic expenditure on R&D (GERD) performed by the Higher Education sector” e “Zscore: Higher Education Total R&D personnel (FTE)”

4.2 Comparison between European and non-European countries

4.2.1 Dimensions Analises

After having verified the normality assumption for all dimensions, we will use the parametric test t (Table 4).

Table 4: Descriptive statistics and Tests t: Relationships between European and non-European dimensions and countries

	Countries	N	Mean	Standard deviation	t38	p
Zscore: Industry	European	27	-,048	,6055	-0,652	0,519
	Non-European	13	,099	,7799		
Zscore: Government	European	27	,029	,9305	0,293	0,771
	Non-European	13	-,059	,7920		
Zscore: Univesity	European	27	-,013	,8917	-0,147	0,884
	Non-European	13	,027	,6222		
Zscore: Society	European	27	-,164	,4462	-3,168	** 0,003
	Non-European	13	,343	,5291		

** $p < 0{,}01$

As can be seen in table 6, the only dimension that presents significant differences between European and non-European countries is civil society.

The average value of the Civil Society dimension is higher for non-European countries, with the differences observed to be statistically significant (t38=-3,168; p=0,003).

Therefore, we can conclude that the Civil Society dimension is more common for non-European countries. Regarding the dimensions Industry, Government and University, there are no significant differences between European and non-European countries.

4.2.2 Individual item analysis

- Industry

After having verified the normality assumption for the industrial dimension items in European and non-European countries, we used the parametric test t (Table 5).

Table 5: Descriptive Statistics and t Tests: Relationships between items of the Industry dimension and European and non-European countries

	Countries	N	Mean	Standard deviation	t38	p
Zscore: Internal market dynamics	European	27	-,196	,8171	-1,842	0,073
	Non-European	13	,407	1,2397		
Zscore: Internal market openess	European	27	,091	1,0573	0,828	0,413
	Non-European	13	-,189	,8778		
Zscore: Financing for entrepreneurs	European	27	-,061	,9693	-0,554	0,582
	Non-European	13	,127	1,0901		
Zscore: Entrepreneurial knowledge rate	European	27	,010	,8680	0,091	0,928
	Non-European	13	-,021	1,2716		
Zscore: Percentage of gross domestic expenditure on R&D by the business sector	European	27	-,008	,8610	-0,070	0,945
	Non-European	13	,016	1,2820		
Zscore: Capital risk available	European	27	-,064	,9568	-0,576	0,568
	Non-European	13	,132	1,1127		

The value of evidence is more than 5% for all items of the Industry dimension, there are no significant differences between European and non-European countries.

- Government

After having verified the normality assumption for the government dimension items in European and non-European countries, we used the parametric test t (Table 8).

Table 8: Descriptive Statistics and Tests t: Relationships between items of the Government dimension and European and non-European countries

	Countries	N	Mean	Standard deviation	t38	p
Zscore: Government support and policies	European	27	-,084	1,0377	-0,763	0,450
	Non-European	13	,175	,9315		
Zscore: Taxes and bureaucracy	European	27	,037	1,0102	0,331	0,742
	Non-European	13	-,076	1,0146		
Zscore: Government programs	European	27	,066	1,0992	0,600	0,552
	Non-European	13	-,138	,7757		
Zscore: Percentage of gross domestic expenditure on R&D by the government sector	European	27	,009	,9659	0,084	0,934
	Non-European	13	-,019	1,1081		
Zscore: Governmental researchers	European	27	-,119	,6218	-1,119	0,270
	Non-European	12	,268	1,5581		
Zscore: Intellectual Property	European	27	,095	,9701	0,866	0,392
	Non-European	13	-,198	1,0715		

The value of evidence is more than 5% for all items of the Government dimension, there are no significant differences between European and non-European countries.

- University

After having verified the normality assumption for the government dimension items in European and non-European countries, we used the parametric test t (Table 6).

Table 6: Descriptive Statistics and Tests t: Relationships between items of the University dimension and European and non-European countries

	Countries	N	Mean	Standard deviation	t38	p
Zscore: Education and higher education for entrepreneurship	European	27	-,122	1,0617	-1,118	0,271
	Non-European	13	,254	,8391		
Zscore: R&D transference	European	27	,006	1,1126	0,055	0,957
	Non-European	13	-,013	,7533		
Zscore: Entrepreneurial intention	European	27	-,292	,6408	-2,908	** 0,006
	Non-European	13	,607	1,3299		
Zscore: Percentage of gross domestic expenditure in R&D, carried out by the Higher Education sector	European	27	,073	,8959	0,659	0,514
	Non-European	13	-,151	1,2142		
Zscore: Total R&D staff, full-time equivalent, in tertiary education	European	27	-,162	,7133	-1,540	0,132
	Non-European	12	,363	1,4296		
Zscore: Research and training services available	European	27	,077	1,0816	0,695	0,492
	Non-European	13	-,159	,8214		

** $p < 0,01$

According to table 9, we can conclude that the intention of entrepreneurship is more for non-European countries than the European countries and that the remaining items of the University dimension do not show significant differences.

- Society

After having verified the normality assumption for the government dimension items in European and non-European countries, the parametric t test was used (Table 10).

Table 10: Descriptive Statistics and Tests t: Relations between Civil Society items and European and non-European countries

	Countries	N	Mean	Standard deviation	t38	p
Zscore: Cultural and social norms	European	27	-,306	,8578	-3,074	** 0,004
	Non-European	13	,635	1,0041		
Zscore: Status of successful entrepreneurship	European	27	,017	1,0568	0,151	0,881
	Non-European	13	-,035	,9102		

Zscore: Media attention to entrepreneurship	European	26	-,337	,9278	-3,358	** 0,002
	Non-European	13	,675	,7960		
Zscore: Informal investor rate	European	27	-,160	,7674	-1,479	0,147
	Non-European	13	,332	1,3405		
Zscore: Adult population with higher education	European	26	,004	,8299	0,032	0,974
	Non-European	11	-,008	1,3704		
Zscore: Percentage of gross domestic expenditure on R&D carried out by the non-profit private sector	European	20	-,237	,3951	-1,918	0,065
	Non-European	10	,474	1,5869		

** $p < 0,01$

With table 10, we can conclude that cultural and social norms and media attention for entrepreneurship is more evident for non-European countries and that the remaining items of the Society dimension do not show significant differences between European and non-European countries.

4.2.3 Multivariate regression model to study the effect of control variables on the relationships between the four dimensions under analysis and European and non-European countries

When applying the multivariate tests (Pillai's Trace, Wilks' Lambda, Hotelling's Trace and Roy's Largest Root) it was found that all tests indicate that "Countries (European vs. non-European)" and "Zscore: Gross domestic expenditure on R&D per capita" are the statistically significant variables to explain the dependent variables (p<0,05).

The significant relationships that are statistically stronger are therefore observed, (Eta2=0,631), followed by Industry (Eta2=0,583), University (Eta2=0,546) and finally Civil Society (Eta2=0,52). It should be noted that the values of Eta2 are the values of the coefficient of determination R2, representing the proportion of the variation of the RVs that is explained by the VIs included in the model.

Table 7 shows the mean RV values for the study factor categories.

Table 7: Descriptive statistics: Relations between dimensions and types of economies

	Countries	N	Mean	Standard deviation	p
Zscore: Industry	European	27	-,048	,6055	0,319
	Non-European	11	,159	,7174	
Zscore: Government	European	27	,029	,9305	0,436
	Non-European	11	,073	,7000	
Zscore: University	European	27	-,013	,8917	0,485
	Non-European	11	,065	,6740	
Zscore: Society	European	27	-,164	,4462	** 0,000
	Non-European	11	,348	,5731	

** $p < 0,01$

The results are not exactly the same as those that had already been obtained using the t-test, due to the existence of missing values for some of the variables in the model, which mean that only 11 non-European countries are used in the overall model. The test values (p) change, but the conclusions remain, with the Civil Society dimension continuing to be the only one that presents significantly different values between the two groups of countries, and this dimension continues to be significantly higher for non-European countries.

Regarding the dimensions Industry, Government and University, there are no significant differences between European and non-European countries.

Overall, therefore, we can conclude that control variables do not affect the previously studied relationship between the four dimensions and European and non-European countries. Regarding the relationship between the control variables and the RVs, there were differences between the bivariate analyzes, in which there were positive relationships between:

- "Zscore: Gross domestic expenditure on R&D" and the domensions "Zscore: Industry, "Zscore: Government" e "Zscore: University.
- "Zscore: Gross domestic expenditure on R&D per capita" and the dimensions "Zscore: Industry", "Zscore: Government" e "Zscore: University".

- "Zscore: Gross National Savings" and the dimensions "Zscore: Industry" e "Zscore: Government".

While in the global model of multivariate regression some of these relations are no longer verified by the moderating effect of some control variables on the others, with positive relationships only occurring between:

- "Zscore: Gross domestic expenditure on R&D" and the dimension "Zscore: Government" (p=0,006).
- "Zscore: Gross domestic expenditure on R&D per capita" and the dimensions "Zscore: Government" (p<0,001) e "Zscore: University" (p=0,002).

5. Discussion

In the comparison between European and non-European countries, the results reveal only statistically significant differences in the Society dimension, with a greater weight being found in non-European countries. Using the individual analysis of this dimension it is verified that the items "Zscore: Cultural and social norms" and "Zscore: Media attention for entrepreneurship" have statistically significant differences, the average of these two variables being higher for non-European countries vis-à-vis European countries. These results are in line with the GEM report 2016/2017, according to which, European countries, when compared to other world regions, had the lowest belief in entrepreneurship as a good professional career and the lowest media attention for entrepreneurship (Herrington & Kew, 2017). In European countries, although there are regional cultural differences, there are common dynamics that bring different countries closer to a common European culture, supranational in nature (Liñán and Fernandez-Serrano, 2014). According to Schwartz (2008), the geographical, political, historical and economic proximity plays a central role in the configuration of cultural values. In this way, since European culture is more homogeneous, it is plausible that there are significant differences when compared to cultures of several world geographies, which are characteristically heterogeneous, taking into account their dispersion.

Regarding the constituent items of the Company and Government dimensions, it is verified that none presents significant differences between European and non-European countries. However, in the University dimension, it was found that the variable "Zscore: Entrepreneurial Intention" shows statistically significant differences, with the mean value being higher for non-European countries. Thus, GEM does not distinguish between formal and informal entrepreneurship, so that in the constituent sample of non-European countries we have economies such as Chile or Argentina, which have a very high level of informal entrepreneurship. On the other hand, in European countries entrepreneurial intent essentially measures formal entrepreneurship and, as such, it is plausible that they have a lower level of entrepreneurial intent (Galvão et al., 2017). In this regard, the GEM report 2015/16 points out that entrepreneurial intent tends to be higher in factor driven economies and lower in economies driven by innovation, so that in the sample of European countries it is found that almost all economies are innovation oriented (Herrington & Kew, 2017).

With the introduction of the control variables, it can be seen that they do not affect the relationship between European and non-European dimensions and countries, with the Society being the only one with significantly different statistical values. It is also verified the existence of positive relations between the variable "Zscore:

Gross domestic expenditure on R&D" and dimension "Zscore: Government", as well as, between the variable "Zscore: Gross domestic expenditure on R&D per capita" and the dimensions "Zscore: Government" and "Zscore: University". The existence of these relations is in agreement with the previous literature review, since the R&D investment by the Government is a central factor in fostering innovation and the economic development of nations (e.g., Wu, et al., 2010; Wang, et al., 2007). In addition to direct R&D policies, central and local governments develop knowledge exploitation strategies through universities and research centres, financing innovation and entrepreneurship projects (Vincett, 2010).

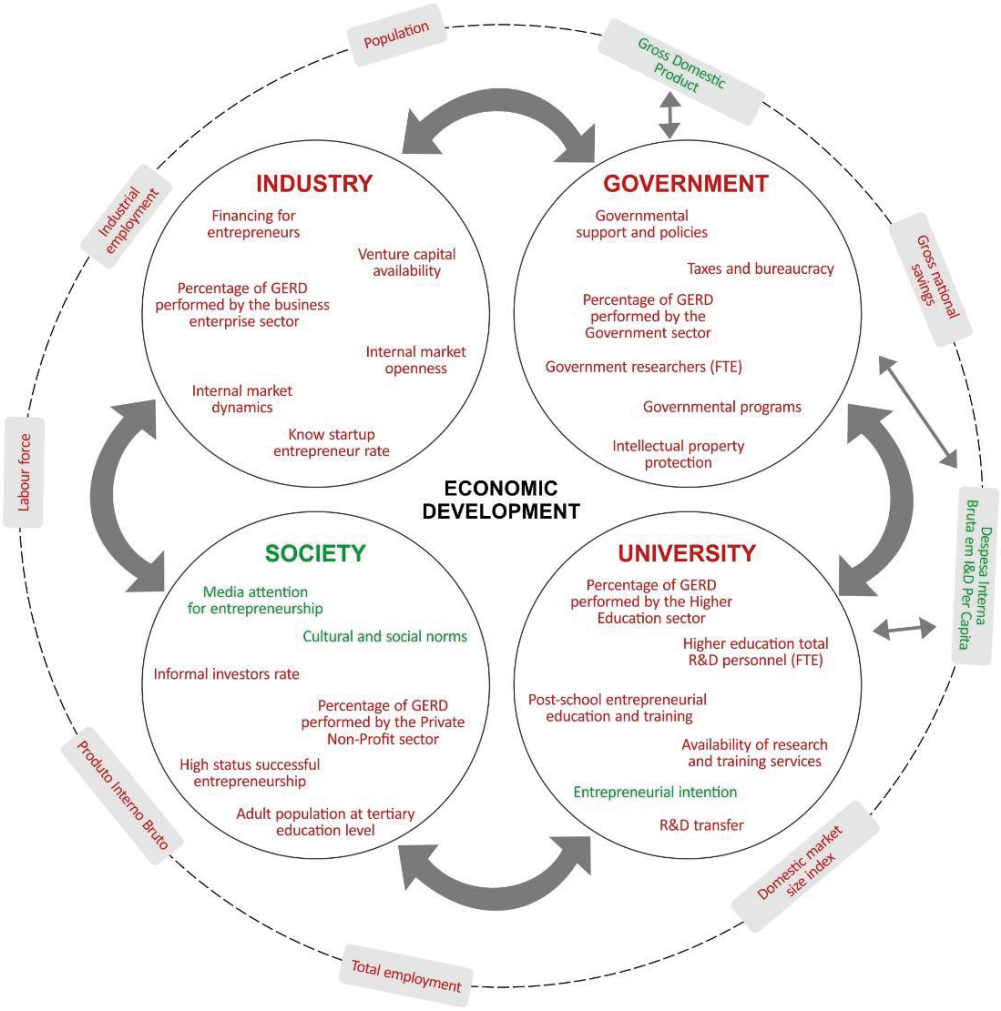

Figure 2: Relationship between variables and dimensions

6. Conclusion

With this study, the quadrupole helix model was constructed, based on variables of innovation and entrepreneurship, to which control variables were added, aiming to determine the existence of differences in the functioning of the helices when comparing different multinational regions. It was considered relevant to understand how the operation of the four propellers contributes to economic development.

The results show that the Society dimension presents statistically significant differences, with a higher average for non-European countries. In this way, it can be concluded that Society plays a more relevant role in non-European countries than in European countries. Considering the constituent variables of this dimension, it is also noted that the "Social and cultural norms" and the "Social media attention for entrepreneurship" show statistically significant differences, also playing a major role in non-European countries. This evidence may be associated with the fact that European culture is more homogeneous, given that, despite regional cultural differences, there are common dynamics, such as geographical proximity, political, historical and economic factors that determine a cultural approximation between the different countries (Liñán and Fernandez-Serrano, 2014).

Regarding Company, Government and University dimensions, there were no significant differences, except for the variable “Zscore: Entrepreneurial intention” which are of greater importance in non-European countries, recalling that GEM considers both formal and informal entrepreneurship.

In this study it was observed that the control variables do not interfere in the model dynamics, noting the existence of a positive relation between the Government dimension and the variables “Zscore: Gross domestic

expenditure on R&D" and "Zscore: Gross domestic expenditure on R&D per capita" and between the second and the University dimension. These relationships could have in their genesis the government's R&D investment policy, which could, on the one hand, directly finance innovation and entrepreneurship (Wu, et al., 2010), or otherwise, transfer funds to the University so that it can carry out research (Vincett, 2010).

It is hoped that this research may contribute to existing scientific literature, helping to clarify the image of entrepreneurship and innovation in economic development. In addition, it is hoped that this work will serve to define policies and strategies that foster innovation and entrepreneurship, with a view to a sustained increase in the level of economic development.

With the development of this research it was possible to identify some limitations that may be of interest to future investigations. The first limitation is the use of multiple databases, the low uniformity of the countries that constitute the same. Thus, only those countries that had data available for all the variables under study were selected, which resulted in the exclusion of several countries from the final sample, most of them non-European. This fact determined that the European countries had a greater preponderance in the sample.

Another limitation is related to subjectivity, since, although all precautions are taken, the choice of the independent variables of innovation and entrepreneurship and their distribution by the propellers, as well as the selection of control variables, entails some discretion.

With regard to future investigations, it would be interesting to repeat the study with new variables or to add variables to the already existing ones regarding the four dimensions of the quadruple helix model, as well as to select other control variables, in order to verify if the obtained results are consistent. Another suggestion is to study the variables and the model used in this study in comparison of countries in order to identify cases of good practices.

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References

Acs, Z. (2006) *"How is entrepreneurship good for economic growth?*", Innovations, Vol 1, No. 1, pp 97-107.

Acs, Z. J., & Audretsch, D. B. (2005). Entrepreneurship and innovation (No. 2105). Papers on Entrepreneurship, Growth and Public Policy.

Acs, Z. J., and Varga, A. (2005) *"Entrepreneurship, agglomeration and technological change*", Small business economics, Vol 24, No. 3, pp 323-334.

Acs, Z. J., Szerb, L., and Autio, E. (2016) The global entrepreneurship and development index. In Global Entrepreneurship and Development Index 2015 (pp. 11-31). Springer International Publishing.

Afonso, O., Monteiro, S., and Thompson, M. (2012) *"A growth model for the quadruple helix",* Journal of Business Economics and Management, Vol 13, No. 5, pp 849-865.

Álvarez, C., Urbano, D., and Amorós, J. E. (2014) *"GEM research: achievements and challenges"*, Small Business Economics, Vol 42, No. 3, pp 445-465.

Amorós, J.E., and Bosma, N. (2014) Global Entrepreneurship Monitor: 2013 Global Report.

Audretsch, D. B. (1995) Innovation and industry evolution. Mit Press.

Audretsch, D. B., and Belitski, M. (2013) *"The missing pillar: The creativity theory of knowledge spillover entrepreneurship"*, Small Business Economics, Vol 41, No. 4, pp 819-836.

Audretsch, D. B., and Keilbach, M. (2008) *"Resolving the knowledge paradox: Knowledge-spillover entrepreneurship and economic growth*", Research Policy, Vol 37, No. 10, pp 1697-1705.

Audretsch, D. B., Bönte, W., and Keilbach, M. (2008) *"Entrepreneurship capital and its impact on knowledge diffusion and economic performance*", Journal of Business Venturing, Vol 23, No. 6, pp 687-698.

Audretsch, D., and Fritsch, M. (2003) *"Linking entrepreneurship to growth: The case of West Germany"*, Industry and Innovation, Vol 10, No. 1, pp 65-73.

Batzordea, E. (2010) A European strategy for smart, sustainable and inclusive growth. Accesible en: http://ec. europa. eu/enterprise/policies/industrialcompetitiveness/industrial-policy/index_en. htm.

Bradford, N., & Wolfe, D. A. (2013). Governing regional economic development: innovation challenges and policy learning in Canada. Cambridge Journal of Regions, Economy and Society, rst006.

Braunerhjelm, P., Acs, Z. J., Audretsch, D. B., and Carlsson, B. (2010) *"The missing link: knowledge diffusion and entrepreneurship in endogenous growth*", Small Business Economics, Vol 34, No. 2, pp 105-125.

Brem, A., & Radziwon, A. (2017). Efficient Triple Helix collaboration fostering local niche innovation projects–A case from Denmark. *Technological Forecasting and Social Change*, *123*, 130-141.

Cavallini, S., Soldi, R., Friedl, J., and Volpe, M. (2016) Using the Quadruple Helix Approach to Accelerate the Transfer of Research and Innovation Results to Regional Growth. European Union - Committee of the Regions. http://cor.europa.eu. Acedido a 18 de Abril.

Coe, D. T., & Helpman, E. (1995). International r&d spillovers. European economic review, 39(5), 859-887.

Crecente-Romero, F., Giménez-Baldazo, M., and Rivera-Galicia, L. F. (2016) *"Subjective perception of entrepreneurship. Differences among countries*", Journal of Business Research, Vol 69, No.11, pp 5158-5162.

Cronbach, L. J. (1951) *"Coefficient alpha and the internal structure of tests*", psychometrika, Vol 16, No. 3, pp 297-334.

Dang, G., and Pheng, L. S. (2015) Theories of economic development. In Infrastructure Investments in Developing Economies (pp. 11-26). Springer Singapore.

Engelbrecht, H. J. (1997). International R&D spillovers amongst OECD economies. Applied Economics Letters, 4(5), 315-319.

Etzkowitz, H., and Klofsten, M. (2005) *"The innovating region: toward a theory of knowledge-based regional development",* R&D Management, Vol 35, No. 3, pp 243-255.

Etzkowitz, H., and Leydesdorff, L. (2000) *"The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university–industry–government relations*", Research policy, Vol 29, No. 2, pp 109-123.

Fang, J. W., & Chiu, Y. H. (2017). Research on Innovation Efficiency and Technology Gap in China Economic Development. Asia-Pacific Journal of Operational Research, 34(02).

Farinha, L., Ferreira, J., & Gouveia, B. (2016). Networks of innovation and competitiveness: a triple helix case study. *Journal of the Knowledge Economy*, *7*(1), 259-275.

Feldman, M. (2004) The significance of innovation. Rotman School of Management, University of Toronto, 1-14.

Feldman, M., Hadjimichael, T., Lanahan, L., and Kemeny, T. (2016) *"The logic of economic development: a definition and model for investment*". Environment and Planning C: Government and Policy, Vol 34, No. 1, pp 5-21.

Galvão, A. R., Mascarenhas, C., Rodrigues, R., Marques, C. S., and Leal, C. T. (2017) *"A quadruple helix model of entrepreneurship, innovation and stages of economic development*". Review of International Business and Strategy, Vol 27, No. 2, pp 261-282.

González-Pernía, J. L., Peña-Legazkue, I., and Vendrell-Herrero, F. (2012) *"Innovation, entrepreneurial activity and competitiveness at a sub-national level*", Small Business Economics, Vol 39, No. 3, pp 561-574.

Guellec, D., & Van Pottelsberghe De La Potterie, B. (2003). The impact of public R&D expenditure on business R&D. Economics of innovation and new technology, 12(3), 225-243.

Kebebe, E., Duncan, A. J., Klerkx, L., De Boer, I. J. M., & Oosting, S. J. (2015). Understanding socio-economic and policy constraints to dairy development in Ethiopia: A coupled functional-structural innovation systems analysis. Agricultural Systems, 141, 69-78.

Khan, M. R., and Al-Ansari, M. (2005) Sustainable innovation as a corporate strategy. Intellectual Assets Management, Saudi Arabia. Resource document: http://www. trizjournal. com/archives/2005/01/02. pdf.

Kireeva, A. A. (2015). Differentiated organizational and economic mechanisms of industrial-innovation development of the regions of Kazakhstan. Ekonomicheskie i Sotsialnye Peremeny, (37), 214.

Landström, H., and Johannisson, B. (2001) *"Theoretical foundations of Swedish entrepreneurship and small-business research",* Scandinavian Journal of Management, Vol 17, No. 2, pp 225-248.

Lee, Y. S. (2017) *"Entrepreneurship, small businesses and economic growth in cities"*, Journal of Economic Geography, Vol 17, No. 2, pp 311-343.

Lew, Y. K., Khan, Z., & Cozzio, S. (2018). Gravitating toward the quadruple helix: international connections for the enhancement of a regional innovation system in Northeast Italy. *R&D Management*, *48*(1), 44-59.

Libecap, G. D., & Hoskinson, S. (Eds.). (2011). Entrepreneurship and Global Competitiveness in Regional Economies: Determinants and Policy Implications (Vol. 22). Emerald Group Publishing.

Lichtenberg, F. R. (1992). R&D investment and international productivity differences (No. w4161). National Bureau of Economic Research.

Liñán, F., and Fernandez-Serrano, J. (2014) *"National culture, entrepreneurship and economic development: different patterns across the European Union*", Small Business Economics, Vol 42, No. 4, pp 685-701.

Murphy, B. M., and Stajano, A. (2006) Research, Quality, Competitiveness: European Union Technology Policy for the Information Society.

Park, H. W. (2014). Transition from the triple Helix to N-Tuple helices? An interview with Elias G. Carayannis and David FJ Campbell. Scientometrics, 99(1), 203-207.

Pradhan, R. P., Arvin, M. B., Hall, J. H., & Nair, M. (2016). Innovation, financial development and economic growth in eurozone countries. Applied Economics Letters, 23(16), 1141-1144.

Prystrom, J. (2012). National Innovation System as the Factor of Economic Development: The Case of Sweden. Ekonomista, 112(4), 499.

Pugh, R. (2017). Universities and economic development in lagging regions:'triple helix'policy in Wales. *Regional studies*, *51*(7), 982-993.

Ramadani, V., Gërguri, S., Rexhepi, G., and Abduli, S. (2013) *"Innovation and economic development: The case of FYR of Macedonia".* Journal of Balkan and Near Eastern Studies, Vol 15, No. 3, pp 324-345.

Romanenko, A., & Chaplay, V. (2016). Sustainable economic growth of the small and medium businesses in Ukraine on the basis of innovation development of diversified economy.

Rüdiger, K., Peris-Ortiz, M., & Blanco-González, A. (2014). Entrepreneurship, innovation and economic crisis. Lessons for Research, Policy and Practice; Springer International Publishing: Gewerbestrasse, Switzerland.

Schumpeter, J. A. (1934) The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle (Vol. 55). Transaction publishers.

Schumpeter, J. A. (1942) Capitalism, Socialism and Democracy, New York: Harper, 1975.

Schumpeter, J. A. (2000). Entrepreneurship as innovation.

Schwab, K. (2013) The Global Competitiveness Report 2013-2014, The World Economic Forum, Geneva.

Schwartz, S. H. (2008) Cultural value orientations: Nature and implications of national differences. Moscow: Publishing house of SU HSE.

Van Stel, A., Millán, J. M., and Román, C. (2014) *"Investigating the impact of the technological environment on survival chances of employer entrepreneurs*", small Business economics, Vol 43, No. 4, pp 839-855.

Veeraraghavan, V. (2009). Entrepreneurship and innovation. Asia Pacific Business Review, 5(1), 14-20.

Vincett, P. S. (2010) *"The economic impacts of academic spin-off companies, and their implications for public policy",* Research Policy, Vol 39, No. 6, pp 736-747.

Wang, T. Y., Chien, S. C., and Kao, C. (2007) *"The role of technology development in national competitiveness—Evidence from Southeast Asian countries",* Technological Forecasting and Social Change, Vol 74, No. 8, pp 1357-1373.

Wu, S. Y., Tang, J. H., and Lin, E. S. (2010) *"The impact of government expenditure on economic growth: How sensitive to the level of development?*", Journal of Policy Modeling, Vol 32, No. 6, pp 804-817.

Yi, S. K., & Jun, B. (2018). Has the German reunification strengthened Germany's national innovation system?: Triple Helix dynamics of Germany's innovation system. *Knowledge Management Research & Practice*, *16*(1), 1-12.

Universities Fostering Entrepreneurship Ecosystems: From Teaching Entrepreneurship to Being Entrepreneurial

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Abstract: Entrepreneurship education must be more than the study of a bunch of theories about entrepreneurship. If something has been clear in the last ten years is the importance of action, experimentation and even failure, in order to understand what being entrepreneurial actually means. Change is difficult, and the University in general is an institution that challenges society, but seldom looks inside to challenge itself; it is the role of innovative teachers to begin a transformation from within the institution. Sometimes this transformation is easier when there is a particularly appropriate environment to foster change, if there is an ecosystem that supports the new initiatives and helps the innovative teachers come together, it is manageable to go from theory to Action. This paper presents the case of Universidad Autónoma de Manizales, one of the five Universities that started the Entrepreneurial ecosystem "*Manizales Más"* in Colombia and a good example of what means going from teaching entrepreneurship to being entrepreneurial. After five years fostering the entrepreneurial ecosystem the university has transformed the way entrepreneurship is taught and lived inside the institution, several changes in its strategic planning, policies and pedagogical approach have allowed the formation of an entrepreneurial community. Some of the most tangible changes have been noticed in the entrepreneurship course, now mandatory for all programs in the university, and the construction of the entrepreneurial competence that shows to the community what are the elements and the rubrics to take into consideration when developing the entrepreneurial spirit, not only in their students, but teachers and administrative staff all together. By the end of the paper it will be clear why the city of Manizales is a University campus and how Universidad Autónoma de Manizales has become a leader in developing an entrepreneurial university.

Keywords: Entrepreneurship Ecosystems, Entrepreneurial universities, teacherpreneurs

1. Introduction

When talking about the entrepreneurial University, maybe the characteristic that draws most of the attention is "that entrepreneurial university is a place possessing a capacity for change" (Clark, 2015). Change is difficult, and the University in general is an institution that challenges society, but seldom looks inside to challenge itself; it is the role of innovative teachers to begin a transformation from within the institution and generate a spill over effect that transforms the classes, the curriculum, the community, the city, and why not, the world.

One of the models used to describe the impact of entrepreneurial Universities is the 'bottom-up' model, community-led, catalysed by students, alumni and entrepreneurs in the regional economy. Often responding to economic and societal challenges, E&I development is triggered by a desire to stimulate regional economic growth, and thereby create graduate jobs, research opportunities and broader avenues for university support through the creation of a vibrant localised entrepreneurial ecosystem. (Graham, 2014). One way this can be achieved is by promoting a transformation within the classrooms, bringing more challenges and "real life problems" in to the academic environments. When academics, businessmen, policy makers and citizens work together it is amazing the kind of deep cultural transformations that can be achieved in a shot span of time.

Such is the case of Manizales, a city in the middle of the Colombian Andes that is promoting an entrepreneurial revolution with the help of the local university system.

"Manizales Más" is a public - private - academic alliance that begun with thirteen institutions working together to promote the development of the entrepreneurship ecosystem in the city of Manizales, Colombia. The main goal is to foster the economic development and to allow business ventures of all sizes and ages to grow more rapidly. Within the axis of this ecosystem, there is knowledge and intelligent action to transform the economic conditions of the city. This entrepreneurship ecosystem is based on Daniel Isenberg theory (2010) and has been developed with the help and support of Babson Entrepreneurship Ecosystem Project (BEEP). They presented the six domains necessary to have a self-sustaining entrepreneurship ecosystem: conducive policy, markets, capital, human skills, culture, and support organizations. (Isenberg, 2011). Every domain has a share in the responsibility of promoting growth and the network expansion. In this case, even the use of the

ecosystem metaphor itself explains the importance of symbiotic relations between agents, necessary to have the companies to survive and flourish.

Something interesting about *"Manizales Más"* is that between the first stakeholders were five of universities in the city, one in particular; Universidad Autónoma de Manizales – from now one referred as UAM – has been the host of Manizales Más headquarters and has certainly become a leader in developing an entrepreneurial university. UAM has a multidisciplinary faculty that welcomes students to Arts, Social, health and engineering studies; And it has been recognized for its entrepreneurial legacy. This legacy is part of the foundational pillars of UAM, a place where senior management promotes the entrepreneurship and innovation as the fundamental ingredient to promote regional development and value creation across all disciplines. Every department has a commitment with excellence, the teachers are empowered to collaborate with businessmen and entrepreneurs, so the students can have access to real industry examples and challenges, turning the classes into spaces for experiential learning and setting the foundation for bigger opportunities for graduates and the university community in general. This Kind of approach towards problem-based learning, requires more integration of knowledge within faculties, departments and disciplines. It is a way show the best theory is one that is tested and works in practice. (Gibb and Hannon, 2006)

In 2001 International Management in Higher Education Conference in Paris it was discussed if being an entrepreneurial university was merely a new way to say that education was a business, about it Burton Clark from the University of California said at the opening session:

> *Universities are much more than a business. They have unique genetic features, and they have developmental trajectories projected by their own generic trends and societal commitments. And proactive universities shape their environments as much as they are shaped by them. Using common terms, they are self-initiating, self-steering, self-regulating, self-reliant, progressive. A well-rounded entrepreneurial narrative spells out the defining characteristics, and especially the advantages, of a type of modern university that stands on its own feet in order to adapt, on its own terms, to a highly complex and highly uncertain world*. (Clark, 2001)

This acknowledges the importance of context awareness and flexibility, the students that walk in to our classrooms today are very different from those walking that same path thirty or fifty years ago. Globalization, cultural transformations and a new need for personal growth and freedom have put entrepreneurship on the spotlight as a great alternative to build a career on. This societal change urges the Universities to raise awareness of the importance of entrepreneurship and actively encourage individuals to become entrepreneurs, provide opportunities to experience entrepreneurship and support moving from ideas to action and implementation.

Transforming the university is quite a challenge, it requires that entrepreneurship is embeded into the university mission and objectives, it requires to foster a culture of innovation and problem solving in their particular environments, so the "creation" of an entrepreneurial ecosystem sounds as a great way to start.

Manizales Universities have played an active role in developing and strengthening the ecosystem, demanding for programs that were as impactful for markets as they are for academia. Even with the first program: "High potential ventures" the universities asked for a couple of spots for teachers so they could share the room with the companies, listen to their experiences and understand the needs of the industry in the city. More programs followed focusing on start-up and growing business but everything gain momentum when the Teachers got a program designed for them. At that point universities knew they were more than mere agents participating in the ecosystem and took *"Manizales Más"* as part of their core, as part of their strategy in changing the way they teach, act, and think.

2. The role of university in *Manizales Más* entrepreneurship ecosystem

Since its creation "Manizales Más" has being a melting pot; it has welcomed the inputs of every agent and has promoted practices like empathy, which allows entrepreneurs to understand the market, but it also has allowed the stakeholders to understand each other. Each program in the project has very specific target audience and depending on what results are meant to be accomplished there are different focus and ways the

university can participate in. let's read a little about each program in the ecosystem and the university participation:

High Potential Ventures, is a program aimed at companies that have at least US$200.000 sales. The goal is income growth and job creation; for this kind of company the workshops focus on the idea of expansion and company improvement. Peer to peer and mentorship meetings become moments to rethink and discuss the entire company with people that can see the opportunities, strengths, and weaknesses with fresh eyes. There is a figure called accompanying teacher, that works with the companies and suggest possibilities based on experience and expertise.

Addventure Más, is a six-week business accelerator. In this case, new companies take the time to plan and rethink the business model. For almost two months around fifteen companies work together in a living lab, getting to know what they do, how they do it, and most importantly, what they should try to overcome the obstacles they are facing to earn more, have better employees, and sale better products. The program is completely run by universities, each week one university is in charge of one of the main topics and the entrepreneurial units get to test their abilities to teach and accelerate companies.

Startup Más, is the place for idea exploration and business model construction. It was created with the students and graduates in mind, many of which went to entrepreneurial units asking for help with their ideas. This early stage is the perfect moment to prototype and iterate ideas before launching anything. This program is also fully operated by the entrepreneurial units of the universities, teachers create different level workshops to help participants explore, pursue, launch and grow the business ideas.

The Mentoring Program, takes advantage of the experience senior managers have accumulated; the growing companies get the chance to talk and learn from seasoned businessmen, that advise them based on their own personal experiences. This method has permitted to recognize the expertise and abilities of many CEOs that have a chance to give back to the community and share the lessons hard learned in business life. The accompanying teacher figure also operates here and it has helped teachers to bring the mentors as guest lecturers to their classes.

Affiliates: a program designed for teachers to become visiting scholars at Babson College, an opportunity to immerse in Boston entrepreneurial ecosystem and Babson College entrepreneurial thought and action methodology. After the six-month experience, teacher come back to Manizales to implement new programs and share the best practices learned while in Boston.

High Potential Teachers, was created to promote a new mindset on professors so they can be the catalyst of change in the university. This is one of the most interactive experiences because educators are both learning and teaching in different moments. Sometimes on the learning side, they are with another faculty member, sharing experiences, accompanying mentorships, or attending workshops. And when they are conducting sessions they lead the audience, whether students or companies to use the resources they have to create new things, evolve, and transform the ecosystem. The idea of this program is to spark the interest of the innovative teachers to transform their classes and university curriculum.

Entrepreneurship Route with its six courses has become the space for experiential learning. Students are encouraged to create new companies, propose new products, and the most important part, to build a functioning prototype to test their ideas. The students have learned by doing and have had to face an audience to convince them of the importance of the proposal and explain how they solve a problem or have found a more innovative way to do things. Some of the projects presented by students are now start-ups or have been developed further as graduation projects.

In the end the success of "Manizales Más" entrepreneurship ecosystem lies on the Entrepreneurial community that has been formed, and the University is the catalytic agent to have a bigger and more impactful transformation.

3. Entrepreneurship in UAM vision mission and history

By the end of 1979, a group of businessmen saw that the city of Manizales needed a university where young people could be trained to address the local needs. Back in those days the scarce academic offer generated many young people to migrate to bigger cities like Bogotá and Medellin. This migration became permanent in the medium term, because these young people began to work in other cities and few returned to Manizales.

At that time the companies needed skilled labour that was not easy to find, this is how Universidad Autónoma de Manizales was born. A university with a business focus from its conception, created by entrepreneurs and businessmen to train the local talent into the future managers and employees they needed. The UAM begins with three academic programs that were the pillars of the three academic faculties that UAM has today: economics, dentistry and systems engineering have evolved over the years and now they are the social and business studies, health, and engineering faculty.

From that first moment the university´s mission was to educate people committed with regional development, following this purpose, the subjects were created focusing on promoting student's skills in the administrative and business field, even for the health students it was part of their core competencies development, because even if the graduates could be employed in public and private existing companies, they also had the possibility to create their own business and generate new economic dynamics in the city.

UAM was not the only university be born at that time in the city to, more universities were created or opened offices in Manizales, but this did not interfere with their growth and with their entrepreneurial conviction, that is why they strengthened their ties with the companies and promoted the triple helix model were science, industry and government need to collaborate and work together. All students carry out internships and practices, visits and class work, in different companies. Since all the students have to take some mandatory courses, the university developed a macro-curriculum that reflected their mission, where subjects like ethics, political culture, art or sport, are included. Also, in the macro-curriculum there was the subject entrepreneurial spirit and administration, today these last two subjects have become the entrepreneurship course, which is the beginning of the entrepreneurial route; the elective courses mentioned before.

As the theories and approaches to entrepreneurship were changing, UAM also change the way they talked and teach entrepreneurship, it became clear that it was important not just to generate economic growth in the city, but also to promote a new dynamic in the university were all the members of the community (managers, professors, administrative employees and students) would internalize that entrepreneurship is more than doing business. From every task and project, they do, they can be entrepreneurs and innovate. That is why within the graduate training programs UAM has a master's degree called Creativity and innovation within organizations, fundamental axes of entrepreneurship and growth in companies.

Given the entrepreneurial vision and the need for guidance and support that many students, graduates and workers requested, the entrepreneurship unit was created. Although at the beginning it was dedicated to advising about the idea, business plan and opening of a business, it was maturing more and more until becoming an ally not only for the people who wanted to set up a business but for the academic and administrative part to become entrepreneurial leaders and take innovation to all university's spaces.

To reinforce the university differentiation, UAM has a set of general competences that included the entrepreneurship competence along with quantitative thinking, citizenship, communicational and digital competence. UAM's current mission and vision is committed to entrepreneurship, from entrepreneurial training to the consolidation of entrepreneurial culture to respond in a creative, innovative and relevant way to the environment needs.

4. The transformation of its curriculum

Betting on entrepreneurship and educational innovation implied the challenge of transforming the curriculum, how students are taught and how the community in general, perceived education. It was necessary to break with the paradigm that knowledge was only in the teacher student direction. An integral change was needed, and that is the reason why UAM begun with a curricular adjustment in 2011. The Adjustment is conceived around four proposed moments: i) epistemological moment, ii) pedagogical moment, iii) curricular moment

and iv) didactical moment. For its development, the proposed work strategy implied to start from a general context perspective to reflected about the faculty, each of the programs and subjects that comprise it.

The first moment is the epistemological, there an analysis on the foundation of the professions is made, A reflexion on what allows them to solve problems of the context from the perspective of sciences, disciplines, techniques and technologies. Here is the nature of the knowledge required to contribute to the training of professionals. The problem field, object of study, generating concepts, logics of disciplinary organization and methods are revised and redefined if necessary; the theoretical underpinnings that guide the epistemological construction in the programs are demarcated.

The second moment is the pedagogical one, that particular reflection is centred on the human development, it is the moment to question about the type of human and professional the university wants to educate, it is fundamental to support in an integrating theoretical position, at this moment the specific and general competences of the program are reframed, as well as the professional and occupational profile, the training purposes and program problem.

The curricular moment is the articulation between the epistemological and pedagogical dimension to rethink the curriculum, an analysis of the curricula is carried out taking as reference the guidelines of the two previous moments; traditionally, the structure and reflection of the study plans had been defined based on criteria about types of subjects, such as basic, professional, socio-humanistic and complementary training. From the Adjustment, and as a complement to the established classification, an analysis of the curriculum is carried out by training areas starting from the professional and occupational profiles of the program. A problem-based curriculum shows the relational diagram of concepts and sub-concepts, the levels of problem comprehension (competence), the contribution areas and subjects, as well as the distribution of contents are taken into account for the product that is the curricular design.

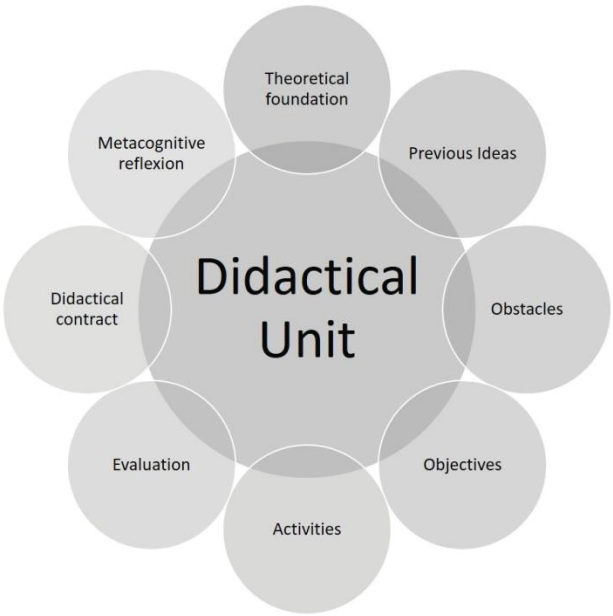
Finally, the didactic moment is where an analysis of the products and clarities reached with the reflections of the previous moments is made and the didactic unit is structured, through which the teaching process is planned and constructed, the definition of the means and resources that facilitate the student's conceptual evolution, and the achievement of the proposed objectives to contribute to the construction of the skills of the future professional.

The didactic unit becomes the integrator of the moments, it is the problem-based planning aiming for the critical thinking development of the student, teacher and context; the unit can be developed by subject or course and it depends on the analysis and / or requirements, the units are composed of eight fundamental factors that are not necessarily linear and become a system (as shown in figure 1). Here a brief description of each:

1. Theoretical foundation, which includes the epistemological and pedagogical moment grounded in the subject or subject.
2. Previous ideas where the preconceptions are explored and the main concepts needed to address the didactic unit are adressed.
3. Obstacles that can be detected in students, which can be of different types such as epistemological, linguistic, affective-emotional, technological, contextual, among others.
4. Objectives, an evaluation of teaching objectives and learning objectives is made from the obstacles identified in the students. The proposed objectives must lead to the development of general competences (communicative competence, quantitative thinking, digital competence, entrepreneurial competence) and the specific ones to each program
5. Activities, It is important to see if the activities planned to be done by the student and the teacher really aim at the proposed objectives.
6. Evaluation, construction of the rubric of qualification of the activities that are going to be evaluated in the course
7. Didactic contract, is the generation of agreements regarding student and teacher commitments, to overcome the initial obstacles and those that may be encountered throughout the course.
8. Meta-cognitive reflection is how the student is aware of what obstacles are faced and how they are going to be addressed and how the concepts, knowledge and objectives are internalized and achieved by the unit.

9. All of the mentioned parts putted together create a didactical unit, a big change in the way classes are planned and executed. The next figure shows all the elements you need to take in consideration to build a didactical unit.

Figure 1: Didactical unit components



Source: UAM teachers work group

As a fundamental part of the didactic unit we have as inputs the socially relevant problems for the development of critical thinking and the solution of problems as a teaching strategy as well as the combination of virtual and face-to-face learning environments under the B-learning modality that contribute to the incorporation of ICT through the use of digital classrooms as a mediator in the relations of the teaching system.

The implementation of the curricular adjustment has been progressive, for this the Institutional Curriculum Committee was created which is formed in a multidisciplinary way with representatives of the faculties and different academic and administrative units. In the committee, the steps to be followed are discussed and reformulated according to the needs of each program and faculty. The process began with the implementation of the adjustment to two academic programs: physiotherapy and economics who later with the help of the committee begin to work with the other programs of their same faculty; Finally, a strategy for the faculty of engineers is built to bring the whole university to adjustment. Currently the adjustment has not ended because the idea is to cover all the programs and that all subjects have built didactic units which are not static, because every semester facing a new student group involves making revisions to the different components of the same.

That is why it is vital to work with teachers, so that they see that the didactic unit is their course in class, it is their integral planning and they leave behind just going to dictate some contents without analysing the reason for the importance of them for the Professional training

For the subject of entrepreneurship, the process of curricular adjustment was something different, as it was said before, the analysis usually starts from the problematic field of the faculty, but entrepreneurship is not a subject that depends on a single faculty, it is more than a subject a stamp that the UAM wants to have in its community. That is why the analysis started from the institutional approach and transcended to its strategic planning where it is contemplated in the UAM entrepreneurship culture, and in the mission, vision and entrepreneurship competence.

Entrepreneurship competition seeks to take into account the entire UAM community, students, employees, graduates and companies, but also seeks ways to take entrepreneurship to the classroom beyond the subject of entrepreneurship. Entrepreneurship competition consists of the following dimensions:

1. Create or Identify opportunities and manage the necessary resources
2. Management of uncertainty and awareness of the work context
3. The ability to define the acceptable loss we call calculated risk
4. The Design Thinking method as a tool to propose solutions to environmental problems.
5. Leadership and ability to plan, manage projects and work teams

Which have performance criteria that students are expected to develop as a result of their training process with respect to each element, which serve as a guide to establish objectives and learning activities. Some of the strategies applied in class that contribute to develop the entrepreneurship competence are: Workshops with specific challenges, Case study for teaching, RPGs, Simulations, Work in subgroups in the classroom, among others.

Entrepreneurship at the UAM has not only permeated the academic sphere in an integral way, it has also permeated the administrative area and the physical plant where today there are spaces designed to encourage collaborative work processes and innovation, with classrooms with technology such as pad board and starboard that promotes interaction in the group, with furniture design that allows work in subgroups and take advantage of the space of the classrooms in its 360° since seeing a problem from different angles can lead to multiple and innovative solutions.

5. Entrepreneurship classes and the Entrepreneurial University

As previously mentioned, all UAM students take a course called entrepreneurship, the course seeks to strengthen the understanding of the entrepreneurial process and business opportunity evaluation that allows entrepreneurs to determine potential feasibility and viability of a new businesses or growth initiatives for an existing company. Part of this process involves different methods and the development of a mindset for adding innovation and the advance of new ideas. This course is mandatory because it helps students from all different programs to understand the impact they can have in any given project they pursue in their careers and it also helps them prove themselves when generating and presenting a business idea and prototype in a pitch event where all the university can participate.

This process of experiential learning and the use of play has allowed students to become much more interested in entrepreneurship and it is not considered as “just another subject” in their curriculum, but an opportunity to find their path as entrepreneurs, regardless of the bachelor’s degree they are pursuing.

Attitudinal changes are seen, students work with more motivation in their projects, present more innovative and ambitious proposals, and form multidisciplinary teams that support integration between different schools.

This work develops tolerance towards uncertainty and the ability to face new situations, search for resources, investors and new markets.

The shift from traditional to experiential classroom management presents multiple challenges for both teacher and student. Each task, reading, video and workshop must fulfil the objective of bringing theoretical knowledge to its practical application in the environment. Each extra class activity should be an opportunity for the student to observe and become aware of the realities that surround them and the world they will have to face once they receive their professional title. Students are now involved with real entrepreneurs, and we are integrating the participants of other “Manizales Más” programs as guest speakers or real industry problems providers for students to work in class.

The course has six moments, an entrepreneurial myths unit to discuss the different approaches and lies that surround an entrepreneurial venture, a self-assessment unit to have a chance to discover each other strengths and passion, a creativity unit to allow students to propose new and unconventional ideas that could be the base for a developable project, a Feasibility unit where students begin to understand the possible customer and need they are targeting with their value proposition, then they move to develop a business model canvas to understand the kind of business they want to create and finally they develop a prototype and a pitch to present in front of an audience of 300 people, usually students and teachers, but occasionally, businessmen and ecosystem representatives.

All of the above description just reaffirms the commitment Universidad Autónoma de Manizales has made to move entrepreneurship from just a subject to a way of teaching and doing things in Manizales. UAM is a young institution that evolves and adapts to the times and context, proving that a university can be entrepreneurial from the core to their everyday actions.

References

Clark, B. (2001) The entrepreneurial university: New foundations for collegiality, autonomy, and achievement. Higher Education Management.

Clark, B. (2015) The character of the entrepreneurial university. International Higher Education.

Gibb, A. & Hannon, P. (2006) Towards the entrepreneurial university. International Journal of Entrepreneurship Education.

Graham, R. (2014) Creating university-based entrepreneurial ecosystems: evidence from emerging world leaders.

Isenberg, D. (2011). The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. Institute of International European Affairs, Dublin, Ireland.

Isenberg, D. J. (2010). How to start an entrepreneurship revolution. Harvard Business Review, 88(6), 40-50.

Sustainability and Entrepreneurship Education. A Survey of 307 UN HESI signatories

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Abstract: The Higher Education Sustainability Initiative (HESI, 2017a) states that higher education institutions (HEIs) are integrating the SDGs into sustainability strategies in the form of research, teaching, pedagogy, and campus practices, and to position HEIs as key drivers for achieving the UN Sustainable Development Goals (SDGs). Concern has been raised (HESI, 2017b) as to the potential impact of HEIs in helping to achieve the SDGs; the challenges faced by HEIs with integrating the SDGs into curriculum and institutional strategies; the role of partnerships for HEIs among students, faculty, government, and various stakeholders; and how the adoption of the 2030 Agenda for Sustainable Development, including the SDGs, will transform the work of HEIs. According to CASE (2017) "… the need of new ways of teaching and learning…includes sustainable entrepreneurial education." This paper reviews progress of a sample of n=307 signatories to the HESI and identifies implications for practice.

Keywords: SDGs, HEIs, UN HESI, Sustainability Pedagogy, HEIs and Governance.

1. Introduction

The Higher Education Sustainability Initiative (HESI) was established in 2012 by a group of UN partners including the Executive Coordinator of Rio+20, UN DESA, UNEP, UNESCO, UN Global Compact, UN GC PRME and UNU. Initially 272 HEIs from 47 countries made voluntary commitments to drive the sustainability agenda.

Progress was evaluated in 2014 (HESI, 2014) finding that 73% of 272 commitments made by HEIs indicated partial progress, either directly or indirectly; 18% hadn't demonstrated any progress, 9% could not be determined.

Research for this paper provides a more recent review of progress and discusses implications for Enterprise & Entrepreneurship Education within HEIs. The focus is on HEIs as they are considered to be a key catalyst for a sustainable society (IARU, 2016); and HEIs serve as institutional moral reinforcers (Hanson *et al*., 2017). And, as Mindt and Rieckmann (2017) contend, the transformation of current economic systems towards sustainable development requires innovative sustainability-driven enterprises with competent managers and staff. This includes HEIs.

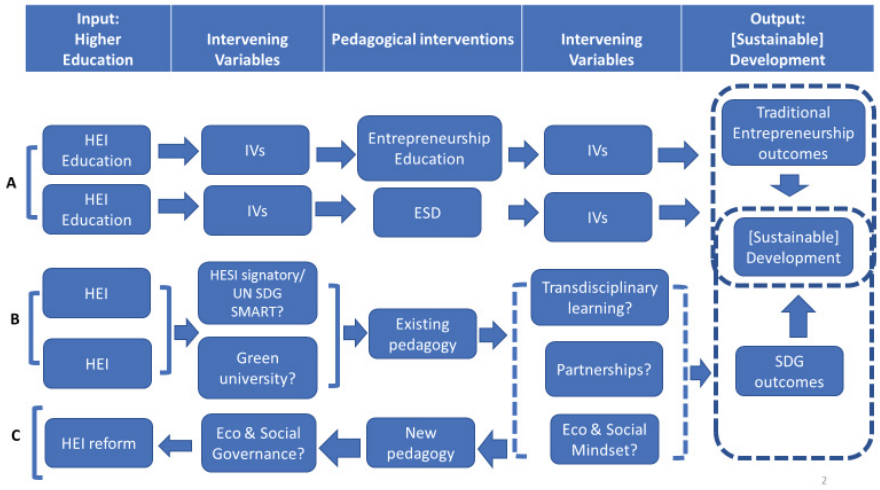


Figure 1: Conceptual framework.

The conceptual framework in Fig.1. is based on academic literature relating higher education to sustainability outcomes (e.g. Wals, 2013). The literatures on the 'need' for both entrepreneurship education (ED) and education for sustainable development (ESD) are both strong. The impact of pedagogical interventions on both EE and ESD outcomes is less clear (conditions A&B) due to numerous intervening variables (c.f. Wals, 2013). In fact, there are tensions between the goals of traditional entrepreneurship and sustainable development i.e. economic growth and the exploitation of resources (self-interest) vs. limiting growth and conserving resources (sustainability). As James & Schmitz (2011) acknowledge, business schools sometimes fail to engage the exploration of sustainability holistically because of the lure to view sustainability as a tool for profitability instead of responsibility.

Aragon-Correa *et al.,* (2017) also draw attention to these tensions. These tensions partly explain the lack of eco and social entrepreneurship courses in HEIs (Moon, 2017); and also creates a potential problem for policy makers in regard to higher education. For example, Snelson-Powell *et al*., (2016) suggest that: rather than institute actual change and include sustainability in organizational activities, business schools may 'merely' indicate that such change is taking place. This paper, therefore, investigates key factors of the above literature e.g. transdisciplinary learning, partnerships and eco & social mindsets (condition C), to see if there are significant pedagogical and governance implications necessary for HEI reform, in order that HEIs can transform from mere catalysts of sustainable development to fully committed enablers. The impact of the research could represent a paradigm shift from conditions A&B to condition C.

2. Prior research

Dawe *et al*., (2005) in a report for the Higher Education Academy (HEA) investigated sustainability 'literacy' of students in different academic disciplines over a six-month period. The authors found an overall patchy picture with sustainable development being marginal or non-existent in some influential disciplines but increasingly higher profile in others; major gaps in curricula; and four major barriers to implementing ESD: (1) overcrowded curriculum; (2) perceived irrelevance by academic staff; (3) limited staff awareness and expertise; (4) limited institutional drive and commitment. The problem over major gaps in curricula and the four barriers cited above all have implications for Enterprise & Entrepreneurship Education.

The Mader and Rammel (2015) study for UNESCO Chair in Higher Education for Sustainable Development, International Association of Universities, Institute for the Advanced Studies of Sustainability (United Nations University) concluded that: to achieve related goals of drafted UN SDGs, HEIs, and higher education policy needs to take action to change not only single curricula, research programs or waste systems within institutions but enable a whole of institution and system-wide transformation in collaboration with practice.

This highlights the importance of taking a more holistic approach to education. 425 higher education stakeholders from 101 countries responded and reported about their achievements and challenges. The study, carried out in collaboration with the International Association of Universities and financed by the Austrian Federal Ministry of Science Research and Economy, was presented in September 2014 at the international Conference on Higher Education for Sustainable Development in Nagoya, Japan. Globally 45% of respondents say that they are inspired by policies to integrate sustainability into their institution. The authors concluded that this transformation would be enhanced by the following actions:

- Establishing transdisciplinary settings for research and education;
- Aiming at capacity building and training to enable individual and collective leadership for sustainability in higher education;
- Initiating the assessment of global, regional and local challenges so to link global challenges to regional context;
- Establishing sustainability as a base line for higher education policies at national, regional and global levels;
- Applying a whole institution approach that reflects people's needs and competences;
- Inspiring transformations at the interface of education, research, policy and practice;
- Supporting a stronger focus on transformative education and new ways of teaching and learning.

Thus, it appears that HEIs might be willing to embrace the sustainability agenda in general but might lack the capacity to support the UN SDGs in their governance strategy and operations. In fact, Wyness *et al* (2015) in a

survey of N=54 entrepreneur educators from Australia, New Zealand, UK and the USA found embedded sustainability practice was typically limited to "add-on" courses to traditional entrepreneurial teaching. Yet, Snelson-Powell *et al*., (2016) conclude that failure to implement sustainability could subject [HEIs] to legitimacy risks, if the lack of operational engagement is later exposed. Thus, the Mader & Rammel (2015) recommendations provide an agenda for change. And this is supported by TEF (2017) in the UK.

3. The need for more 'holistic' approaches

HESI (2017b) have noted that institutional structures and hierarchies within universities often impede interdisciplinary and trans-disciplinary research and studies. A focus on more holistic approaches could, therefore, have a considerable impact on spurring sustainable innovation and applied research. The emphasis could, therefore, shift from 'teaching' students to supporting students, 'enabling' them to learn applied skills of relevance to business and society in general. And if students were more involved in formal or informal institutional governance then perhaps there could be a renewed interest in the SDGs and in developing new and innovative solutions from the perspective of youth or the next generation.

Unfortunately, the European Commission funded project "University Educators for Sustainable Development" (UE4SD) revealed that among 33 European countries there is a big lack of professional training programs in education for sustainable development. An investigation among 33 countries showed that even though 16 countries report about national strategies or action plans on sustainable development or ESD, only 9 strategies call for professional development and only seven countries report about national or regional initiatives for professional ESD training (UE4SD, 2014). Consequently, there is a sizeable gap between what is explained in national or regional strategies and what is done to empower people to act accordingly. Significant to CPD (continuous professional development) is ensuring that teaching-learning approaches are updated; and this can be achieved via good academic-business partnerships.

4. The need to partner with business

The most recent review of progress with the HESI was in July 2017 (HESI, 2017b) in New York, on the occasion of the 2017 session of the High-Level Political Forum on Sustainable Development - United Nations' central platform for follow-up and review of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) - and in conjunction with the 2017 Global Forum for Responsible Management Education. Over 500 participants from governments, the United Nations (UN) system, academia, and other relevant stakeholders including business attended the two-hour event, which presented concrete case studies from a wide range of higher education institutions and initiatives on how they are contributing to implementation of the Sustainable Development Goals. Examples of best practices collaboration between academia and business include:

- ESPAE-ESPOL - five companies presented their experiences and progress in aligning their strategies with the SDGs through use of the SDG Compass.
- ChallengeLab.org of Chalmers University of Technology provides a broad platform for students to engage and take on the planet's biggest challenges in collaboration with industry, governments and academia.
- Stanford University Sustainable Urban Systems (SUS) initiative – an initiative which applies multiple engineering knowledge fields in an integrated approach to shape the future of cities to test SDG localization strategies, collecting relevant actionable data at the city level to achieve the SDGs.

Whilst it is too early to evaluate the impact of these partnerships, it is clear that the overall trend is for companies to work with HEIs to better inform their strategies in support of the SDGs.

5. The need for new approaches to teaching and learning entrepreneurship

Mindt and Rieckmann (2017) conclude that 'To date, there is no comprehensive literature review dealing with teaching-learning approaches and methods of higher education for sustainability-driven entrepreneur-ship'.

These authors distinguish sustainability-driven entrepreneurs as having: (1) systems thinking competence; (2) normative competence (values thinking); (3) action competence; (4) interpersonal competence; and (5) strategic management competence. This builds on the work of Wiek *et al* who more recently identified a meta

competence (6) integrated problem-solving (Wiek *et al*., 2016, 243). And of ENTRECOMP (2016) which identifies ethical and sustainable thinking as a key competence of entrepreneurs.

Active, collaborative, problem-based, experiential, and interdisciplinary approaches can all benefit from academic-business partnerships. Mindt and Rieckmann (Ibid) cite various authors that testify to such benefits (e.g. Barth *et al*., 2014; Lehmann *et al*., 2008; Thomas, 2009). One example is the European project CASE – Competencies for A Sustainable Socio-Economic Development – which is a joint European Master's Programme on Sustainability-driven Entrepreneurship involving 10 universities and business partners from five European countries (CASE, 2017). The pedagogical framework is shown in Fig. 2.

Figure 2: CASE thematic and pedagogical outline.

Evaluations of 9 pilot courses are currently under way. Examples of innovative pedagogical practices involving external partnerships (from a total of 19 partnerships) include:

- Austria 'sustainability challenge' – intra and transdisciplinary course in cooperation between four HEIs - encourages students to develop their own business solution together with business partners. TryOut – six-week internships in start-ups.
- Germany 'Outside the University Box' provides city challenges for students with three external partners: the city administration, a local food entrepreneur (start-up company) and a municipal institution for elderly people and intense nursing. Working with a company partner on corporate sustainability communications. Internship in an institution with disabled persons.

According to CASE (2017): The CASE Knowledge Alliance jointly accepts the need of new ways of teaching and learning as well as a strong cooperation between higher education and business to enhance a sustainable socio-economic development in general and new forms of sustainable driven enterprises in particular.

6. The need for adequate measurement of sustainability in HE

Cortese (2003) highlighted the critical role of higher education in creating a sustainable future. In fact, he acknowledged that it is the people coming out of the world's best colleges and universities that are leading us down the current unhealthy, inequitable, and unsustainable path. Thus, a transformation of higher education is called for. More recently, IARU (2016) have produced a report on 'greening' the university. Whilst the report is written by the International Association of Research Universities, the findings are aimed at all HEIs. Thus, IARU recognise that all aspects of HEI life need to be geared towards achieving sustainability including: sustainable campus organisation, campus-wide operations, buildings, laboratories, green purchasing, transport, communication, employee and student engagement. There are clear implications here for the governance of HEIs. Indeed, without top level support and more holistic approaches there is little to suggest that HEIs can overcome the 'cynical' or 'instrumental' attitudes towards the environment that many students can have (Moon, 2015). Therefore, steps that HEIs take towards 'greening' the university (as identified by IARU) will be used as a default measure of 'holism' for the purposes of this research.

Another measure of HEI commitment to sustainability is 'sustainability literacy'. In fact, there is one test named SULITEST (2017) that has been taken by over 61K students from over 600 HEIs in 57 countries. Results show that students are on average more aware of specific SDGs than of the 2030 Sustainable Agenda and related UN processes. However, this test reveals general awareness of sustainable development knowledge rather than impacts of HEIs tackling SDGs in particular. And Dawe *et al.,* (2005) in their report for the Higher Education Academy (HEA) concluded from 'sustainability literacy' there was an overall patchy picture with sustainable development being marginal or non-existent in some influential disciplines and higher profile in others; major gaps in curricula; and major barriers to implementing ESD. Nevertheless, various statements are included in the accompanying survey for this paper to check for the strength and depth of HEI commitment.

Thus, statements pertaining to pedagogical approaches, transdisciplinary projects, partnerships, give a more thorough indication of the level of commitment provided towards the HESI and concomitant SDGs.

Clearly the best measure of the effectiveness of ESD is actual behavioural change. This can be evidenced by identifying sustainable development projects initiated as a result of ESD programmes in HEIs. However, the actual impact of educational programmes might not be evident for years after students graduate, if at all.

Thus, apart from impact case studies written of projects undertaken by participating students, most educators are again left to try and measure the effectiveness of ESD programmes through various default measures e.g. attitude change, propensity to engage in sustainable development initiatives, etc. One approach to eliciting such propensity is through identifying sustainability mindset, or more specifically eco and social mindset in the case of eco and social entrepreneurs. Moon (2013) used personal construct theory and rep grid technique to show that the mindset of eco and social entrepreneurs does differ from more traditional entrepreneurs. The stage is now set to more precisely measure what this mindset involves; and several scales are explored in this study relating to compassion, empathy and connectedness in relation to the SDGs. The findings will form the basis of a tool that can be used by organisations, educators and students for reflection, appraisal and development purposes. From the above literature the following research questions were formed.

6.1 Research questions

Our survey instrument, educator interviews, and student feedback mechanisms, were designed to get answers to the above challenges:

1. What are the benefits and best practices in adopting the UN SDGs?
2. What are the benefits and best practices of the UN HESI as a tool for adopting the UN SDGs?
3. What are the challenges and obstacles faced by HEIs in adopting the above e.g. governance issues, silo issues, mindset issues?
4. What are the implications for enterprise and entrepreneurship education e.g. mindset of educators, CPD of educators, tools for educators?
5. What added value does enterprise and entrepreneurship education bring to HEI implementation of the SDGs?
6. To what extent is the 'competence' model the primary theoretical underpinning to pedagogical development in this area i.e. sustainable entrepreneurship.
7. How can we effectively measure changes in student attitudes and behaviours as a result of ESD interventions?

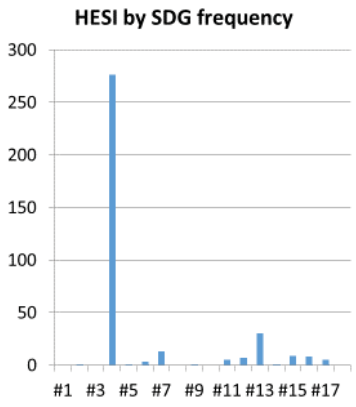
6.2 Methodology

The target sample was the 307 HEI signatories to the UN HESI. Follow-up interviews were also conducted with 80 students of enterprise education and 8 entrepreneur academics. The initial survey instrument included questions on which SDGs each HESI had signed up to, progress with their implementation, challenges faced and how obstacles were overcome. Further, a series of statements from the literature were designed to test the validity of the literature on ESD pedagogy, governance, and partnerships, etc. As our research analysis is not yet concluded, at the time of writing this paper, only related responses from the initial survey are reported below.

6.3 Findings

Fig. 3 shows that 276 of 307 HEIs committed to SDG#4 Education i.e. 89%. 30 HEIs committed to SDG#13 Climate Action i.e. 9.7%. Only 24 HEIs committing to > 1 SDG i.e. 7.8%. Of particular concern is that five SDGs

are not being committed to by any of the HESI signatories. And SDG#17 Partnerships for the Goals is only committed to by N=5 HEIs.



Raw data

SDG#4	**Education**	**N=276**
SDG#13	Climate Action	N=30
SDG#7	Affordable & Clean Energy	N=13
SDG#15	Life on Land	N=9
SDG#16	Peace, Justice & Strong Institutions	N=8
SDG#12	Responsible Consumption & Production	N=7
SDG#17	**Partnerships For The Goals**	**N=5**
SDG#11	Sustainable Cities & Communities	N=5
SDG#6	Clean Water & Sanitation	N=3
SDG#5	Gender Equality	N=1
SDG#9	**Industry, Innovation & Infrastructure**	**N=1**
SDG#14	Life Below Water	N=1

Missing: #1 No Poverty; #2 Zero Hunger; #3 Good Health & Well-Being; #8 Decent Work & Economic Growth; #10 Reduced Inequalities.

Figure 3: Frequency of SDG SMART commitments by HESI signatory.

Table 1 indicates that although over 300 HEIs signed the UN Higher Education Sustainability Initiative, only a small proportion are taking the more holistic approach across the HEI to implementing the SDGs. Our measure based on IARU (2016) provides an indication of the extent to which whole institution approaches are being implemented i.e. board level support with sustainability integrated into operations. For each HEI that means ESD curriculum, transdisciplinary and extra-curricular activities including academic-business partnerships. For the majority of HEIs these are still absent.

Table 1: Implications of the SDGs for HEI reform & enterprise education.

How the SDGs can help HEIs (PRME)	Obstacles for HEIs that can hinder the adoption of SDGs (adapted from Rasche et al, 2016)	How HEIs can overcome the obstacles (adapted from Rasche et al, 2016)	Implications for HEIs (EEUKRP 2017/18 survey findings)	Implications for entrepreneurship education (EEUKRP survey findings 2017/18)
Strengthen and enable future business practitioners, thereby adding value to modern business and society	Groups of actors can obstruct the development and implementation of the SDGs	Base on mission and strategic vision of HEI; integrated through all levels of the HEI and through strategic engagement with staff and students	HEIs are catalysts for a sustainable society. Therefore, HEIs need to develop sustainably: including campus organisation; campus-wide operations; buildings; laboratories; green purchasing; transport; communication; employee and student engagement.	Entrepreneurship education can benefit from being more competency based e.g. CASE competences for a sustainable socio-economic development with real-world orientation, university-business cooperation, and sustainability-driven entrepreneurship.
Give future business leaders the tools to recognise and maximise sustainable opportunities	Aspirational talk, greenwashing, and 'bullshit' can be used to oversell commitment to SDGs	Ensure specific, time-bound and measurable, linked to value creation, financial drivers and future investment	HEIs need to set goals based on achieving all 17 SDGs, with measurement and reporting based on all 17 SDGs.	All enterprise and entrepreneurship students should be tooled in e.g. Circular Economy Design techniques and Life Cycle Analysis (LCA) tools.
Create a paradigm for teaching, learning and understanding sustainability as core to the business model	Individuals can exploit loopholes in the SDGs	Ensure covers all dimensions of sustainable development and implemented on an interdisciplinary scale	There are 17 SDGS. EEUKRP found that most HEIs have only signed up to one SDG #4 Education. Sustainability needs to be integrated across schools and programmes building on the agenda set by Mader& Rammel.	Approaches to solving global risks increasingly need to be based on developing sustainability innovations via transdisciplinary approaches, partnerships and eco & social mindsets. Policy makers for EE should ensure that there is a paradigm shift in this regard.

How the SDGs can help HEIs (PRME)	Obstacles for HEIs that can hinder the adoption of SDGs (adapted from Rasche et al, 2016)	How HEIs can overcome the obstacles (adapted from Rasche et al, 2016)	Implications for HEIs (EEUKRP 2017/18 survey findings)	Implications for entrepreneurship education (EEUKRP survey findings 2017/18)
Connect with a network of stakeholders reaching beyond the business sphere, into signatories and supporting organisations	[Isolation; institutionalisation, bureaucracy, etc.]	Ensure covers entire value chain and all HEI stakeholders	Only N=5 HESI signatories commit to SDG#17 Partnerships for the Goals. HEIs need to more actively consider ecosystems development in this regard e.g. glocal identities; and promote academic-business partnerships across disciplines.	Learning gain by students needs to be curricula and extra curricula. The Erasmus CASE program provides examples of academic-business partnerships.

7. Discussion

This paper has highlighted some of the benefits of adopting the UN SDGs and a sample of best practices.

Benefits include providing a focal point for students to learn about the breadth and depth of sustainability issues and problems within local and global contexts. Best practices are more evident when HEIs have committed to more than one SDG. In fact, this highlights the interdisciplinary nature of problems and potential solutions. The UN HESI has been shown to be a valuable tool for adopting the UN SDGs in HEIs. The framework provides a reminder that there are 17 SDGs and innovative projects can be based on single or combined goals.

By combing goals in different ways students across disciplines can 'disrupt' silo thinking and develop more creative solutions to complex problems.

HEIs are facing numerous challenges and obstacles when implementing the SDGs. Becoming one of the UN HESI signatories does provide an impetus to each HEI tackling the SDGs. However, there can still be important governance issues to face. Thus, HEIs that are adopting the more holistic approach to implementing sustainability have a more effective platform for SDG implementation, overcoming the vagaries of silo thinking. Indicators of this holistic thinking are evident when HEIs adopt more comprehensive measures to become a greener university (IARU measure). The growing emphasis on eco and social entrepreneurship in a small number of HEIs also provides a positive indication that mindsets are changing within HEIs. That is, accepting that traditional entrepreneurship has not always considered eco and social entrepreneurs as having qualitatively different mindsets which are more supportive of achieving the SDGs in general.

The main implication for enterprise and entrepreneurship education is that CPD of educators is an important perquisite for developing the next generation of eco and social entrepreneurs. Thus, there needs to be more CPD tools and training to enable staff development in this regard. This is especially true for enterprise and entrepreneurship education which is designed to enable the entrepreneurs of the future. Education to develop the mindset of entrepreneurs has ideally included an awareness of social, economic and environmental factors (QAA, 2015). However, there is increasing recognition that all graduates need to be prepared to make a strong contribution to a sustainable society (TEF, 2017). There is evidence of a changing emphasis on broader competences (ENTRECOMP, 2017). Thus, the development of sustainability competences is now a feature of a small but growing number of university programmes. However, the efficacy of the competency model in this regard is still relatively untested and should be subject to further research.

8. Conclusions

This paper has reviewed developments in higher education towards achieving the SDGs. The UN Higher Education Sustainability Initiative was used as a default measure of HEI commitment as each HEI has to make SMART commitments towards tackling one or more of the SDGs. Of the 307 HEI signatories surveyed 276 (89%) only committed to SDG#4 Education. Whilst HEIs are clearly part of the education industry and education is critical to sustainable development, there is concern that some HEIs have selected SDG#4 out of mere convenience or marketing.

Other HEIs have committed to a broader range of SDGs and this provides the opportunity to identify best practices in relation to more than one SDG. And several HEIs have identified academic-business partnerships as evidence of such best practices. However, these examples are in the minority which raises concerns that the governance of HEIs is not fully committed to achieving the SDGs. Thus, numerous HEIs are still at the stage of simply providing courses in sustainability but not fully integrating them across disciplines; and not addressing sustainability practices in a holistic way across HEI operations.

This paper recognises that if HEIs are to fully prepare students to work in the green economy, and to be the creators and innovators of more sustainable solutions, then HEIs need to transform their governance systems to fully endorse sustainability principles and practices. This includes signing up to the UN HESI but more so for each HEI to make SMART commitments towards achieving all the SDGS. Ashridge/Hult, in the UK, now report against all the SDGs; and is a leader in this regard globally. Perhaps it is time for other HEIs to transform or reform, in this way, in order to fully realise the transformative potential of the SDGs cited by Stevens & Kanie (2016).

References

Aragon-Correa, J. A., Marcus, A.A., Rivera, J.E., Kenworthy, A.L, (2017), Sustainability Management Teaching Resources and the Challenge of Balancing Planet, People, and Profits, Academy of Management Learning & Education, Vol. 16, No. 3, 469-483.

CASE., (2017), Competencies for a sustainable socio-economic development, www.case-ka.eu.

Cortese, A.D., (2003), The Critical Role of Higher Education in Creating a Sustainable Future, Planning for Higher Education, March-May 2003, 15-22.

Dawe, G., Jucker, R., Martin, S., (2015), Sustainable Development in Higher Education: Current Practice and Future Developments. A report for The Higher Education Academy, November 2015.

EC., (2012), Effects and impact of entrepreneurship programmes in higher education. http://ec.europa.eu/growth/content/effects-and-impact-entrepreneurship-programmes-higher-education-0_en.

EEUK., (2017), Enterprise Educators UK, http://www.enterprise.ac.uk/.

ENTRECOMP., (2016) EntreComp: The Entrepreneurship Competence Framework. JRC Science for Policy Report. European Commission. https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/entrecomp-entrepreneurship-competence-framework.

Ferrer-Balas, D., Adachi, J., Banas, S., Davidson, CI., Hoshikoshi, A., Mishra, A., Motodoa, Y., Onga, M., Ostwald, M., (2008), An international comparative analysis of sustainability transformation across seven universities, International Journal of Sustainability in Higher Education, Vol. 9 Iss: 3 pp. 295 – 316.

Hanson, W.R., Moore, J.R., Bachleda, C., Canterbury, C., Franco, C., Marion, A., Schreiber, C., (2017), Theory of Moral Development of Business Students: Case Studies in Brazil, North America, and Morocco. Academy of Management Learning & Education, Vol. 16, No. 3, 393-414.

HESI., (2017a), The UN Higher Education Sustainability Initiative, www.hesi.org.

HESI., (2017b), Higher Education Institutions – Key Drivers of the Sustainable Development Goals. A special event of the 2017 High-level Political Forum on Sustainable Development, UN HQ New York.

HESI., (2014), Rio+20 Higher Education Sustainability Initiative (HESI) Commitments - A Review of Progress.

IARU., (2016), Green Guide for Universities. International Association of Research Universities.

James, C.D., & Schmitz, C.L., (2011), Transforming Sustainability Education: Ethics, Leadership, Community Engagement, and Social Entrepreneurship, International Journal of Business and Social Science. Vol. 2 No. 5; Special Issue - March 2011.

Mader, C., & Rammel, C., (2015), Transforming Higher Education for Sustainable Development, Brief for GSDR 2015.

Mindt, L., & Rieckmann, M., (2017), Developing Competencies For Sustainability-Driven Entrepreneurship in Higher Education: A Literature Review Of Teaching And Learning Methods. Teor. Educ. 29, 1-2017, pp. 129-159.

Moon, C.J., (2013), Where are all the ecopreneurs? The development of a construct for Eco-entrepreneurship. ISBE Annual Conference, 2013. https://www.researchgate.net/profile/Christopher_J_Moon/contributions

Moon, C.J., (2014), Enterprise and Entrepreneurship Education: lmplications for lnnovation in Delivery, European Conference on Innovation & Entrepreneurship 2014. https://www.researchgate.net/profile/Christopher_J_Moon/contributions

Moon, C.J., (2015), Green Universities and Eco-Friendly Learning: From League Tables to Eco Entrepreneurship Education, European Conference on Innovation & Entrepreneurship 2015. https://www.researchgate.net/profile/Christopher_J_Moon/contributions

Moon., C.J., (2017), 100 Global Innovative Sustainability Projects: Evaluation and Implications for Entrepreneurship Education, European Conference on Innovation & Entrepreneurship 2017. https://www.researchgate.net/profile/Christopher_J_Moon/contributions

PRME., (2017), Principles for Responsible Management Education. http://www.unprme.org/.

QAA., (2012), Enterprise and entrepreneurship education: Guidance for UK higher education providers. Quality Assurance Agency for Higher Education, UK.

Rasche, A., Morsing, M. & Moon, J. (2017). The Changing Role of Business in Global Society, in: Rasche, A., Morsing, M., &Moon, J. (Eds). Corporate Social Responsibility: Strategy, Communication, Governance. Cambridge/New York: Cambridge University Press, pp. 1-28.

Snelson-Powell, A., Grosvold, J., Millington, A., (2016), Business School Legitimacy and the Challenge of Sustainability: A Fuzzy Set Analysis of Institutional Decoupling, Academy of Management Learning & Education, Vol. 15, No. 4, 703-723.

Stevens, C., Kanie, N., (2016), The transformative potential of the Sustainable Development Goals (SDGs), Int Environ Agreements, 16:393–396.

SULITEST., (2017), Sustainability Literacy Test (SULITEST) of the Higher Education Sustainability Initiative (HESI), https://sustainabledevelopment.un.org/partnership/?p=9551.

TEF., (2017), Teaching Excellence Framework, http://www.hefce.ac.uk/lt/tef/.

UE4SD., (2014), University Educators 4 Sustainable Development, https://www.ue4sd.eu/.

UN Sustainable Development Goals, (2015,) https://sustainabledevelopment.un.org/partnerships.

Velasquez,L., Munguia, N., Sanchez, M., (2005), Deterring sustainability in higher education institutions. An appraisal of the factors which influence sustainability in higher education institutions, International Journal of Sustainability in Higher Education.

Wals, A.E.J., (2013), Sustainability in higher education in the context of the UN DESD: a review of learning and institutionalization processes, Journal of Cleaner Production. 1-8.

Wiek, A., Bernstein, M.J,. Foley, R.W., Cohen, M., Forrest, N., Kuzdas, C., Kay, B, Withycombe Keeler, L., (2016), Operationalising competencies in higher education for sustainable development, in Barth, M., Michelsen, G., Rieckmann, M., Thomas, I., (eds.) Routledge Handbook of Higher Education for Sustainable Development. London, New York, Routledge, 241-260.

Wyness, L., Jones, P., Klapper, R., (2015), Sustainability: what the entrepreneurship educators think, Education + Training, Vol, 57 Issue: 8/9, pp.834-852.

Exploring the Early Stages of Growth in a Slovenian Health-Technology Startup

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Abstract: This explorative study investigates the early stages of a health-technology startup in the Slovenian context. Although numerous stage models have attempted to clarify management priorities during the early stages of business growth, more focused, context-specific studies are needed. This study bridges this gap by synthesising these studies and answering the following research questions: (1) How do the most recent empirical stages of growth describe the early-stage management priorities in technology-based firms? (2) How do the experiences of managers in a technology-based health startup relate to the assumptions of stages of growth theory in the Slovenian business context? First, a revised synthesis of earlier published stages of growth literature is provided to clarify the central management priorities of early-stage technology-based firms. Second, though a single exploratory case study in a Slovenian context, we test a new research protocol based on a revised four-stage grid-type framework. Meta-analytical methodology is used to revise the framework, and a sequential incident technique and semi-structured interviews are used for case study data collection. For triangulation purposes, multiple managerial perspectives (e.g. company, operations and marketing management) are analysed for each company studied. In this study, the applicability of the revised framework are explored and context-specific viewpoints in Slovenia are analysed. Based on the results, the next steps for data collection and analysis in Slovenia are suggested. This study is limited by the context, the number of cases examined and the study's focus on the first phase of the framework. The applicability of the results to other contexts is, therefore, limited. Context-specific viewpoints and their effects on the early stages of companies have not been widely investigated. This work considers and provides new insights into the growth and management of technology-based health startups in the Slovenian context.

Keywords: stages of growth, growth process, sequential incident technique, entrepreneurship, micro-entrepreneurship

1. Introduction

Enterprise growth can be studied from multiple perspectives, including stochastic models (e.g. Gibrat, 1931) as well as static equilibrium (e.g. Coase, 1937), transaction cost (e.g. Williamson, 1975), economics of growth (e.g. Penrose, 1959), resource-based (e.g. Penrose, 1959), evolutionary (e.g. Nelson and Winter, 1982), organisational ecology (e.g. Hannan and Freeman, 1977), strategic adaptation (e.g. Sandberg and Hofer, 1982), motivational (e.g. McClelland, 1961) and configuration (e.g. Churchill and Lewis, 1983; Greiner, 1972) theories.

This study focuses on the configuration perspective, which deals with the actual growth process, in contrast to perspectives that are concerned with factors that *lead* to growth. According to Davidsson and Wiklund (2006), the configuration perspective focuses on how managerial problems occur and how they can be dealt with during the presumed growth of a firm in typical stages of development.

The configuration models developed during the past few decades vary widely in terms of their focus industry, use of empirical evidence, number of stages and other factors (e.g. Siu and Kirby, 1998). Recent reviews of the literature show that numerous stage models abound (see Levie and Lichtenstein, 2010; Muhos et al., 2010; Phelps et al., 2007). In the management literature, generic analyses of these models have shown neither consensus nor empirical confirmation of the stages theory because many of such models and frameworks are conceptually based. However, focused empirical models have produced consistent findings. Empirical studies have mostly examined technology-based firms. Empirical tests by Hanks et al. (1993) and Kazanjian and Drazin (1990), among others, have provided support for the applicability of technology-based, firm-focused models.

The main findings of 14 recent empirically based stage models that centre on technology-intensive companies were synthesised into a four-stage self-evaluation framework by Muhos (2011) to test the main results of the models. The framework was preliminarily tested in Thailand, Finland, Taiwan and the United States (Muhos et al. 2016; Muhos et al. 2014a; Muhos et al. 2014b). The findings initially supported the applicability of the framework in these contexts, and some context-specific viewpoints were emphasised and further analysed. An

in-depth analysis of the experiences of the managers of case companies will allow an examination of the gaps between reality and stage models, as well as highlight potential paths for the further development of these models.

In this research, the abovementioned reference framework is revised and further developed into a new research protocol that will be preliminarily tested in analysis of a technology-based health startup within the Slovenian business context. By implementing a single-case study to test this research protocol, this study supports the collection and analysis of a broader multiple-case study to be implemented in the Slovenian and, eventually, other contexts.

The startup period is critical for the survival of a new company; decisions made during the early stages of growth greatly influence the lifespan, productivity and success of a company. An empirical and context-specific understanding of the underlying processes of startup growth is urgently needed. This study bridges this gap by answering the following research questions: (1) How do the most recent empirical stages of growth describe the early-stage management priorities in technology-based firms? (2) How do the experiences of managers in a technology-based health startup relate to the assumptions of stages of growth theory in the Slovenian business context?

This retrospective single-case study seeks to clarify which viewpoints the managers of technology-based health startups experience in this critical stage. Through a single-case study strategy, we explore these experiences from conception and development to commercialisation and compare the managerial experiences to literature describing the early stages of technology intensive firms. A preliminary test is conducted of the applicability of the research strategy and framework to technology-based startups within the Slovenian context, and context-specific viewpoints are explored.

2. Early stages of service-based companies: revising the self-evaluation framework

This study devises a reference framework based on a meta-analytical synthesis of recent studies focused on technology businesses and the empirical stages of growth[1]. From an analysis of 14 recent and relatively consistent models (Abetti, 2001; Garengo and Bernardi, 2007; Hanks et al., 1991; Hanks and Chandler, 1992; Hanks et al., 1993; Hanks and Chandler, 1994; Kaulio, 2003; Kazanjian, 1988; Kazanjian and Drazin, 1989; 1990; Mitra and Pingali, 1999; Poutziouris et al., 1999; Smith et al., 1985; Stam, 2007; Swiercz and Lydon, 2002; Van de Ven et al., 1984), the early stages of technology-intensive small and medium-sized enterprises were identified as (1) **conception and development**, (2) **commercialisation**, (3) **expansion** and (4) **stability/renewal**.

The first two stages of the four-stage self-evaluation framework for early-stage technology-based companies are presented as a frame of reference to describe what happens during critical early development of a firm from establishment to commercialisation.

The above-described framework was revised for this study following a meta-analytical research strategy. First, an in-depth analysis of the abovementioned 14 models was conducted. The models that were selected and further analysed in this study are presented in Table 1.

Table 1: A sample of the selected empirical studies included in the meta-analysis

#	Authors, Year	Peer review	Business focus	Stages	Research strategy	Sample size
1	Van de Ven et al., 1984	yes	Technology	5	Case study	12
2	Smith et al., 1985	yes	Technology	3	Survey	27
3	Kazanjian et al., 1988; 1989; 1990	yes	Technology	4	Multi-method	283
4	McCann, 1991	yes	Technology	4	Survey	100
5	Hanks et al., 1991	yes	Technology	4	Survey	166
6	Hanks and Chandler, 1992; 1993	yes	Technology	5	Survey	133
7	Hanks and Chandler, 1994	yes	Technology	4	Survey	133
8	Poutziouris et al., 1999	yes	Technology	4	Survey	100
9	Mitra and Pingali, 1999	yes	Technology	5	Multi-method	40
10	Abetti, 2001	yes	Technology	4	Case study	2
11	Swiercz and Lydon, 2002	yes	Technology	2	Multi-method	27
12	Kaulio, 2003	yes	Technology	4	Case study	8
13	Garengo and Bernardi, 2007	yes	Technology	4	Survey	100
14	Stam, 2007	yes	Technology	5	Survey	174

[1] The main phases of growth were identified earlier in an extensive literature review (see Muhos, 2011).

Second, the models were analysed to describe their characteristics in relation to the stages identified by Muhos (2011) to clarify shared growth management themes. Data were interpreted through explorative meta-analysis, based on which the shared perspectives were classified into the following nine themes:

1. Focus
2. Power
3. Structure
4. Decision-making system
5. Strategic management
6. Product and/or technology development and delivery
7. Marketing
8. Human resources
9. Growth management

Third, the results were described in the form of a revised self-evaluation framework. The revised reference stage framework is presented in Table 2.

This explorative meta-analysis was completed to lay a foundation for developing reliable self-evaluation frameworks and conducting further analysis of the early stages of technology-based businesses. The framework described above is used to analyse and reflect upon the experiences of managers during the early stages of firm growth.

Table 2: Developmental characteristics of technology-based startups: a revised self-evaluation framework

	Stage 1: Conception and development	Stage 2: Commercialisation	Stage 3: Expansion	Stage 4: Stability/renewal
Beginning of the stage	The establishment of the company	Early reference customers	Technical feasibility and market acceptance, which lead to high growth	A slowing growth rate and intense competition in maturing product markets
Focus	A1.1 The main objectives are product and/or technology development and the establishment of an early customer base.	A2.1 The main objectives are the creation of the business and commercialisation of the product; resource generation and survival are key issues.	A3.1 The main objectives are management of the company towards growth and increasing the market share by marketing and manufacturing the product efficiently at a high volume.	A4.1 The main objectives are the second generation of the product and improvement of the effectiveness and efficiency of the first generation.
Power	A1.2 The newly established firm is owner-dependent.	A2.2 The firm is dependent on the owner(s) and/or a small number of partners.	A3.2 The owner and/or partners remain central but delegate responsibilities to a small management team.	A4.2 The owner–manager(s) is/are supported or replaced by a professional executive or a team of executives.
Structure	A1.3 The organisation functions as a product development team.	A2.3 The owner(s) and/or a small number of partners form the nucleus of the administrative system.	A3.3 Specialised functions are considered and added. Efficiency and effectiveness is improved through structures and processes.	A4.3 A formal structure with defined roles is introduced; more specialised functions and processes are added.
Decision-making systems	A1.4 Formal decision-making systems and procedures are almost non-existent.	A2.4 Development of decision-making systems and procedures is started.	A3.4 The firm moves rapidly from basic decision-making systems to scalable systems.	A4.4 Strategies, rules and policies are written and supported by professional management systems.
Strategic management	A1.5 The owner(s) makes the strategic decisions.	A2.5 The owner(s) and/or a small number of partners make the strategic decisions.	A3.5 Strategic planning is gradually formalised by the owner(s) and/or a small number of partners.	A4.5 Strategies, rules, regulations and procedures are standardised and formalised.
Product and/or technology development and delivery	A1.6 The development of a working technology and/or prototype is started.	A2.6 The stage is characterised by early manufacturing and initial technical challenges. The company learns to make the product and produce it.	A3.6 The company needs to produce and distribute the product at an increasing volume.	A4.6 New product generation(s) and profitability improvements help to maintain growth and a reasonable market share.
Marketing	A1.7 The main activities relate to the business idea, identification of a market and resource mobilisation.	A2.7 The stage is characterised by early marketing activities.	A3.7 The company needs to sell the product at an increasing volume. New customers and new market channels require constant attention.	A4.7 The identification of new markets is essential for company renewal.
Human resources	A1.8 Management is informal, flexible and creative. Communication is face-to-face.	A2.8 The management style is participative and coordinative.	A3.8 A sense of hierarchy increases. Personnel problems result from high growth.	A4.8 Employees become specialised non-risk-takers.
Growth management	A1.9 The cash flow falls into the red due to a lack of product at this point.	A2.9 Amount of negative cash flow decreases.	A.3.9 Positive cash flow increases rapidly.	A4.9 The stage is characterised by a decreasing growth of cash flow.

3. Method

This study is a retrospective single-case study with a holistic research strategy (Saunders et al., 2007; Yin, 1989). This case study followed the guidelines established by Yin (1989). The sequential incident technique (SIT), a specific form of the critical incident technique (CIT; Edvardsson and Roos, 2001; Fisher and Oulton, 1999; Flanagan, 1954), is also used. Figure 1 presents the research process.

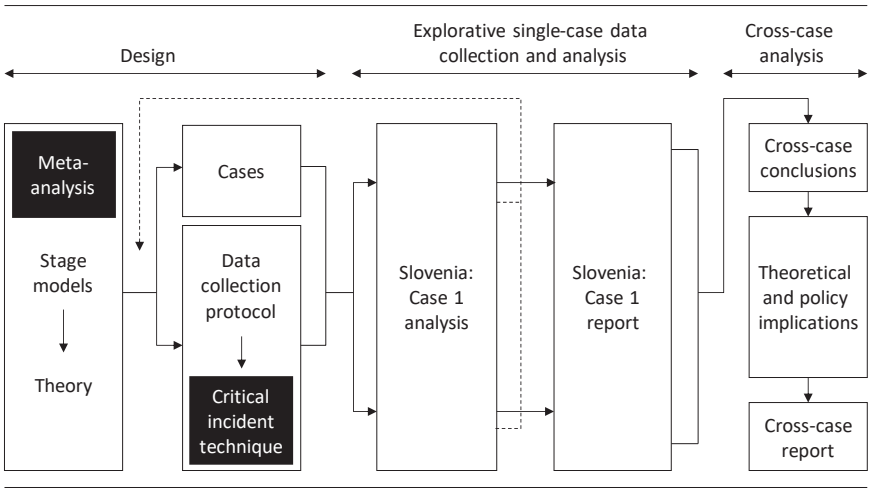

Figure 1: The research process of this study (modified from Yin, 1989)

In an overview of CIT methods, Gremler (2004) recognises SIT, a variant of CIT that considers the sequential characteristics of a process (see Stauss and Weinlich, 1997). Case studies using SIT clarify the main stages of the process under analysis prior to data collection, which is advantageous if the process has already been defined empirically. Critical incidents are reflected in the sequential framework presented in the theoretical section of this study. Here, a critical incident is considered to be an extreme behaviour, which is either outstandingly effective or ineffective with respect to attaining the general aims of the activity (Fisher and Oulton, 1999).

For the case study, a private-owned case company in Slovenia was selected on the basis of its focus on new technology and the 'newness' of the firm. This technology-based startup was analysed from multiple managerial perspectives using CIT and semi-structured interviews, which were conducted in 2016 (Edvardsson and Roos, 2001; Fisher and Oulton, 1999; Flanagan, 1954). For triangulation purposes, three managerial viewpoints were examined from company, operations and marketing management, respectively. The key indicators of growth and the main characteristics of the case company are summarised in the next section.

4. Results

In this section, a test case analysis of the critical incidents related to a technology-based health startup is provided. First, positive and negative incidents are analysed. Aspects that are either parallel or contradictory to the assumptions of the framework are first presented in a quantified form to test the applicability of the framework to each case. Then, the contradictory aspects are analysed further to point out potential context-specific aspects.

4.1 Case A: A Slovenian health-technology startup

Case A is a startup aiming towards a new type of disruptive optoelectronic innovation. The company was established in 2000. By the end of 2016, it had 10 employees and €444,980 of positive cash flow. The company reached stage 2, commercialisation, in 2010. When the interviews were conducted in 2016, it was almost ready to move from stage 2 to stage 3, expansion.

Altogether, 85 critical incidents (59 positive and 26 negative) were recalled by the management team interviewed. Of these critical incidents, 58 were parallel to and 27 were contradictory to the assumptions of the framework. The majority of the incidents were, thus, parallel to the framework and were positive. According to the interviewees' evaluations, the framework fit their experiences very well at this stage.

4.1.1 Stage 1: Conception and development

The distribution of stage 1 critical incidents recalled by the management team of Case A during the interviews is presented in the following table. Although the majority of the incidents were parallel to the framework assumptions, many contradictions were also detected. These contradictions were mostly related to the original contract manufacturing business model, which was later used to fund the supplementary owned product business that soon became the core vision of the management team.

Table 3: Stage 1 – critical incidents experienced by the Case A management team

Stages and assumptions	Case A P*	Case A C**
Stage 1: Conception and development		
A1.1	12	5
A1.2	2	-
A1.3	5	3
A1.4	-	1
A1.5	-	-
A1.6	4	1
A1.7	1	1
A1.8	1	-
A1.9	-	9
Stage 1: Total number of parallel and contradictory critical incidents	25	20

A = assumption, P* = parallel incidents, C** = contradictory incidents

The parallel aspects related to stage 1 are presented in the following table:

Table 4: Key parallel aspects related to the assumptions of stage 1

Assumption	Key parallel aspects
A1.1	Simultaneously with contract manufacturing, the company conducted research and development gradually: *'…We did some research and development in electronics [but] did not have our own product. …So, we did the research [and] development, and we tested the prototypes… The first equipment was just for cosmetic purposes. Then, while we were searching this* [name removed] *database, we found a lot of similar articles, with similar technical parameters to our device. We tested this device in an institute, which confirmed that [it] can be used for medical purposes'.* Development was lengthy because the target market (health-technology) is heavily regulated (medical directives, quality assurance, certification, etc.).
A1.2	In the first stage, the company was owner-dependent. The vision of this health-technology business was driven by the owner–manager's positive passion for technology: '*First, the thing what was interesting is that stuff works – really works. It's maybe the first decision to try something yourself that is really some kind of miracle'.*
A1.3	The group of technology founders functioned as a product development team: *'…We were not afraid to invest in a product, even if it was not our idea. We were searching for solutions. … We didn't think about its cost, but we did find the solution, and [in the end], it was good choice'.* The main driver of the team was technology development: *'We tested … a simple prototype [by ourselves to] see … [how] it works. And it's enough reason to ask yourself how to make it if it is so good'.* Case A was creative in its acquisition of human resources during the conception and development stage: *'Human resources vary, including students, which comprise one quarter of our team, and other kinds of employees. When there are there are new products to make, then you have to hire new employees.'*
A1.4	-
A1.5	-
A1.6	At this stage, the development of a working health-technology prototype was mainly self-financed using the revenue generated by the contract manufacturing business: '*…We tested a prototype, a simple prototype, and we saw that it worked. … [We included] technical folders, risk analysis and a clinical evaluation report to make it medical,… [and] we made a lot of developments and changes'.*
A1.7	After recognising a business opportunity, the owner–managers aimed at establishing a customer base within the challenging health-technology market*: 'So basically, this was our first finished idea…. First, you [need to] get an idea for a product, …but this, I think, was the first product that I was ready to develop all the way from an idea to the market'.* However, they took an outsourcing approach to reaching the final target market: *'…We do not have contracts, and we do not have data. …They [just] sell the product. But still, maybe our problem is that we are not pushy; we are not asking, "Tell us when you will say how much you will sell". We are just thinking about our job – making good developments [and] technical solutions. They will do their part. This is our strategy'.*
A1.8	*'I think that … our cooperation between our team is always very strong, so I think this is very empowering. …I think we always listen to each other's ideas'.*
A1.9	-

The contradictory aspects related to stage 1 are presented in the following table:

Table 5: Key contradictory aspects related to the assumptions of stage 1

Assumption	Key contradictions
A1.1	Case A started as a contract manufacturer in 2000: *'[We were] just in production without our own technology'.* They were highly dependent on the main supplier, a large international player: '*We can't sell their product, only they can. We would like to be more independent'.* Since the management team had limited business capability, the company focused on its strengths in technology development and contract manufacturing; the latter was used to fund the business as it was not yet possible to sell the product in this target market.
A1.2	-
A1.3	The company funded research and development through contract manufacturing, which provided a stable revenue. That part of the business was organised as a typical contract manufacturing unit rather than a product development team: *'Very specific manufacturing – that is our in-house know-how'.*

Assumption	Key contradictions
A1.4	The company had to invest early in formal decision-making systems because of the demanding target market: *'…Generally, it's always a conflict between producers and [individual] certifications. It is one of the most difficult things. We are a small company, and it's sometimes hard to follow all protocols. … The certification … was a positive … in this management system, [which conformed to] ISO [standards] for medical devices…. Big companies maybe have five employees: … one for technical data, one for risk analysis, one for clinical evaluation reports, [etc.]. This is very hard for [both] small companies [and] organisations, and these critical points can show you what you are doing wrong and what you should do [instead]'.*
A1.5	-
A1.6	Although contract manufacturing provided constant income to support health-technology product development, which was considered by the owner–manager as the core business, it sometimes distracted the focus from product development.
A1.7	Due to the market characteristics, actually selling the product is time-consuming: *'I have personally written the clinical evaluation report, … with support from [medical] doctors. Risk analyses [and] technical files … are our [area of expertise], but when it comes to selling the product, we [prefer] to give [this task] to someone else'.* The company has not yet been able to sell the product to an actual customer: *'Okay, so later, … much later, we will ask ourselves again how to sell this, but… it's a little problem* [laughs]*'.*
A1.8	-
A1.9	The company's cash flow has been steady from the beginning due to the original contract manufacturing business model: '*Cash flow. This is everything, let's say, from* [the main contractor]*; this is* [Case A]. *So, the main profit comes from* [the main contractor]. *… This is quite constant business … for you, and [a somewhat] secure source of financing. …We have one core business, and one part of the money goes to the development our products'.* The company was supported by an external investor: *'…he found us, and he wanted to have his own device, so we [worked] together with this … investor, [who] … contributed maybe one quarter or even less of the [funds required] for development. … He is a distributor, and he has the distribution rights. He is not a medical [professional] …He [let us know] that he is very good at marketing [and] selling [products] … [and that] he will almost definitely sell [our product]. The problem just was "Can you make enough of this?" and of course we can'.*

4.1.2 Stage 2: Commercialisation

The distribution of critical incidents in stage 2 recalled by the Case A management team during the interview is presented in the following table. The majority of the incidents were parallel to the assumptions of the framework. Only a few contradictory incidents were reported. The contract manufacturing business model and the characteristics of the heavily regulated health-technology business environment are related to most of the contradictions found in stage 2.

Table 6: Stage 2 – critical incidents experienced by the Case A management team

Stages and assumptions	Case A P*	Case A C**
Stage 2: Commercialisation		
A2.1	11	3
A2.2	2	-
A2.3	1	-
A2.4	-	-
A2.5	-	-
A2.6	12	-
A2.7	5	3
A2.8	2	-
A2.9	-	1
Stage 2: Total number of parallel and contradictory critical incidents	33	7

A = assumption, P* = parallel incidents, C** = contradictory incidents

The parallel aspects related to stage 2 are presented in detail in the following table:

Table 7: Key parallel aspects related to the assumptions of stage 2

Assumption	Key parallel aspects
A2.1	The company aims at commercialising the product to decrease its dependency on the main contractor. The company found an investor to help speed up this process. However, its own product sales had not started yet: *'…We [realised that we] closed the door [and] couldn't sell our own product because he was an investor, and we need investors. …[Because he was more than] just… a partner with rights, … we gave him a chance to … sell our product…. We [would] do the technical changes, [but he would say, for example, "We] cannot sell this if [it is] in grey – it must be white" … [or] "It should not be 17 programs; it should be 5 programs". …This is a medical product, and it must be [made] according to a standard. …He [proposed] a lot of these changes, which made it difficult for us… [and] cost a lot of money'.*
A2.2	The company is still highly dependent on a small group of partners that was recently extended to include an investor: *'…Marketing and selling are [done by] our partner. …[There are] other kinds of development'.* The managers started to delegate responsibilities: *'…People who were previously working in production now can work, let's say, in administration. So, this is a kind of reorganisation [in] a new business – reorganisation with better tasks, better positions and new jobs'.*
A2.3	Case A does not yet have complex structures established. However, its administration is built around the owners and partners: '*A group of owners and partners control the administration – that's true'.*
A2.4	-
A2.5	-
A2.6	*'In 2012, we finally developed our medical product, which was quite a breakthrough for us'.* The company will soon have to respond to the expected demand with serial production: *'We spent almost a year and half [doing this], and now we are at 80 or 90 percent completion. …[Next,] it goes into serial production. For … [one or two years], production was only experimental, testing the best parameters and the best design solutions for the product…'. 'But right now, [the number of] orders [and purchases] is [increasing]…, [so] they need to … automatise – make production cheaper [and] faster. These are the last two percentile points of development that are going through the process right now'.* The company is solving the technical challenges related to serial production: *'We already know how to make the product and how to produce it, but we still have some small difficulties … [which will require minimal] finances until the final production. … [we just need to confirm] the 3D prototype, the electronics, the program – everything – and … in a few months, we can start production'.*
A2.7	The company is focused on ramping up its marketing activities with help from a distributor who invested in the company: *'…We …did find a distributor. We are still waiting; we did give him some contract definitions that he must turn around in a few months. …He must sell a [minimum quantity] of this medical equipment per month and must pay all the certification costs, but from our point of view, this is zero cash flow – nothing for our personal growth. But in the end, we have a device. Now we have a contract [with a buyer from a European country]'.* The owner–manager pointed out that funding for technology development is available but limited *'for implementation in the market, I think. It's always expected that the product should come to the market at the end, but the mentality here of the people is that this is an automatic process'.*
A2.8	Management was found to be participative and coordinative in the company, which has been able to build a loyal core team: *'…That's why …[for] all these years [the employees have basically been the same] in number. [We have always had between] nine [and] eleven full-time employees'.*
A2.9	-

The contradictory aspects related to stage 2 were further analysed in detail; see the following table:

Table 8: Key contradictory aspects related to the assumptions of stage 1

Assumption	Key contradictions
A2.1	The initiation of sales and distribution has begun to worry the owner–managers: *'…You [become so involved] in your research and development that you … forget about the business. You think, "Oh my God, we are still in stage 1 or 2 two, and we should be in the market now! What will we do to get into the market? With whom will we cooperate? What will our conditions be?"'.* The revenue generation model is not clear yet as the company has focused on technology development with the support of contract manufacturing: *'…For the next project, [we might take a slightly] different approach. [We will have] a few more calculations, a few more requirements [in terms of] where the money comes from, where it goes and how much it will cost – especially in medicine. It's very, very important simply because today, it's impossible to start certification somewhere in the middle. First, you have to have plan'.*
A2.2	-
A2.3	-
A2.4	-
A2.5	-
A2.6	-
A2.7	The original group of owners does not participate in marketing activities. The new partner of the company is currently testing different distribution channels, while the original team focuses on technology: '*…First we were talking about… some kind of net-marketing. It was his first idea. Then he [thought it might not be a good idea], so he started to [talk to] doctors. …We don't think about marketing because this distributor now has all-exclusive rights, but we have some internal flow*'.
A2.8	-
A2.9	Just before the commercialisation stage, the company is still funding most of its development activities organically by revenue generated from the contract manufacturing business. The cash flow has been positive for a long time.

5. Discussion and Conclusion

This explorative study aimed to develop and test a new type of research protocol to clarify the early stages of health-technology startups. The functionality of the research protocol was preliminarily tested through a single-case study in the Slovenian context. This study answers the following research questions.

First, *how do the most recent empirical stages of growth describe the early-stage management priorities in technology-based firms*? An earlier-published four-stage self-evaluation framework of early-stage technology-based companies was revised through meta-analytical methodology. Table 2 in the second section details the startup stage from the revised grid-type version of the stages of growth framework. This is a preliminary, experimental attempt to provide a more comprehensive research protocol for in-depth analysis of the management priorities in early-stage technology-based companies.

Second, *how do the experiences of managers in a technology-based health startup relate to the assumptions of stages of growth theory in the Slovenian business context*? The first two stages of the framework were used as a set of assumptions to be tested in a single Slovenian case study. An analysis of context-specific viewpoints was also provided.

Case A was analysed utilising SIT to test how the managers' experiences were related to the key management themes of the framework and answer the first research question. The applicability of stages 1 and 2 of the framework for analysing Case A was tested in the context of Slovenia by analysing the number and content of positive and negative incidents experienced by the management team. First, the positive and negative incidents experienced by the managers were reflected through the key management themes and the related central assumptions:

Table 9: The number of positive and negative management priorities of a Slovenian technology-based startup and the central management themes

	Stage 1	Critical incidents		**Stage 2**	Critical incidents	
Management theme	Assumption	Positive (+)	Negative (-)	Assumption	Positive (+)	Negative (-)
1. Focus	A1.1	14	5	A2.1	5	8
2. Power	A1.2	2		A2.2	2	
3. Structure	A1.3	8		A2.3	1	
4. Decision-making system	A1.4	1		A2.4		
5. Strategic management	A1.5			A2.5		
6. Product and/or technology development and delivery	A1.6	3	2	A2.6	8	4
7. Marketing	A1.7	2		A2.7	5	2
8. Human resources	A1.8	1		A2.8	1	1
9. Growth management	A1.9	6	3	A2.9		1
Number of incidents, + and -		**37**	**10**		**22**	**16**

Second, the central parallel and contradictory aspects in relation to the assumptions of the framework were explored. The condensed distribution of the abovementioned management priorities is provided in the following table:

Table 10: The number of parallel and contradictory critical incidents experienced by the Case A management team

Stage	Case A P*	Case A C**
Stage 1 (conception and development): Total number of parallel and contradictory critical incidents	25	20
Stage 2 (Commercialisation): Total number of parallel and contradictory critical incidents	33	7
Total number of parallel and contradictory critical incidents in stages 1 and 2	58	27
A = assumption, P* = parallel incidents, C** = contradictory incidents	Total	85

The majority of the framework assumptions were preliminarily supported by the experiences of the owner–managers of the Slovenian technology-based startup. However, more cases need to be analysed to make further conclusions.

The research protocol utilised functioned reasonably well for analysis of the positive and negative incidents experienced by the management team of the firm sequentially. Not only did the management team interviewed find it easy to self-evaluate the current stage of development, but they also found it useful to

externalise their experiences. The research protocol prompted the managers to evaluate their prior decisions and clarified the path from the establishment of the company to the current state of the business. They were encouraged to reflect on the past while making strategic decisions concerning the future. The empirically based stage framework seems to be an effective tool for reflecting on and predicting the challenges faced by a company during its early developmental stages.

In this study, the framework and research protocol were tested in Case A, a health-technology company, which revealed context-specific perspectives. By analysing more similar types of cases, it would be possible to develop stages of growth theory towards a more dynamic understanding of the business growth process.

In conclusion, this study formulated and preliminarily tested the startup stage of a four-stage framework and a research protocol for further context-specific analysis of the early stages of technology-based companies. This study revealed a number of viewpoints that were contradictory to the framework: Companies in different contexts face culture- and context-specific issues during their early growth. Growth is a multi-dimensional phenomenon, and every service-based startup is, to some extent, unique.

The preliminarily tested case study research protocol using SIT seems to be effective for an open-ended analysis of early growth; it considers the sequential characteristics of the process. The construct validity of the study is based on a sound research plan, multiple sources of evidence, the synergy between quantitative and qualitative data and an established chain of evidence. Analytic generalisation (generalisation to theorisation) is possible when building frameworks applicable to a specific context. Because the research focus of this study is limited to one test case, the findings cannot be directly generalised to other countries or business contexts; furthermore, the findings are not replicable. However, a case study protocol was followed, and a database was established, which allow for further testing of the findings.

References

Abetti, P. A. (2001) "Accelerated Growth: Helping Companies Get and Stay on the Fast Track", *International Journal of Manufacturing Technology and Management*, Vol 3, No. 1, pp 15–30.

Blank, S. and Dorf, B. (2012) *The Start-up Owner's Manual. The Step-by-step Guide for Building a Great Company.* K&S Ranch Press, CA.

Churchill, N. C. and Lewis, V. L. (1983) "The Five Stages of Small Business Growth", *Harvard Business Review,* Vol 61, No. 3, pp 30–50.

Coase, R. H. (1937) "The Nature of the Firm", *Economica,* Vol 4, No. 16, pp 386–405.

Davidsson, P. and Wiklund, J. (2006) "3 Conceptual and Empirical Challenges in the Study of Firm Growth", In: Davidsson, P. *Entrepreneurship and the Growth of Firms,* Edward Elgar Publishing. pp. 39-61.

Edvardsson, B. and Roos, I. (2001) "Critical Incident Techniques: Towards a Framework for Analysing the Criticality of Critical Incidents", *International Journal of Service Industry Management,* Vol 12, No. 3, pp 251–268.

Fisher, S. and Oulton, T. (1999) "The Critical Incident Technique in Library and Information Management Research", *Education for Information,* Vol 17, No. 2, pp 113–125.

Flanagan, J. C. (1954) "The Critical Incident Technique", *Psychological Bulletin,* Vol 51, No. 4, pp 327–358.

Garengo, P. and Bernardi, G. (2007) "Organizational Capability in SMEs: Performance Measurement as a Key System in Supporting Company Development", *International Journal of Productivity and Performance Management*, Vol 56, No. 5/6, pp 518–532.

Gibrat, R. (1931) *Les Inégalités Économiques* (1st ed.), Recueil Sirey, Paris.

Greiner, L. (1972) "Evolution and Revolution as Organisations Grow", *Harvard Business Review,* Vol 50, No. 4, pp 37–46.

Gremler, D. (2004) "The Critical Incident Technique in Service Research", *Journal of Service Research*, Vol 7, No. 4, 65–89.

Hanks, S. H. and Chandler, G. (1994) "Patterns of Functional Specialization in Emerging High Tech Firms", *Journal of Small Business Management*, Vol 32, No. 2. pp. 23-36.

Hanks, S. H. and Chandler, G. N. (1992) "The Growth of Emerging Firms: A Theoretical Framework and Research Agenda", Proceedings of the 7th Annual National Conference of the United States Association for Small Business and Entrepreneurship. United States Association for Small Business and Entrepreneurship, Chicago.

Hanks, S. H., Watson, C. J. and Jansen, E. (1991) "Toward a Configurational Taxonomy of the Organization Life Cycle", In: Hills, G. and LaForge, R. (eds.) *Research at the Marketing/Entrepreneurship Interface*, University of Illinois Press, Chicago.

Hanks, S. H., Watson, C. J., Jansen, E. and Chandler, G. N. (1993) "Tightening the Life-cycle Construct: A Taxonomic Study of Growth Stage Configurations in High-technology Organizations", *Entrepreneurship: Theory and Practice,* Vol 18, No. 2. pp. 5-29.

Hannan, M. T. and Freeman, J. (1977) "The Population Ecology of Organizations", *The American Journal of Sociology,* Vol 82, No. 5, pp 929–964.

Kaulio, M. A. (2003) "Initial Conditions or Process of Development? Critical Incidents in the Early Stages of New Ventures", *R&D Management*, Vol 33, No. 2, pp 165–175.
Kazanjian, R. K. (1988) "Relation of Dominant Problems to Stages of Growth in Technology-based New Ventures", *The Academy of Management Journal*, Vol 31, No. 2, pp 257–279.
Kazanjian, R. K. and Drazin, R. (1989) "An Empirical Test of a Stage of Growth Progression Model", *Management Science*, Vol 35, No. 12, pp 1489–1503.
Kazanjian, R. K. and Drazin, R. (1990) "A Stage-contingent Model of Design and Growth for Technology Based New Ventures", *Journal of Business Venturing,* Vol 5, No. 3, pp 137–150.
Levie, J. and Lichtenstein, B. B. (2010) "A Terminal Assessment of Stages Theory: Introducing a Dynamic States Approach to Entrepreneurship", *Entrepreneurship Theory and Practice,* Vol 34, No. 2, pp 317–350.
McClelland, D. C. (1961) *The Achieving Society* (1st ed.), Van Nostrand, Princeton.
Mitra, R. and Pingali, V. (1999) "Analysis of Growth Stages in Small Firms: A Case Study of Automobile Ancillaries in India", *Journal of Small Business Management*, Vol 37, No. 3, pp 62–63.
Muhos, M. (2011) *Early Stages of Technology Intensive Companies*. University of Oulu, Oulu.
Muhos, M., Kess, P., Distanont, A., Phusavat, K. and Sanpanich, S. (2014a) "Early Stages of Technology-intensive Companies in Thailand and Finland", *International Journal of Economics and Business Research*, Vol 7, No. 2, pp 177–197.
Muhos, M., Kess, P., Phusavat, K. and Sanpanich, S. (2010) "Business Growth Models: Review of Past 60 Years", *International Journal of Management and Enterprise Development,* Vol 8, No. 3, pp 296–315.
Muhos, M., Kess, P., Rasochova, L. and Foit, D. (2016) "Early Stages of Technology-intensive Companies in California", *International Journal of Innovation and Learning*, Vol 19, No. 3, pp 244–271.
Muhos, M., Lee, T., Chang, S. and Kess, P. (2014b) "Growth Strategies in Early-stage Technology-intensive Firms", In: *Handbook of East Asian Entrepreneurship*, Routledge, London, UK, pp 68–80.
Nelson, R. R. and Winter, S. G. (1982) *An Evolutionary Theory of Economic Change* (1st ed.), Belknap Press, Cambridge.
Penrose, E. T. (1959) *The Theory of the Growth of the Firm* (1st ed.), John Wiley & Sons, New York.
Phelps, R., Adams, R. and Bessant, J. (2007) "Life Cycles of Growing Organizations: A Review with Implications for Knowledge and Learning", *International Journal of Management Reviews,* Vol 9, No. 1, pp 1–30.
Poutziouris, P., Binks, M. and Bruce, A. (1999) "A Problem-based Phenomenological Growth Model for Small Manufacturing Firms", *Journal of Small Business and Enterprise Development*, Vol 6, No. 2, pp 139–152.
Ries, E. (2011) *The Lean Startup: How Constant Innovation Creates Radically Successful Business*, Penguin, St Ives, U.K.
Sandberg, W. R. and Hofer, C. W. (1982) "A Strategic Management Perspective on the Determinants of New Venture Success", In: K. H. Vesper (ed.), *Frontiers of Entrepreneurship Research* (1st ed.), Babson College, Wellesley, pp 204–237.
Saunders, M., Lewis, P. and Thornhill, A. (2012) *Research Methods for Business Students* (6th ed.), Pearson, Essex, U.K.
Siu, W. and Kirby, D. A. (1998) "Approaches to Small Firm Marketing", *European Journal of Marketing,* Vol 32, No. 1/2, pp 40–60.
Smith, K. G., Mitchell, T. R. and Summer, C. E. (1985) "Top Level Management Priorities in Different Stages of the Organizational Life Cycle", *The Academy of Management Journal*, Vol 28, No. 4, pp 799–820.
Stam E. (2007) "Why Butterflies Don't Leave: Locational Behavior of Entrepreneurial Firms", *Economic Geography*, Vol 83, No. 1, p 27.
Stauss, B. (1993) "Using the Critical Incident Technique in Measuring and Managing Service Quality", In: *The Service Quality Handbook*, American Management Association, New York, pp 408–427.
Swiercz, P. M. and Lydon, S. R. (2002) "Entrepreneurial Leadership in High-tech Firms: A Field Study", *Leadership & Organization Development Journal*, Vol 23, No. 7, pp 380–389.
Van de Ven, A. H., Hudson, R. and Schroeder, D. M. (1984) "Designing New Business Startups: Entrepreneurial, Organizational and Ecological Considerations", *Journal of Management*, Vol 10, No. 1, p 87.
Williamson, O. E. (1975) *Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization*, Free Press, New York.
Yin, R. K. (1989) *Case Study Research*, Sage Publishers, Beverly Hills.

Open Innovation and Corporate Culture: A Case Study among German SMEs

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Abstract: Open Innovation offers great chances for the improvement of the success rate of innovations to enterprises and is widely researched among bigger companies and corporations. This case study investigates the knowledge transfer and dissemination of Open Innovation for German small and medium sized enterprises (SMEs) from the very traditional technical textile industry. The study investigates sample of 56 SME, which corresponds to 22% of enterprises of the German textile industry. This study shows that the corporates' cultural framework and the resulting organizational structures have a massive influence on Open Innovation and the willingness to open up innovation processes. Nevertheless, a very interesting result of this examination is that, when it comes to cooperation, a similar culture within the cooperating enterprises is of less relevance for executives compared with other factors. Moreover, many of the surveyed companies still struggle with their experiences after Germany was reunited and complain about a lack of confidence especially when cooperating with companies from former Western Germany. On the other hand, when it comes to international cooperation, the missing skills in speaking English are named as the most important obstacle. A special focus of this examination is on the influence of the employee's mind-set and the company's culture as well as on the mind-set of the executives to develop an assessment tool regarding the cultural readiness for Open Innovation. This paper shows the concept of the culture based Open Innovation approach by a set of success factors, which are defined in cooperation with the technical textile SMEs themselves.

Keywords: Open Innovation, Corporate Culture, SMEs, Germany, Technical Textiles, Readiness Check

1. Introduction

The results presented in this paper are part of a study, which was conducted during the futureTEX project that was funded by the German Federal Ministry of Education and Research. The aim of the futureTEX project was to enable the technical textile industry in Germany, which is characterized by small and medium sized enterprises (SMEs), to prepare themselves for a successful future. One promising way for this preparation is the application of methods from and the dissemination of knowledge about Open Innovation (OI).

Furthermore, one specific research question was to investigate the correlation between the corporate culture and OI.

1.1 Open Innovation capabilities in German SMEs

During the past 15 years, starting with Chesbrough's published monograph "Open Innovation: The new imperative for creating and profiting from technology" in 2003, Open Innovation became more and more popular among researchers as well as companies (West et al., 2014). Open Innovation is defined as a paradigm, which assumes that companies must open up to their environment and culture in terms of ideas, knowledge transfer and different market accesses in order to improve their own technologies (Chesbrough, 2003).

Lately published research results show that it seems like especially SMEs struggle with the implementation of OI and it does not really seem to be accessible to SMEs in particular (Brunswicker, 2014). However, OI is a relevant topic for SMEs because it offers many promising advantages. Being active in networks and cooperating with enterprises to combine and bundle different competencies and knowledge with the help of the OI paradigm is a promising opportunity to increase the efficiency and quantity of innovations and to enable new areas for business opportunities (Chesbrough et al. 2006; Nawroth et al., 2017).

To improve the innovation capability of companies, networking – both internally and externally – is one of the essential elements to make a significant positive contribution (Dhanaraj & Parkhe, 2006; Tsai, 2001).

External openness leads to new cross-industrial impulses (Gassmann et al., 2010) and involvement of innovation-relevant external competencies and knowledge. Besides external cooperation, also internal cooperation can lead to competitive advantage through cross-divisional cooperation and internal competence bundling (Freytag & Young, 2014).

In addition to the organizational and structural based view of opening up innovation processes, there is another very important component of the OI paradigm: the cultural based view of opening up is the foundation to spread Open Innovation across all employees within a company. This means that an open mind-set of employees and executives can dramatically improve the innovation capabilities of enterprises (Lindegaard, 2010).

As this cultural based view has an excessive impact on the innovation capability of a company, this study investigates the influence of the corporate culture on OI among SMEs from the German technical textile industry.

1.2 General challenges in the German technical textile industry

To collect the challenges of SMEs from the technical textile industry they are currently facing, a workshop in Chemnitz, Germany, with 35 participants from the technical textile industry was organized in March 2016.

From an economic point of view, the German technical textile industry is challenged by strong competition and strong competitive pressure especially from Asian low-wage companies. Resulting from this competition there is a high price pressure in the international market, which is particularly challenging for the German non-low-wage SMEs from this industry. Therefore, those companies focus their innovation efforts on high-quality and high-tech products. Hence, the traditional German textile SMEs aim to evolve from a producing to an innovating company.

With regard to this evolvement, technical textile SMEs feel uncomfortable and precarious due to the lack of knowledge about the future workplace and content in the textile environment. Moreover, these enterprises feel like they are lagging behind the technology trends. One of the most impacting global trends - the digitization - is often unknown and/or underestimated within the textile industry.

2. Open Innovation and corporate culture

In the beginning of the following section a common understanding of corporate culture and Open Innovation (from a cultural perspective) was developed. Following this, general success factors for integrating Open Innovation in SMEs were identified. Finally, the specific cultural challenges for the SMEs from the German technical textile industry were collected.

2.1 Definition of corporate culture

For this study, corporate culture was understood and defined, based on one of the first anthropological definitions of culture, as the “complex whole” of “human habits” within an organisation (Tyler, 1871). This simple interpretation of corporate culture makes it clear that, on the one hand, describable, supra-individual habits exist within an organisation; on the other hand, it allows the measurement of the organisational homogeneity (Rathje, 2010). This interpretation enables an access to corporate culture by looking at the habits of an organisation and is in line with the core of established, usually much more detailed corporate culture definitions of the last three decades. Moreover, it stands for the equal inclusion of manifest and cognitive elements (Rathje, 2010).

2.2 The understanding of Open Innovation for this study

To create a common base of understanding regarding Open Innovation, we chose a cultural-based approach of describing Open Innovation and discussed this description with SMEs from the technical textile industry (see Figure 1).

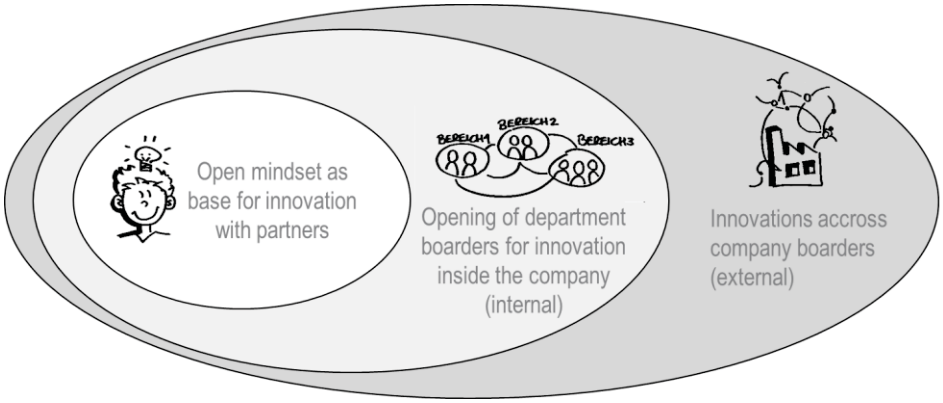

Figure 1: the three openness stages

This model, which was developed during the workshop in Chemnitz, displays the correlation between the three different culture-dependent stages of openness, we differentiated:

- **Stage 1:** individual based openness stage
  The model states that an open mind-set of the employees and especially the executives of an enterprise is the most relevant prerequisite for opening up processes and innovate with both internal and external partners. In particular, it is intended to prevent the old known "Not-Invented-Here-Syndrome" that can occur as one of the major obstacles of cooperation, both internally and externally (Katz & Allen, 1982).

- **Stage 2:** company based openness stage
  Based on the open mind-set of the employees, a corporate culture in which different departments or divisions from the same company cooperate and co-innovate is possible, if the organizational structures are also created for this purpose. This internal opening of processes and the exemplary function of senior officials is the first step towards a successful performance of OI activities between several divisions inside a company to establish inter-divisional and interdisciplinary cooperation.

- **Stage 3:** external openness stage
  Following this behaviour, the opening of innovation processes for and integration of external partners and knowledge, which allows innovations across company boundaries, characterize the third stage of openness.

In the commonly developed understanding of Open Innovation, all of these three culture-dependent stages need to be established in enterprises. Both, the stages concerning the personal attitude of the employees and executives as well as those stages concerning culture-organizational aspects.

2.3 General success factors for the implementation of OI

In the same workshop, we extracted following four fundamental success factors, which were seen as necessary for a success promising preparation for the future by the SMEs:

1. Culture for Open Innovation:
   OI requires a corporate culture that is characterized by a willingness to share knowledge and an inner attitude that learning orientation requires a strategically oriented ability to change.

2. Integration of target groups:
   In the introduction and implementation of OI, the selection of the actors involved and the way in which they are involved is decisive for success.

3. Structure for Open Innovation:
   Open both real and virtual structures are necessary for successful OI in order to effectively shape the flow of knowledge and ideas from outside to inside and from inside to outside.

4. Open Innovation Strategy:
   OI is not an instrument separate from other management systems, but is always closely linked to the strategic challenges of the organization.

Knowing these general success factors, we developed solutions for the successful use and implementation of these factors into the SMEs.

In the present paper, we focus on the first success factor, the corporate culture, This is required for the successful implementation of OI, since the participating companies in this workshop rated this factor as the most relevant one.

2.4 Specific cultural challenges in the technical textile industry

The SMEs that participated in the workshop in Chemnitz said that they are facing mental blockades within their companies when it comes to changes. This is the exact opposite of the most important cultural prerequisite, an open mind-set for new topics. Besides these mental blockades an attitude of "we have always done it this way" is dominating. Coming with this attitude is the denial of change processes. These processes are just not started. Furthermore, the SMEs are missing thinking out of the box. This is another big obstacle to being creative and innovative, e.g. by combining the own knowledge with knowledge from other industries.

The limitation of innovations to product-innovations is also named as a specific cultural challenge by the participating SMEs. The great potential of process-innovations and service-innovations is not used by focussing and limiting the resources on innovations of products.

In addition to these "internal" challenges, there is an external challenge that has to do with the demographic change in Germany: It is getting harder and harder for those SMEs to find qualified apprentices.

In addition to the workshop in Chemnitz, an online questionnaire, consisting of 130 questions, clustered into 18 different topics, was set up and in-depth interviews were derived. The online questionnaire was designed according to a Likert scale consisting of usually five answer options. In addition, some questions had only three answer options or free text answers were possible. Moreover, the questions were designed to lead the participant through the questionnaire only asking these questions that were relevant for him. For example only a participant that responded positively to the question whether Open Innovation methods are in use or not, was lead to questions that ask about Open Innovation methods in more detail. The questionnaire was sent to approx. 300 SMEs. From the returned answer-sets, 56 were complete and could be used for analytics.

The whole survey was performed between November 2016 and February 2017. That means, in total, 20% of the complete technical textile industry could be examined. In the second step, personal in-depth interviews with the participating SMEs, researchers and technical textile experts were conducted. These in-depth interviews were based on the results of the online survey.

The results of the surveys show that the corporate culture of the investigated SMEs from the technical textile industry in Germany is characterized by mistrust and suspiciousness against opening up any processes towards external partners. One of the reasons for this fear might be the experiences that were made after the reunion of former Eastern and Western Germany, when qualified employees from Western Germany took the leading positions in companies from Eastern Germany and skilled workers from Eastern Germany migrated to Western Germany (Bluhm & Jacobs, 2016).

Another sign for the protective behaviour and mind-set is the internal organisational structure of the SMEs: A top-down approach is the dominant way of innovating and deciding. That means, the executives of the SME decide about innovations and bring up new ideas. There are strict responsibilities of separated departments in the innovation process and the executives mostly make the final decisions. That means, in addition to the refusal to open processes to external partners, there is also no opening up of internal processes. Furthermore, a conservative and protectionist behaviour on the part of the managerial staff can be observed.

An interesting result of the survey is the fact that the surveyed SMEs do not consider cooperation with external partners to be very important. However, when it comes to cooperating with external partners, companies of a similar size are the preferred partners. Recent research results support this behaviour, as they

reveal that there is an imbalance in the flow of information when cooperating with large companies. Large companies absorb more external information than it flows from them to smaller partner companies (Chesbrough & Brunswicker, 2013; Nawroth et al., 2017).

Moreover, the investigation revealed that many of the SMEs struggle with the English language and the wording of OI. The results show that many of the SMEs use OI methods like participating in networks and similar methods but do not know that they are part of the OI paradigm because they do not know the English names of these methods. Although the SMEs are willing to cooperate with international partners, they also fear linguistic barriers when it comes to cooperating with such partners.

Nevertheless, as already described, one elementary prerequisite for the successful use of OI is the opening up of internal and external processes and integrating different external knowledge and experience into the innovation process. This opening of processes requires a certain corporate culture.

However, the prevailing corporate culture among SMEs from the German technical textile industry, which is characterized by clear hierarchies and strict responsibilities as well as mistrust and suspiciousness towards external partners, makes it difficult to spread the idea and advantages of Open Innovation across the industry.

All of these identified specific challenges as well as the experience of the SMEs, lead to the assessment that undergoing a cultural change is the greatest challenge.

3. Solution: The Open Innovation Readiness Check

This section describes the development and the evaluation of the OI Readiness Check, which is a self-assessment tool for SMEs to compare themselves with similar companies from the same industry.

3.1 Development of the OI Readiness Check

To help SMEs from the technical textile industry in Germany to overcome this clash between the prevailing corporate culture and an OI supporting corporate culture, the so-called Open Innovation Readiness Check, a semi-standardized questionnaire, for a self-assessment was developed. This readiness check helps SMEs to self-assess their current Open Innovation readiness level. Based on the result, we developed and gave individualized advice on how to get the company to their desired readiness level.

As input for the development of the OI Readiness Check, four different sources were used: the information collected in two previous OI projects, InnoKMU and IMProve, as well as the information gathered at the workshop in Chemnitz. These were supplemented by the scientific results concerning Open Innovation e.g. from Chesbrough, Brunswicker or Piller.

Based on the collected information from the four different sources, the cultural prerequisites for successful OI activities were identified. All together, we identified 20 different cultural prerequisites, e.g. an open and transparent handling of information or cross-division cooperation in multidisciplinary teams. From these 20 different prerequisites, seven detailed culture-related success factors were derived and integrated into the assessment:

1. We deal with information openly and transparently
2. We treat each other with respect and trust
3. The commitment and initiative of our employees are very high
4. We regard mistakes in innovation projects as an opportunity to learn (by systematically learning from them)
5. We are open-minded to new things and willing to change
6. We encourage our employees to network with others
7. The willingness of the management to embrace new ideas is very high

The SMEs could answer these statements with one of four answer options ranging from “yes” via “rather yes” and “rather no” to “no”. However, due to the semi-standard questionnaire, the companies do not only assess their degree of agreement but are also asked to explain the reason for their rating (if possible with an example) as well as the cause for their rating and a suggestion for improvement in a free text field to collect some further qualitative information.

The OI Readiness Check is structured into the four different general success factors that are necessary for Open Innovation and asks with a total of 23 indicators (= specific success factors) in more detail about the fulfilment of each success factor. The 23 indicators were derived from the four general success factors as well as from the identified prerequisites for each success factor. Since the presented study has its focus on the correlation between corporate culture and OI, the following section is about the results concerning the culture-related success factor and its seven specific success factors.

3.2 Evaluation of the OI Readiness Check

Since Germany's economy and especially the SMEs in Germany are very diverse, it is very hard to rate the readiness level and assess a level to an enterprise based on only quantitative data. Moreover, SMEs do not have the same capacities and resources as larger companies and enterprises. That means it is almost impossible to be "very good" in each of the identified indicators. Therefore, we have decided not to assign levels based purely on numbers. Instead, the result from the OI Readiness Check is similar to the result from a benchmark analysis and, due to the semi-standard questionnaire, allows a comparison of the own readiness level with the readiness level of other enterprises from the same industry.

The following figure (see Figure 2) displays, the aggregated answers of the approximately 40 participants of the workshop in Chemnitz (n=35). The results indicate that the systematic learning from mistakes is the rarest occurring indicator whereas the willingness of the management to embrace new ideas is applied the most often. These results already allow a first classification of the own SME (even from different industries) in comparison with the OI readiness level of the German technical textile industry.

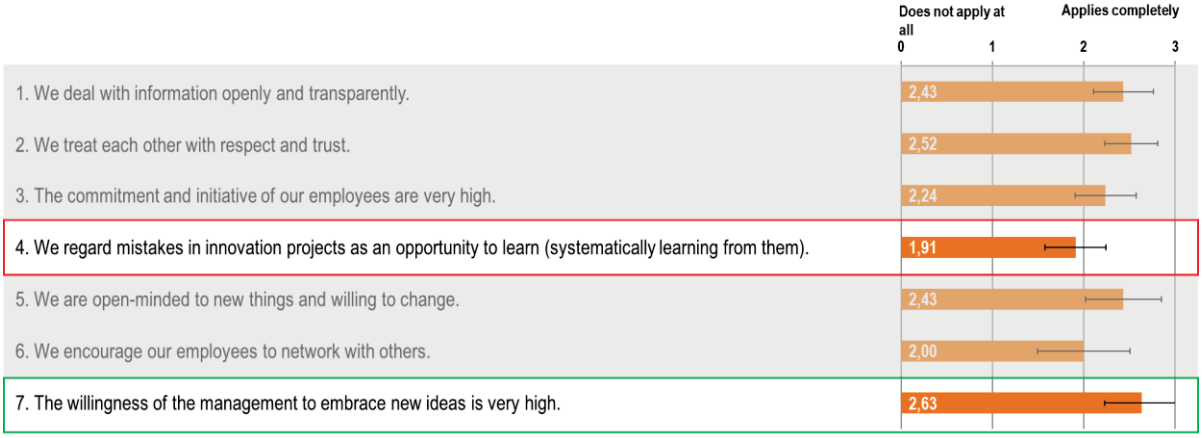

Figure 2: Answers to the corporate culture part of the OI Readiness Check

Subsequently, these indicators were tested on several companies to support an open innovation corporate culture. Therefore, eight different employees from different departments and across the entire hierarchy structure were interviewed to get an enterprise specific value for each indicator. Two extreme use cases are presented below, which show the results of the check on the one hand and the recommendations for action derived from them on the other. The use cases below were selected because they differ greatly in some respects, such as organizational structure and employee development, but can also be easily compared in some respects, such as a similar number of employees. Table 1 shows the most important criteria to get an impression of the companies.

Table 1: Most important criteria of the two use cases

	Use Case 1	Use Case 2
Employees	approx. 200	
Employees development	increasing	stagnating
Organisation	department orientated	process orientated
Enterprise culture	hierarchic culture	grassroots democratic culture
Open mindest	high	low
RnD-Intensity	high	low

Both medium-sized textile companies are comparable in number of employees and innovation activities (employees available for innovation activities (RnD), marketing and customer solutions). Both companies differ drastically in their organisational culture. While use case 1 has a classical hierarchy structure and the

employees are organized in task-related departments, the employees in use case 2 are organized along the company processes, in which a grassroots democratic corporate culture is lived. For example, in use case 2 job interviews are held publicly for all employees and the salary or assignment of work tasks along the company processes is determined together with everyone. In use case 1, on the other hand, the tasks are distributed and monitored by the managers. Outstanding employees may share their ideas with managers and then obtain permission to implement them. In the following, however, due to the comparable boundary conditions and the very different corporate structures and cultures, it is exciting to examine the results of the open innovation check in more detail.

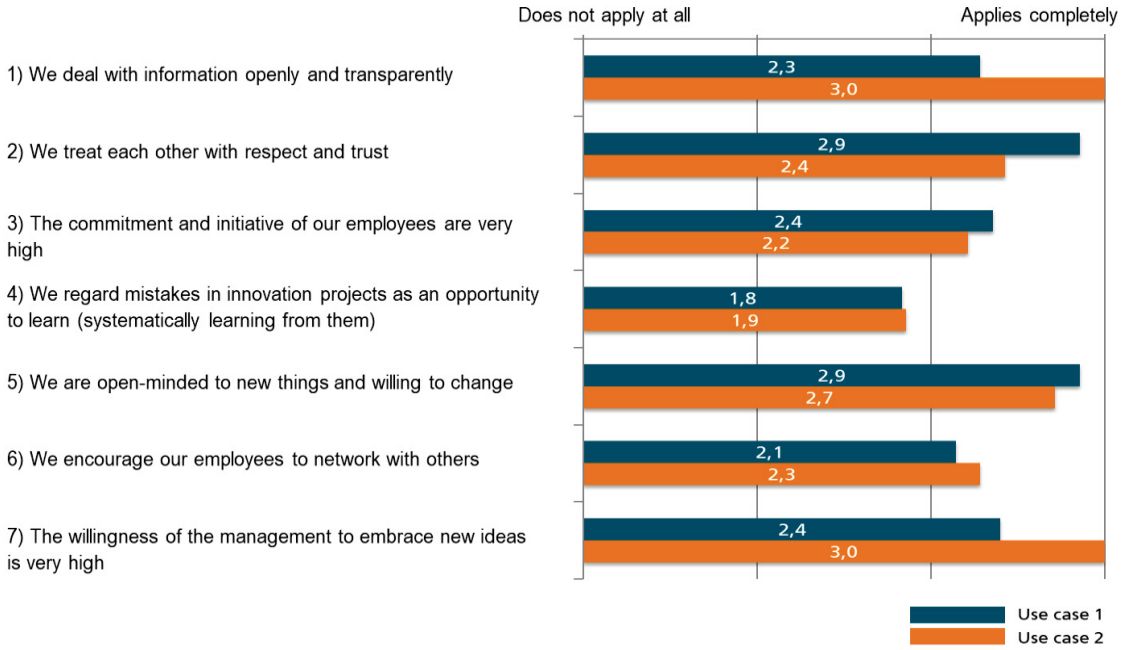

Figure 3: Comparison of the culture indicators for use case 1 and use case 2

There are three main differences shown in Figure 3:

1. While the basic democratic principles of use case 2 reflect the openness and transparent handling of information, the hierarchical structures and the organization in individual departments of use case 1 lead to less transparent exchange of information. In order to improve this indicator for use case 1, the company was given the recommendation to share information before the start of the project and to create shared data servers to which every project employee, regardless of departmental affiliation, has access. In addition, the employees themselves were required to provide training in order to improve cross-departmental cooperation and communication.
2. At the same time, the willingness of CEO to embrace new ideas is significantly higher in use case 2. The basic democratic orientation of use case 2 means that all employees are responsible for solving problems or generating innovation ideas. This means that the CEO is open to new requirements for implementing them. The recommendations for use case 1 were that the transparency of the CEO should be increased, e.g. by regular consultation hours and exchange of information even with the individual employees and not only managers. This contact between CEO and employees should serve above all as motivation to improve the cross-departmental innovation work.
3. It is even interesting to compare how employees treat each other based on respect and trust. Despite the grassroots-democratic orientation in use case 2, trust and respect between the employees are rated significantly worse here. The high individual responsibility of each employee and the lack of individual departments, which also develop a certain identification and affiliation in companies, similar to a sports team, apparently lead to a sometimes innovation-impeding behaviour between the employees. Use case 2 was recommended to increase the trust between the employees through team-building activities and to focus on the interaction between studied and unstudied employees, possibly through joint workshops or joint off-site meetings.

4. Future research directions

As mentioned in the previous section, the diversity among German SMEs is very high. Therefore, future research should focus on matching the most relevant indicators for the success factors with the specific characteristics of the examined SME.

In the case of this study, the general success factors were all rated with the same importance. In future research, it should be investigated if the performance and the accuracy of the self-assessment can be improved by weighting the individual general success factors. For the specific success factors of the Readiness Check as they are described in this paper the same should be investigated.

As our study shows, the biggest challenge for SMEs from the German technical textile industry, is the process of changing the corporate culture. Therefore, new ways, methods or instructions for the successful cultural transformation need to be researched and developed.

Another interesting research gap is the comparison of the corporate culture in SMEs from the technical textile industry with SMEs from different industries. Doing so, might offer the chances of learning from each other and might lead to a sustainable improvement of the economic system.

5. References

Bluhm, M. and Jacobs, O. (2016). Wer beherrscht den Osten? Ostdeutsche Eliten – ein Vierteljahrhundert nach der deutschen Wiedervereinigung, [online], University of Leipzig, https://www.mdr.de/heute-im-osten/wer-beherrscht-den-osten-studie-100-downloadFile.pdf [15.04.2018].

Brunswicker, S. and Van de Vrande, V. (2014). Exploring open innovation in small and medium-sized enterprises. New frontiers in open innovation, 135-156.

Chesbrough, H. (2003). Open Innovation: The new imperative for creating and profiting from technology, Harvard Business School Press, Boston.

Chesbrough, H. and Brunswicker, S. (2013). Managing Open Innovation in large firms, Berkeley, CA: Fraunhofer Verlag.

Chesbrough, H., Vanhaverbeke, W. and West, J. (2006). Open innovation: Researching a new paradigm. Oxford University Press on Demand.

Dhanaraj, C. and Parkhe, A. (2006). Orchestring innovation networks. Academy of management review, 31(3), 659-669.

Freytag, P. and Young, L. (2014): Introduction to Special Issue on innovations and networks: Innovation of, within, through and by networks. Industrial Marketing Management, 43(3), 361-364.

Gassmann, O., Zeschky, M., Wolff, T., Stahl, M. (2010). Crossing the industry-line: breakthrough
innovation through cross-industry alliances with 'non-suppliers'. Long Range

Katz, R. and Allen, T. J. (1982). Investigating the Not Invented Here (NIH) syndrome: A look at the performance, tenure, and communication patterns of 50 R & D Project Groups. R&D Management, 12(1), 7-20.

Lindegaard, S. (2010). The Open Innovation Revolution. Essentials, Roadblocks, and Leadership Skills, Hoboken, John Wiley & Sons.

Nawroth, G., Wingartz, N., Spitzley, A. and Warschat, J. (2017). Open Innovation in der technischen Textilbranche, Stuttgart: Fraunhofer Verlag.

Piller, F. T., and Reichwald, R. (2009). Wertschöpfungsprinzipien von Open Innovation. In Kommunikation als Erfolgsfaktor im Innovationsmanagement (pp. 105-120). Gabler.

Planning, 43(5), 639-654.

Rathje, S. (2010). Gestaltung von Organisationskultur. Ein Paradigmenwechsel. In: Barmeyer, Christoph I./Bolten, Jürgen (Hrsg.): Interkulturelle Personal- und Organisationsentwicklung: Methoden, Instrumente und Anwendungsfälle. Verlag Wissenschaft & Praxis, Sternenfels, 15-30.

Tsai, W. (2001). Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. Academy of management journal, 44(5), 996-1004.

Tyler, E. (1871). Primitive culture – Researches into the development of mythology, philosophy, religion, language, art and custom. London.

West, J., Salter, A., Vanhaverbeke, W. and Chesbrough, H. (2014). Open innovation in the next decade. Research Policy, 43(5), 805 – 811.

Creating Entrepreneurial Attitudes among Students of the Faculty of Entrepreneurship and Commodity Science in Gdynia Maritime University

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Abstract: The recommendations of the European Parliament and of the EU Council of 18 December 2006 on key competences for lifelong learning concern creativity, innovation and risk-taking, as well as the ability to plan projects and lead them to achieve their goals. These are the basic requirements of the competence of initiative and entrepreneurship, which is determined by three basic characteristics of an entrepreneurial person, i.e. knowledge, skills and personal characteristics. There is a difference between learning about entrepreneurship and learning an entrepreneurial attitude. Accepting entrepreneurial attitudes and behaviour by young people is more important than knowing how to run your own business. The goal of educating the students of the Faculty of Entrepreneurship and Commodity Science in Gdynia Maritime University is to shape their entrepreneurial attitudes. The aim of the paper was to assess the possibility of shaping entrepreneurial attitudes among students of the 1st and 5th year of studies at the Faculty of Entrepreneurship and Commodity Science in Gdynia Maritime University with the use of the original questionnaire. The issues contained in the questionnaire concerned the characteristics, skills and knowledge of the creative entrepreneur and how entrepreneurship can be assessed. Students also evaluated the study program in terms of creating entrepreneurship on the example of proposed lectures related to entrepreneurship given during studies. They also indicated the subjects and manner of conducting classes which, in their opinion, support their entrepreneurial attitudes. The answers obtained were compared with the entrepreneurial activities of the surveyed students. Conclusions on whether and how much, through the system of education and other activities, the studies could influence the entrepreneurial attitudes of the academic youth were formulated. The obtained results indicated the necessity of moving away from teaching in a traditional form for teaching into an active way, where the student should be at the centre of the teaching process.

Keywords: entrepreneurship, creating attitudes, entrepreneurial attitudes, entrepreneurial education, academic entrepreneurship

1. Introduction

Joseph Schumpeter's economic thought is indissolubly linked to the study of entrepreneurship. He was probably the first scholar to develop its theories. Since the research and work of Schumpeter (1934), multiple definitions of entrepreneurship were developed and presented. Disregarding all the minor differences, there can be a unified core part identified in most of them. It states that entrepreneurship is a set of actions that combine various resources in order to produce new goods or services. It always includes the risks as the outcomes of the process are uncertain. It needs to be organized, to create the whole process leading to expected results. And lastly it should be innovative in a certain way, that it is not just replicating the existing solutions (Bąk 2016).

Functioning and development of modern organizations are, in the current new economy, directly related to entrepreneurship and innovation. Business environment is the combination of internal and external factors influenced a company's operating situation. It can include factors such as: clients, suppliers, owners, its competition, improvements in technology, laws and government activities, market, social and economic trends. Entrepreneurship development is an important requirement for achieving the goal of smart, sustainable and inclusive growth set out in the Europe 2020 strategy. It is also a means to respond to new economic challenges, to create jobs and to fight social and financial exclusion. The impact of the global financial and economic crisis calls for giving entrepreneurship and self-employment a stronger role in economic and social development policies. This is particularly relevant for youth who face higher unemployment rates than the adult population and face increased difficulties entering the labour market to start their careers (Arzeni 2015). Scepticism exists in academic circles around the idea of 'teaching' entrepreneurship, rather than practicing it hands-on. Practical assignments are mainly utilized in order to teach entrepreneurship, rather than traditional classroom teaching (ASHE Higher Education Report, 2009).

According to Baaken at all. (2015), Polish university managers and academics do not seem to perceive important reasons for undertaking cooperation with business.

1.1 Entrepreneurship education at school level

The primary goal of entrepreneurship education at the school level is to provide young students with an opportunity to learn about entrepreneurship as a labour market activity and develop a positive attitude towards entrepreneurship, which would be expected to increase the desirability and feasibility of entrepreneurship as a career option. Older students should also be given an opportunity to learn some basic technical skills related to business management (e.g. risk management, planning), as well as other important skills such as how to work in a team. It is also important that students have an opportunity to acquire some experience putting these skills into use through project work, business simulations or actual start-up projects.

Currently, entrepreneurship education is not offered systemically in schools in Poland. It is not a compulsory subject and as a result, schools do not receive funding for this activity. International comparisons indicate that the availability and quality of entrepreneurship teaching in primary and secondary schools in Poland are among the lowest in the EU. Despite this, there is a small and growing number of activities to promote entrepreneurship education in schools, including meetings with entrepreneurs, business games, limited entrepreneurship teaching, entrepreneurship workshops and festivals (Arzeni 2015).

1.2 Entrepreneurship as the element of modern oriented university

Entrepreneurship is included in the National Framework of Qualifications for higher education. This requires most students in higher education to receive a minimum level of exposure to entrepreneurship during their studies but entrepreneurship has not yet achieved the same status as other traditional academic disciplines such as science. While there are a number of examples of higher education institutions that actively promote and support entrepreneurship to their students, most public universities only offer a very limited amount of entrepreneurship teaching that covers only the basic elements of business management. Furthermore, entrepreneurship teaching does not generally utilise current research on entrepreneurship and there is often no link between research and teaching. This is largely due to a lack of researchers in the field of entrepreneurship which contributes to the lack of recognition of entrepreneurship as an academic discipline that is on par with the sciences. Those professors and staff who do provide entrepreneurship teaching generally do not receive any training (Arzeni 2015).

Traditional roles of universities: education and scientific research, are still applicable and no one wants to change them. However, the conditions in which the roles are performed are changing. The entrepreneurial university should be interested in building its good position in the academia as well as on the educational and scientific market. At the same time, the university – apart from striving for achievement of the social mission – should build its economic strength by using the resources held and external considerations. An important characteristic of the entrepreneurial university is the proper system of its relations with the socioeconomic environment. The university's environment includes: individuals, groups of people, other universities, social institutions, administrative institutions, and market entities having various relations with the institution of higher education. An important part of the university's environment is its beneficiaries, that is individuals and entities interested in diverse benefits brought to them by good operation of the university. It is necessary to identify individual entities within this environment, to form the desired relations between the institution of higher education and such entities, to maintain and develop the relations – all for the purpose of creating the position of the university as an active and important member of various environments, and as a market entity (Olearnik and Pluta-Olearnik 2015).

Polish institutions of higher education are changing but the scale of the changes towards the entrepreneurial university model is insufficient. The changes need to be intensified in two directions. One is the reform of the centrally codified law, which is an extremely strong determinant in Poland, and at times also a restriction to the activities pursued by institutions of higher education. The other direction is transformations in the consciousness and attitudes of the university's employees and management staff, liberation from the patterns formed over many years, bold exit from the "ivory tower" towards a modern entrepreneurial university that is open to the external environment (Olearnik and Pluta-Olearnik 2015).

It is assumed that an entrepreneurial institution of higher education is one which demonstrates each of the four presented attributes in its determined goals and rules of action as well as in the practice of its operation

and development. The degree (intensity) of a given entrepreneurship attribute may be different, it may change, which provides bases for assessments and conclusions with respect to entrepreneurship of a given university and its distance to the models adopted as standards. The first attribute is the economic orientation, or in the strict sense – the economic and financial orientation. The second entrepreneurship attribute of institutions of higher education is the market orientation. The third attribute is the innovative orientation, as there is no entrepreneurship without innovativeness. The fourth entrepreneurship attribute is the managerial orientation (Olearnik 2013).

The recommendations of the European Parliament and of the EU Council of 18 December 2006 (RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL) on key competences for lifelong learning concern creativity, innovation and risk-taking, as well as the ability to plan projects and lead them to achieve their goals. The Recommendation contributes to the development of quality, future-oriented education and training tailored to the needs of European society, puts forward the key competences for further learning and working life of young people and supports key competences throughout their lives. The Recommendation emphasizes on infrastructure for continuing education and training of adults including teachers and trainers, validation and evaluation procedures. These are basic requirements of the competence of initiative and entrepreneurship. Three basic characteristics determine entrepreneurial person, i.e. knowledge, skills and personal characteristics. There is a difference between learning about entrepreneurship and learning an entrepreneurial attitude.

1.3 Entrepreneurship as an important feature of an entrepreneur

The Oxford English Dictionary (2010) defines entrepreneur as "a person who attempts to profit by risk and initiative". A great number of different studies about the entrepreneur as an individual have been conducted. (Arzeni, 2015, Bąk, 2016, Belás and Ključnikov, 2016, Garlińska-Bielawska, 2015, Kurczewska, 2011, Olearnik, 2013, Olearnik and Pluta-Olearnik, 2015, Omerzel and Kušce, 2013). Also university students are very interested in entrepreneurship. However, the scholarly understanding of the field of entrepreneurship is still limited. Studies have shown that entrepreneurs are not a homogeneous unity and there are different types of entrepreneurs (Westhead et al. 2011). Entrepreneurship has an important role in the creation and growth of businesses and in the growth and success of countries (Hisrich et al. 2013).

Study conducted by (Ahmad 2010) shows that personality characteristics are one of the most general psychological theories used to explain and predict the behaviour of humans, including in entrepreneurship.

According to Westhead et al. (2011) the possession of certain personality characteristics exposes an individual toward entrepreneurial behaviour. According to Beugelsdijk and Noorderhaven (2005), entrepreneurs differ from the general population and from paid employees in a lot of characteristics. They are more individually oriented; they have a greater individual responsibility and effort. Westhead claim that many detailed academic studies have emphasized the characteristics of need for achievement, locus of control, risk-taking propensity, need for autonomy, decisiveness, initiative, creativity, self-confidence and trust. (Westhead et al. 2011). Omerzel and Kušce (2013) indicated that the inclination to take risks, self-efficacy and the need for independence are the most important factors affecting personal performance of the businessman. Belás (2016) found that entrepreneurs consider expertise (54.25%), responsibility (52,94%) and perseverance (51.10%) to be the most important personal characteristics and skills. Propensity to risk (46.36%) and decisiveness (39.18%) are ranked right after them. The same group of three most important attributes is presented by all defined groups of entrepreneurs, except for the case of the youngest entrepreneurs, who reported propensity to risk as the second most important factor. Emotional stability and internal self-control which help to trust in their decisions (Caliendo et al. 2014).

2. Aim and Method of the Research

The aim of the paper was to assess the possibility of shaping entrepreneurial attitudes among students of the 1st and 5th year of studies at the Faculty of Entrepreneurship and Commodity Science in Gdynia Maritime University and quantify the most important attributes of entrepreneurs in this group to compare the opinions of the students in relation to their level of education. For the purpose of this work, personality characteristics and motives of future individual entrepreneurs were investigated. The specially designed for this research author's questionnaire was used.

2.1 Topic Questions

The questionnaire consisted of ten questions. Used questions were alternatives and closed with one or multiple choices and open ended as well. The survey concerned program of studies realized, most useful subjects, modules of classes and methods of entrepreneurship teaching. Statements concerning entrepreneurship and features needed to be a good entrepreneur were also investigated.

2.2 Characteristic of the respondents

Determination of respondents' opinion on education of entrepreneurship was made by a survey conducted in 2017 in Gdynia Maritime Academy. The respondents were chosen in a targeted manner, attention was paid to the year of study - as variability factor influencing his behaviour/opinions. Two hundreds of students from Faculty of Entrepreneurship and Commodity Science, Gdynia Maritime University were investigated. One hundred of respondents came from the first year and one hundred from the fifth.

Table 1: Gender of the respondents [%]

Gender	Year of studies	
	I	*V*
Women	72	65
Men	28	35

Genders of the respondents are shown in table 1. Over 60% of students were female. What is very important, women are a minority among entrepreneurs, both in Poland (34%) and in the entire EU (31%). Women are more burdened with family obligations, which is a significant factor affecting the position of women entrepreneurs in comparison with men. On a positive note, it must be observed that in Poland, the both the share of women among the employers and self-employed (women entrepreneurs) (34%) as well as the rate of women entrepreneurship (14%) are higher that the EU average (31% and 10% respectively) (Garlińska-Bielawska 2015).

3. Results

Students were asked if they feel entrepreneurial people. The same amount 60% of investigated students from the first and fifth year of study are considered to be entrepreneurial people. Willingness to run their own business but after graduation declares 54% of younger students. Their older colleagues are less willing to this type of business activity, only 33% indicated this answer. This may be due to the fact that most of them are already working. Many of investigated students now have no plans related to this 28% of younger and 52% of older students. Every second person declaring willingness to conduct their own business provides that it will be related to the course of studies carried out. According to Kautonen, Down, and Minniti (2014) people are interested to have their own business especially until the age of 40. Submitted for respondents' evaluation statements concerning entrepreneurship are presented in Table 2.

Table 2: Statements concerning entrepreneurship in respondents' opinion [%]

Statement	I disagree		I neither agree nor disagree		I agree	
	Year of studies					
	I	*V*	*I*	*V*	*I*	*V*
Entrepreneurship can be learned	26	10	22	20	52	70
The entrepreneur must be ambitious and determined	8	4	4	2	88	94
Entrepreneurship is an individual feature	10	4	37	24	53	72
The entrepreneur must be creative and show initiative	7	0	0	2	93	98
The entrepreneur easily establishes contacts and is able to work in a team	11	4	10	12	79	84
The entrepreneur must have leadership qualities	2	6	6	6	92	88
The entrepreneur must be an open person	7	2	7	8	86	90
The entrepreneur must be honest	10	10	18	16	72	71
Anyone can run a company	70	62	16	10	14	28

In the opinion of the surveyed students, entrepreneurship can be learned, although first year students more often than their older colleagues think that this is not possible. Similar results were obtained for statement Entrepreneurship is an individual feature. This statement is chosen by more than 20% of the 5th year students than their younger colleagues. The culminations of such opinions are the indications of about 65% of all surveyed students who do not agree that "Anyone can run a company". In entrepreneurship it is possible to learn the process of taking advantage of opportunities and creating new value from individual actions, this is

an important factor affecting processes and results in development of both single businesses and whole groups, and thus, contributing to economic development. It is particularly significant for developing countries as well as those transforming their economies, e.g. Poland, where its boom has lasted since 1989 (Garlińska-Bielawska 2015). Many researchers state that decision to take on the business risk is symptomatic of a certain type of people (Kozubíková at all. 2015, Frese & Gielnik 2014, Hvide & Panos, 2014).

Most of the surveyed students think that the entrepreneur must be an ambitious, determined, creative and show initiative, he must also have leadership qualities and be an open person. Slightly fewer respondents thought that the entrepreneurs should be able to work in a team. About 70% of all students believed that the entrepreneur must be honest. Respondents from 15 submitted features (tab. 3) had to point 5 particularly important for a creative entrepreneur. Among them they pointed on characteristics like: organized, ready to risk, can plan and anticipate, self-confident and creative. Differences between students were shown on Figure 1.

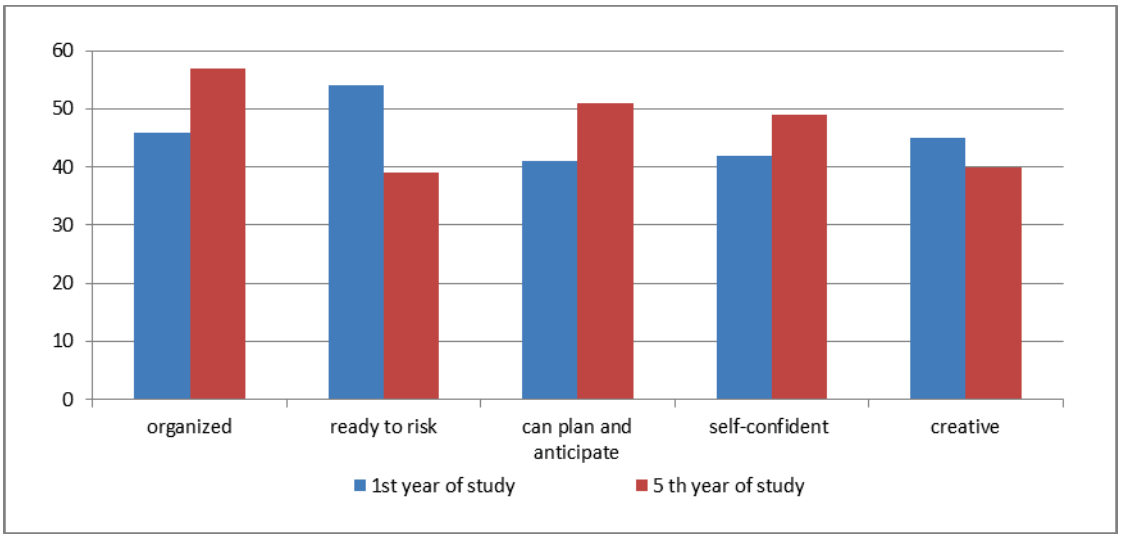

Figure 1: The most important features for creative entrepreneur in respondents opinion [%]

Table 3: Most important characteristics of the entrepreneur in the opinion of the respondents [indications]

Important characteristic of the entrepreneur	Year of studies		Total
	I	*V*	
organized	*46*	*57*	*103*
ready to risk	*54*	*39*	*93*
can plan and anticipate	*41*	*51*	*92*
self-confident	*42*	*49*	*91*
creative	*45*	*40*	*85*
learning all his life	41	32	73
rugged and patient	38	34	72
well-timed management	23	44	67
can work in a team	24	39	63
honest	37	18	55
sociable	27	26	53
enthusiastic	32	20	52
have respect for money	29	12	41
determined	8	25	33
can select the information	13	14	27

Ready to risk, self-confident are two of the five most important characteristics of the entrepreneur in the opinion of the respondents. That is confirmed by earlier indications regarding openness as a significant characteristic of the entrepreneur. The respondents admittedly also pointed out that determination is such a feature, but according to research, it is not one of the most frequently indicated attributes, in contrast to creativity. Two further important characteristics of an entrepreneur is good organization and planning and anticipation skills. The ability to select information is, in the opinion of the respondents, the least important characteristic of an entrepreneur. According to Deáková et al. (2010) the most important personal features for an entrepreneur are: courage, self-reliance, responsibility, determination, perseverance, proactive approach, creativity and scholarship in a particular area, where this entrepreneur intends to do business. Majková and

Ključnikov (2017) divided the features of an entrepreneur into three groups as follows: (1) ability to accept and face the risk, (2) creativity and new ideas, (3) ability to solve a complex task.

The completed study program in terms of usefulness in current/future work in the opinion of the 65% first-year surveyed students is overloaded with theory, but for 18% of them it prepares well to conduct its own activities and for 13% respondents prepares to work in various enterprises. Their older colleagues (45%) also think that the program is overloaded with theory, includes not enough content related to the own enterprise management (59%). For 25% of investigated students study program does not educate interpersonal skills and they (19%) suggested changing the form of classes.

The most useful for conducting activities forms/modules of classes in the opinion of the younger respondents are professional practice (69%) and exercises (38%), laboratories (33%), the least useful are lectures. For last-year students the most useful forms of classes are professional practice - 67% indications and exercises (41%), the least useful also are lectures. Table 4 presents the useful and useless study subjects in opinion of surveyed students.

Table 4: Useful and useless study subjects in opinion of surveyed students [%]

OBJECT / GROUP OF ITEMS	I disagree		I neither agree nor disagree		I agree	
	Year of studies					
	I	*V*	*I*	*V*	*I*	*V*
Basic subjects (mathematics, physics, chemistry, foreign languages)	53	67	21	8	26	25
Major subjects (biochemistry, microbiology, storage, etc.)	71	50	6	17	23	33
Economic subjects - humanities and social (economics, marketing, management, psychology, sociology, etc.)	59	81	20	12	21	7
Specialization subjects (commodities, quality management, consumer behaviour, dietetics, etc.)	87	93	3	0	10	7
Subjects shaping skills in the laboratory	55	44	11	19	34	37

In the opinion of more than half of the students, basic subjects, i.e. mathematics, physics, chemistry, foreign languages, are useful in their own business management, but over 20% of students consider them unnecessary. This may be due to the fact that they are taught in the first year and students nowadays are dealing with them and they are causing them difficulties. Younger respondents, for the same reason, may more often consider that major subjects like biochemistry, microbiology, storage, etc. will be useful. Less than half of the respondents consider shaping skills in the laboratory to be unhelpful. They consider specialization subjects (commodities, quality management, consumer behaviour, dietetics, etc.) to be the most useful in running their own business. Economic subjects: humanities and social (economics, marketing, management, psychology, sociology, etc.) are important for 60% of younger and for 80% older students. The respondents were asked to indicate the subjects that most effect on the creation of entrepreneurial attitudes among students. The most influential subjects in the opinion of the respondents are: finances - in each group over 20% of respondents reported this subject.

Other subjects mentioned by students are economics, entrepreneurship, management and commodity science. At the same time, the economy was twice more often indicated by younger and the entrepreneurship by older students. First-year students also indicated foreign languages -16 indications, and older students HR - 12 indications and quality management - 13 indications. The subject consumer behaviour on the market was indicated by 10 young and 6 older respondents.

Changes that should be introduced in the study plan to encourage students to run their own business in students' opinion are: meetings with entrepreneurs, practical classes, lectures conducted by entrepreneurs, specialization subjects should be earlier in study plan.

According to Case Study of Entrepreneurship Education at Cracow University of Economics (Wach2008) studies curricula should include more practical education, especially based on the cooperation with local entrepreneurs, within which students should prepare real world consulting projects for cooperating enterprises. Such workshops should be offered as optional courses for students of all economic and managerial majors. Academic education in the field of entrepreneurship should also implement training enterprises (similar to the idea of Junior Enterprise Concept JADE). Students should run their own training

companies to gain real experience in entrepreneurship. It should be supported by the idea of university incubators.

There are three actors involved in effective entrepreneurship education: an educator (an academic teacher), a student, and an institutional framework (university or other higher education institution). In a contemporary paradigm, the role of a teacher is to design the most effective learning opportunities for students; while the role of a student is to get involved in the process of learning and profit from that process. Institutional framework should enable a fruitful execution of both roles, that is create the most favourable conditions for entrepreneurship courses development and make the students' learning and educators' teaching possible. The active approach from all three actors is expected. However, the challenging issue remains the problem of types of teaching interventions to be implemented in order to make learning of entrepreneurship most efficient, or in other words – *how to be effective?* (Kurczewska 2011). Ho et al.(2014) found that entrepreneurship education encouraged entrepreneurial behavior in students,and more profoundly, that experiential learning had a significantly higher impact on entrepreneurial engagement than classroom-based programs.Tutaj wycinek behavior (Ho, Low & Wong, 2014,

4. Conclusions

This paper intended to answer the question whether the program of studies in AMG influenced od entrepreneurial attitudes among students. The study showed that there is a growing need for increased contextual knowledge on the aspects of learning, forms, content and methods in the future teaching and training of students.

Human resources should be considered as good educated, motivated and highly skilled workers, should be the essence of innovation processes in enterprises. Good and active cooperation of researchers and academics with entrepreneurs could be very useful and necessary for the quality of entrepreneurial teaching.

Study confirmed, that given by Entrepreneurship Education (2014) Entrepreneurial competences require active methods of engaging students to release their creativity and innovation. Entrepreneurial skills can be taught across all subjects as well as a separate subject (Entrepreneurship Education 2014). Many of top-rated universities in Europe and the UK do not offer Entrepreneurship, but if they do it is usually across faculties, available to all as an elective option. However, at many European and UK universities, various minor and major modules in Entrepreneurship are presented at undergraduate level (i.e., at Erasmus University and Tilburg University) (Nieuwenhuizen et. al. 2016).

Arend et al. (2015) found that effectuation theory satisfies the basic criteria for theory building, but the criteria theorizing about entrepreneurship were not met (Arend at all. 2015). USA university students are free to select their own electives that accompany their majors and are, therefore, not limited by fixed modules within their chosen programs. It is less onerous to introduce alternative modules within such universities. Entrepreneurship-focused programs are offered through centres for professional development or executive education. These are focused on stand-alone, workshop-based programs to train entrepreneurs in creating new ventures and growing these ventures. The targeted audience for such workshops are international and local entrepreneurs, as well as educators and academics (Nieuwenhuizen at all. 2016). Parsley & Weerasinghe determined that 40% of sampled institutions in Canada did not have a strategy for delivering Entrepreneurship as part of their curriculum, while 28% did have a strategy in place. It was determined that Entrepreneurship courses were primarily offered in conjunction with business and engineering courses. It is, however, noteworthy that 98% of surveyed institutions offer a module in Entrepreneurship, while 23% offer full degrees specializing in Entrepreneurship. This could indicate that, while the vast majority of institutions offer an Entrepreneurship module, there exists minimal effort in teaching entrepreneurship comprehensively (Parsley & Weerasinghe, 2010).

According to students' opinions entrepreneurship can be learned but in proper way, using active methods of teaching. Students pointed on meetings with people running their own business, successful. They also suggested changing the form of classes by minimalizing lectures and maximizing workshops. The year of the study influenced on the opinion about most important subjects creating entrepreneurial attitudes.

Use active and innovative teaching methods that will bring closer the reality of the business. Involve the business community in entrepreneurship teaching as lecturers and mentors and in entrepreneurship projects for students.

Regular surveys on the outcomes of entrepreneurship education should be conducted. According to the results of these surveys the program of the studies and way of teaching should be actualized to achieve better teaching results. Teachers must continually improve their education.

References

Ahmad, H. (2010) Personality Traits among Entrepreneurial and Professional CEOs in SMEs, International Journal of Business and Management, Vol. 5, No. 9, pp 203-213.

Arend, R.J., Sarooghi, H. and Burkemper, A. (2015). Effectuation as Ineffectual? Applying the 3E Theory Assessment Framework to a Proposed New Theory of Entrepreneurship, Academy of Management Review, Vol. 40, No 4, pp 630-651.

Arzeni S. (2015) Youth Entrepreneurship Support In Poland. Rapid Policy Assessments of Inclusive Entrepreneurship Policies and Programmes, Centre for Entrepreneurship, SMEs, Tourism and Local Development OECD Working Paper.

ASHE (2009) ASHE Higher Education Report, Entrepreneurial Domains, 34 (5), pp 63-73.

Baaken T., Rossano S., Von Hagen F., Davey T., Meerman A. 2015. University-Business Cooperation And Entrepreneurship At Universities – An Empirical Based Comparison Of Poland And Germany, Optimum. Studia Ekonomiczne, Vol. 5 No. 77, pp 3-26. DOI: 10.15290/ose.2015.05.77.01.

Bąk K. (2016) Academic Entrepreneurship – Conceptual Framework and Example from Poland, Forum Scientiae Oeconomia Vol. 4, No. 3, pp 105-114.

Belás J., Ključnikov A. (2016) The Most Important Attributes of Entrepreneurs. Case Study of the Environment of Czech SMEs, International Journal of Entrepreneurial Knowledge, Vol. 4, No. 1, pp 104 -111, DOI: 10.1515/ijek-2016-0008.

Beugelsdijk, S., Noorderhaven, N. (2005) Personality characteristics of self-employed; An empirical study, Small Business Economics, Vol. 24, No. 2, pp 159-167. DOI 10.1007/s11187-003-3806-3

Caliendo, M., Fossen, F., Kritikos, A. S. (2014) Personality characteristics and the decisions to become and stayself-employed, Small Business Economics Vol. 42, pp 787-814.

Deáková, K., Drážovská, K., Grznárik, D., Kondášová, I. (2010). Entrepreneurship.Bratislava: SOPK.

Entrepreneurship Education: A Guide for Educators (2014) European Commission Brussels Entrepreneurship 2020 Unit, Directorate-General for Enterprise and Industry, European Commission, Brussels, Document date: 10/11/2014 - Created by ENTR.D.1 - Publication date: 11/11/2014, http://ec.europa.eu/DocsRoom/documents/7465 (downloaded 22 February 2018) doi:10.2769/51003

Frese, M., Gielnik, M. M. (2014). The Psychology of Entrepreneurship. Annual Review of Organizational Psychology and Organizational Behavior, Vol. 1, pp. 413 - 438.

Garlińska-Bielawska J. (2015) Women's entrepreneurship in Poland and the EU: on selected actions to promote women's entrepreneurship, Trends in the World Economy, Szczecin University Press Vol. 7, pp 21-37

Hisrich R., Peters M., Shepherd D. (2013) Entrepreneurship, 9thed. New York: McGraw-Hill.

Ho, Y., Low, P. and Wong, P. (2014) Do University Entrepreneurship Programmes Influence Students'Entrepreneurial Behaviour? An Empirical Analysis of University Students in Singapore, Innovative Pathways forUniversity Entrepreneurship in the 21st Century Advances in the Study of Entrepreneurship, Innovation andEconomic Growth, Vol. 24, pp 65-87.

Hvide, H.K., Panos, G. A. (2014). Risk tolerance and entrepreneurship. Journal of Financial Economics, Vol. 111, pp 200 – 223.

Kautonen, T., Down, S., Minniti, M. (2014) Ageing and entrepreneurial preferences, Small Business Economics, Vol. 42, pp 579-594.

Kozubíková, L., Belás, J., Bilan, Y., Bartoš, P. (2015) Personal characteristics of entrepreneurs in the context of perception and management of business risk in the SME segment, Economics and Sociology, Vol. 8, No 1, pp. 41-54 DOI: 10.14254/2071- 789X.2015/8-1/4.

Kurczewska A. (2011) Entrepreneurship as an Element of Academic Education – International Experiences and Lessons for Poland, International Journal of Management and Economics Vol. 30, pp 217-233.

Majková Sobeková M., Ključnikov A. (2017) The Specific Character Traits Of Young Entrepreneurs In Slovakia, International Journal of Entrepreneurial Knowledge, Vol. 5, pp 41-48. DOI: 10.1515/ijek-2017-0004.

Nieuwenhuizen C., Groenewald D., Davids J., van Rensburg L.J., Schachtebeck C. (2016). Best practice in entrepreneurship education. Problems and Perspectives in Management, Vol. 14 pp 528-536. doi:10.21511/ppm.14(3-2).2016.09.

Olearnik J. (2013) Przedsiębiorczość jako element nowoczesnej orientacji szkoły wyższej, Zeszyty Naukowe, No 751, Seria Problemy Zarządzania, Finansów i Marketingu nr 29, Uniwersytet Szczeciński. (in Polish).

Olearnik J., Pluta-Olearnik M. (2015) Entrepreneurial University – From Ideas To Reality Optimum. Studia Ekonomiczne Vol. 77, No. 5, pp 110-120. DOI:10.15290/ose.2015.05.77.07

Omerzel, G. D., Kušce, I. (2013) The influence of personal and environmental factors on entrepreneurs' performance. Kybernetes Vol. 42, No. 6, pp 906-927. http://dx.doi.org/10.1108/K-08-2012-0024.

Parsley, C. and Weerasinghe, M. (2010). The Teaching and Practice of Entrepreneurship Within Canadian Higher Education Institutions. Industry Canada. http://www.ic.gc.ca/eic/site/061.nsf/vwapj/entrepreneurship-entreprenariat_dec2010_eng.pdf/$file/entrepreneurship-entreprenariat_dec2010_eng.pdf (Accessed on 25 June 2018).

RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (2006) of 18 December 2006 on key competences for lifelong learning (2006/962/EC). 30.12.2006.

Schumpeter, J.A. (1934), The theory of economic development, Cambridge: Harvard University Press.

The Oxford English Dictionary (2010) Oxford University Press, Oxford.

Wach, K. (2008). Entrepreneurship Education in Poland. ERENET Profile, III(3), 36-44. www.erenet.org (Accessed on 26 June 2018).

Westhead, P., McElwee G., Wright M. (2011) Entrepreneurship: Perspectives and Cases. Essex: Pearson Education Ltd.

A Typology of University Business Incubators: Implications for Research and Practice

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Abstract: The use of incubators and accelerators as institutions to facilitate the development of new business ventures has exploded worldwide in recent years. In particular, there is significant growth in the numbers of university-based business incubators (UBIs), which are incubators housed at and closely integrated with the knowledge development and dissemination activities of universities. In addition to the common incubator objectives of company creation and economic wealth generation, these incubators therefore also have objectives related to student experiential education and the commercialization of university IP. This divergence of stakeholder objectives creates unique challenges for UBIs, which have been addressed through a wide range of structures, processes and management models. This paper is an attempt to bring greater clarity to this situation by proposing a typology of UBIs, based on broad review of the UBI literature and data from incubator management practitioners. The typology examines UBIs from the perspectives of Stakeholders, Objectives, Strategic Focus, Incubation Processes, Resources and Services provided, and the resulting Socioeconomic Effects. Use of a clarifying typology by future researchers should help guide future UBI research by suggesting potential linkages between the context of different universities and the appropriate UBI types. This should lead to more valuable insights than current "one size fits all" isomorphic approaches to UBI management.

Keywords: UBI, incubation, accelerator, stakeholders, incubator performance, typology

1. Introduction

Currently, there are over 10,000 business incubators worldwide and approximately 4000 of these are associated with universities (Bhatli 2016). Business incubators are organizations that support the establishment and growth of new businesses by providing tangible resources (e.g., space, shared equipment and administrative services) and intangible resources (e.g., knowledge, network access) during a flexible period and sustain their operations through self-funding and/or external sponsorship by governments or corporations (Hausberg and Korreck 2018). This definition subsumes 'accelerators' which are defined as organizations that aim to accelerate successful venture creation by providing specific incubation services, focused on education and mentoring during an intensive program of limited duration (Pauwels et al., 2016)

Business incubaors have become a popular vehicle used by different levels of government, the private sector, and universities to reduce risk of business failure and to encourage and support entrepreneurial outcomes, including: innovation, wealth creation, employment, and entrepreneurial skill development (Roig-Tierno et al. 2015; Pauwels et al. 2016; Kolympiris and Klein 2017). The widespread use of business incubators as a public policy instrument has produced a variety of different typologies (see reviews by Barbero et al. 2012; Bakkali et al. 2014; Barbero et al. 2014).

Yet across these typologies, universities are treated as a homogeneous category. This is surprising given that university-based business incubators (UBIs) vary widely in form and function reflecting the diversity in their historical resource and capability endowments (Todorovic and Suntornpithug 2008), institutional logics (Redondo and Camarero 2017), and their unique regional and organizational characteristics, constraints, and stakeholder groups (McAdam et al. 2016).

Our paper addresses this deficit in the literature by (1) developing a parsimonious typology that identifies the sources of systematic variation in UBIs, and (2) drawing implications for incubator management and academic research.

2. Literature Review

2.1 The entrepreneurial university

> *Despite industrial and academic systems at varying stages of development, governments in all parts of the world are focusing on the potential of the university as a resource to enhance innovation environments and create a regime of science-based economic development (Etzkowitz et al. 2000: 314)*

Much of the growth of university business incubators has occurred since the early 1990s as the concept of the entrepreneurial university became a global phenomenon (Kalar and Antoncic 2015) and universities accepted economic development as a third mission, alongside research and teaching (Etzkowitz et al. 2000).

The realities of reduced government spending on higher education and increases in student enrolment, coupled with the need to demonstrate more direct contributions to economic development, pushed universities to extend their mission beyond creating and disseminating new knowledge to commercializing knowledge. Thus, universities began pursuing third stream activities like contract research, technology transfer through patenting and licensing, the creation of science parks and incubators (as mechanisms to generate revenue while facilitating knowledge sharing and diffusion), or taking equity stakes in university spin-offs, spin-outs, and start-ups (Fuller and Pickernell 2018). Interactions across the 'triple helix' of university-industry-government institutional boundaries became a foundation for explaining pathways to innovation and economic development (Etzkowitz 2008).

Against this backdrop, it is not surprising that UBI research has focused on activities associated with the commercialization of science and technology (Mian et al. 2016), rather than exploring the broader role UBIs play in advancing entrepreneurship and innovation. This technology centric perspective is consistent with the view that UBIs support academic entrepreneurship by licensing and commercializing intellectual property developed within the university (Barbero et al. 2012). Shah and Pahnke (2014) assert that this conception of academic entrepreneurship is too narrow: Universities generate start-ups across all departments - including music, social sciences, and the humanities – not just in those associated with science, technology, and engineering. Moreover, a university's entrepreneurial activities may include actors who innovate in the context of universities, regardless of whether they are employed as current faculty, staff and students.

To capture the full range of activities associated with university entrepreneurship, Shah and Pahnke (2014) propose conceptualizing university entrepreneurship along two dimensions: sources of innovative knowledge (academic research or other source) and sources of entrepreneurial knowledge (university provided entrepreneurial education or other source). The resulting 2x2 matrix distinguishes between four different types of new ventures. The implication is that universities create societal and economic benefits by laying the foundation for entrepreneurial activities regardless of where or when that activity occurs.

It is important to recognize that universities are embedded in a broader entrepreneurial ecosystem involving multiple contexts, actors, stakeholders, and processes that influence the nature and quality of entrepreneurial activities (Autio et al. 2014; Wright et al. 2017). Entrepreneurship education is increasingly viewed as a core function of the university and because experiential learning has been associated with improved employment outcomes (Wright et al. 2017), universities are moving to provide an experiential component in their approach to entrepreneurship education. Embedding opportunities for all students to launch start-ups expands the scope of universities third-stream activities and provides impetus to define UBI activities more broadly than as a vehicle for technology commercialization.

The specific approaches universities take to the formation and operation of UBIs depends upon their prevailing institutional logic.

2.2 Institutional logics

Institutional logic refers to the socially constructed, historical set of material practices, assumptions, values, and beliefs that shape individual cognition and action (Thornton et al. 2012). Multiple logics are embodied in most organizations. In some cases, one logic can dominate and in other cases the logics blend to provide a single set of practices, assumptions, values and rules (Besharov and Smith 2014). The diversity of stakeholders influencing a university's mission and objectives (e.g., faculty, students, government policymakers, private

sector sponsors) suggests the potential for multiple institutional logics to evolve and co-exist within a university. Thus, even when entrepreneurial universities share a common strategic goal and certain comparable economic and social conditions, they still differ from each other on account of their traditions, characteristics, and policies (Guerrero and Urban 2012; Kalar and Antoncic 2015).

Entrepreneurial universities must balance their roles as knowledge creators, disseminators, and exploiters. Their unique institutional logic(s) guides choices about how resources are allocated toward: basic or applied research; STEM disciplines (science, technology, engineering mathematics) versus social sciences, humanities, and liberal arts; building faculty competence in research versus teaching; educating students with broad capacities for scepticism and learning versus developing marketable job-related skills and offering experiential learning opportunities; use of various mechanisms to facilitate and capture value from activities related to innovation and entrepreneurship (e.g., establishing technology transfer/licensing offices, building science parks, creating incubators/accelerators to support new venture creation and/or taking equity positions in spin-offs and start-ups associated with academic entrepreneurship), etc.

2.3 Prior literature on Business Incubation

There is a growing body of academic literature on business incubation (see comprehensive reviews by Theodorakopoulos et al. 2014; Albort-Morant and Ribeiro-Soriano 2016; Mian et al. 2016; Hausberg and Korreck 2018). Barbero et al. (2012) identify seven different business incubator typologies. Six of these typologies include UBIs as a category in their classification scheme. Following from our previous discussion about institutional logics, and the diversity they can encompass, we assert that researchers interested in the study of business incubation need to recognize that universities are not homogeneous. Thus, there is a need for a more nuanced approach to examining and explaining how these differences are reflected in UBI form, function, and performance.

We take a first step in this direction by offering a typology of UBIs.

3. Method

We conducted our search for literature on university business incubators and incubation using the largest scholarly abstract and citation databases - Scopus and the ABI/Inform collection of ProQuest. We restricted the search to peer-reviewed journal articles, as they are considered to be validated knowledge. We searched for journal articles containing both “Incub*”, and “Business” in their abstracts, without any date restrictions. This search initially yielded 927 papers; 442 of them from Scopus and 485 from ABI/Inform. In the first step, we excluded papers that were not published in scholarly peer-reviewed journals, were in languages other than English, or were on unrelated topics. From this stage remained 63 articles from Scopus and 89 articles from ABI/Inform. Then we read the abstracts and titles and retained 26 articles from Scopus and 13 papers from ABI/Inform. The criteria for retention were papers that were conceptual or empirical studies focusing on UBIs or review papers related to the functions, typologies and performance of UBIs. After reading these papers and carefully reviewing the references they cited, five more papers (not found in the original searches) were added to the set. The resulting set of 44 articles reflect the current state of scholarly knowledge about university-based incubators and became the foundation for development of our typology.

4. Analysis

4.1 Stakeholders

Stakeholders matter to UBI operations; they set objectives, provide resources and legitimacy. Institutional support matters (Dahms and Kingkaew 2016). Different UBIs can have very different institutional contexts.

They also have a lifecycle within this context: Starting up operations, getting embedded with the institutions, ongoing operations. UBI lifecycle stage affects level of autonomy and ability to access resources.

Different classes and levels of stakeholders have different interests. University is the overall administrative institution, but stakeholders also include the various different faculties (especially STEM vs non-STEM), the faculty members (innovator-entrepreneurs, advisors), UBI management staff, and students (launching new ventures, working as employees for new ventures or for the incubator itself). The new venture is an entity itself, with founders and employees. Investors are providers of funding or corporate partners (seeking

innovation). Governments at the national, regional, or municipal levels may also exert influence on the UBI. Society can be general, the local community, and the specific entrepreneurial ecosystem members.
Different types of stakeholders have different institutional logics, such as the public/private distinction made by Hausberg (2018) or the academic/industry distinction by Theodorakopoulos (2014). Even those of the same class but of different levels may have different logics. These could be market logic (pursue competitive advantage to make profits), education logic (discover knowledge, disseminate to students), social development logic (poverty reduction, employment), or political logic (negotiate competing community demands). For example, government may have the objective to empower a marginal community (women, immigrants) (Dahlstrand and Politis 2013).

If a UBI is supported by a range of different stakeholder classes (or different levels of the same class) there can be competing institutional logics. Investors want to make financial returns, while faculty members want to teach students, and university administrators want to enhance institutional reputation. A biomedical UBI operated in partnership between a university, a research hospital, and a venture capital fund will have many such competing institutional logics. Somehow in the governance and management of the UBI, these differences must be resolved to a single dominant logic that guides strategy and defines reporting structures.

4.2 Objectives

Generally, objectives and performance measures of incubators have been poorly defined and reported (Dee et al. 2011). Performance definition is implicit in the dominant logic, and so it should reflect that choice (Hausberg and Korreck 2018). The details may be different between one-time (during start-up) and operational (operations) (Wann et al. 2017). Some identified success factors (Gozali et al. 2015), but we don't really know which are best (Lumpkin and Ireland 1988; Dee et al. 2011). Further, objectives can focus on output efficacy (measures of quantity of desired outputs created), on output efficiency (measures of the inputs required to create the desired output), or as simple inputs (activity/effort measures of utilization or consumption of inputs, regardless of their effect on creation of outputs).

4.3 Strategic focus

The UBI's strategy reflects its objectives and the chosen dominant logic. Within a single set of objectives and logic, different strategic choices are possible for different UBIs, including: sectoral focus (especially STEM vs non-STEM), lifecycle stage (ideation, launch, growth, maturity), and desired impact over time (short-term vs long-term) and across space (specific geographic, or community focus). These strategic choices drive the adoption of specific performance measures, which may be a mix of stock (amount) and stream (rate of change), hard (quantitative) and soft (qualitative) measures (Voisey et al. 2006).

These strategic choices are operationalized through the design of a business model, including the choice of revenue streams (rent, fees, royalties/equity, or sponsor grants) and the choice of cost structure. Even within a single strategy, multiple business models are possible for different UBIs (Dee et al. 2011). For example, the market-logic imperative to make money can be interpreted as a strategy to increase prices, decrease costs, or increase volumes. Research has not provided a theoretical basis for selecting/designing strategies or business models. So, there is still a lot of practitioner uncertainty about which business models work best for UBIs. This is hard to know because we don't know which stakeholders are best, which institutional logics are best, and which measures are best (Dee et al. 2011).

The choice of strategic focus also necessitates control structure, such as the governance of the UBI, or the degree of proactive intervention the UBI management makes in incubated new ventures (laissez-faire, monitored, picking winners, survival of the fittest (Dee et al. 2011; Hausberg and Korreck 2018)) (Lewis et al. 2011).

4.4 Incubation process

The incubation process will exhibit a particular structure of intake, value-adding interventions, and graduation (Wann et al. 2017; Hausberg and Korreck 2018). Intake may be open or closed to entrepreneurs outside of the university community, may be continuous or in cohorts, and may use selection criteria that may emphasize the market potential, the founder management team, or the quality of the business idea. And graduation may be based on elapsed time or on achievement of new venture milestones (valuation points).

Through this process, the UBI may provide various value-adding interventions (see Resources and Services below). In many UBIs, this value-creation process may follow a pre-determined causal development logic. But in others it may follow an ad hoc effectuation logic. And, in both cases, UBIs may differ on the degree to which they customize this process – matching it both to the specific demands of the type of new ventures (e.g., industry dynamism), and to the changing needs of new ventures as they progress through the start-up lifecycle (Dee et al. 2011).

4.5 Resources and services

A key capability decision for a UBI to make is how to translate the chosen strategic focus into the suite of resources and services provided. In this choice, they may decide to provide what is "typical" of similar UBI institutions of the same generation (Theodorakopoulos et al. 2014), or what is specifically wanted/needed by the new ventures. There is an unfortunate dearth of research to rigorously establish what actually works.

Many therefore opt for the typical offerings (Hausberg and Korreck 2018): infrastructure (space, tools, business services) (Dahms and Kingkaew 2016), training (mentoring and coaching, formal education, peer learning), networking (inbound connection to customer opportunities, resource providers or partner capabilities, or outbound connection for marketing or PR), and capital (funding provided by the incubator or external investors).

Recent research suggests the important role played by less-objective resources and services, such as culture, legitimacy, and social capital (Redondo and Camarero 2018). Culture provides new ventures with community support, identity, and the negotiation of boundaries with stakeholders and other institutional or market participants (Theodorakopoulos et al. 2014).

4.6 Socioeconomic effects

Effects of UBI operations on stakeholders can be quite varied, and a mix of positive and negative.

For the university, these include entrepreneurial skills development, fostering entrepreneurship on campus (Stal et al. 2016), encouraging innovation (Wonglimpiyarat 2014; Wonglimpiyarat 2016; Kolympiris and Klein 2017), and enhancing reputation among university stakeholders. Commercialization of university IP leads to regional economic development, employment, and increased tax base (Jamil et al. 2015; Lasrado et al. 2016).

The successful operation of incubated new ventures involves the creation of valuable new products and services in the marketplace. For founders of new ventures (students or faculty members) the support of the UBI means increased human and social capital, higher sales and higher growth rates, and longer survival, (Hausberg and Korreck 2018). Most of these are immediately beneficial to the new venture. And some are of benefit to all future ventures involving the same individuals (i.e., acting as serial entrepreneurs) (Westhead et al. 2005).

In addition, the effects of a UBI on third parties should also be considered. A UBI is an employment and income multiplier (Markley and McNamara 1995; Sherman and Chappell 1998). And a targeted UBI can act as a powerful tool for social development among disadvantaged groups. Furthermore, the entrepreneurship supported by the UBI may act as an inspiration to others or make the locale of the UBI a more-desirable home for immigrants and creative-class residents. It may also initiate relationships that lead to other, unrelated transactions or benefits. For example, the UBI activities of DMZ at Ryerson University initially attracted the attention of Google, which led to increased Google interest in the Toronto area for a variety of other non-incubation business operations.

5. Discussion

The existing literature has relatively little to say about the varieties of UBI that may exist. Clarysse et al. (2005) provided one of the first attempts to bring structure to the types of UBI, classifying by what is done, what is used, and how. Todorovic and Suntornpithug (2008) implied a typology that focussed on the unique role of the university as supporter and beneficiary of the UBI activities, and drawing an interesting distinction between static and dynamic factors. Barbero et al. (2014) recently drew together various incubator archetypes in the literature and related these to innovation (as a key UBI output). Table 1 summarizes the key typological features of these previous attempts.

Table 1: Summary of extant typologies

Study	Typological Features
Clarysse et al. (2005)	Activities (opportunity search, IP protection, strategy, business planning, funding, spin-out). Resources employed (organization, human resources, technology, physical resources, finance, network). Reference models (strategies, outcomes).
Todorovic & Suntornpithug (2008)	University involvement. Nurturing. Community networking. Teaching (static, dynamic). Commercial networking. Emphasis: differing capability/resources, proprietary, capital, production, entrepreneurial culture.
Barbero et al. (2014)	Archetypes: basic research (conducting fundamental research), university (promotion of academic entrepreneurship), economic development (creation of profit and jobs), private (corporate R&D).
Wonglimpyarat (2016)	Source of budget (university, government). Policies (intake, graduation, IP management, resources). Area of focus (STEM sector). Operational functions (services, governance, partnerships).

5.1 Proposed Typology

By drawing upon the features of these previous typological attempts and incorporating the attributes of UBIs that are fundamental to the literature reviewed above, but overlooked in the previous typologies, we are able to propose a more comprehensive and unified typology of UBIs. This new typology is presented in Table 2. It features six major dimensions of UBI classification, as well as 17 sub-dimensions that prescribe the scope of each dimension. We also provided illustration of the possible values each sub-dimension may take. For example, the Stakeholder dimension comprises which classes of stakeholder have an interest in the particular UBI, the range of institutional logics that these stakeholders will strive to implement, and the resulting dominant logic that emerges and therefore guides the Objectives and Strategic Focus of that UBI.

Table 2: Proposed typology

Dimension	Sub-dimension	Values
Stakeholders	Classes	University, faculty, new venture, founders, investors, governments, community
	Logics	Market, education, social development, political
	Dominant logic	Resolution of stakeholder competition
Objectives	Performance definition	Market, education, social development, political
	Outputs	Efficacy, efficiency, effort (utilization of inputs)
Strategic Focus	Target scope	Sector, stage, time horizon, geography, social or political group
	Measures	Hard/soft, stock (amount) vs stream (rate)
	Business model	Revenue streams, cost structure
	Control	Governance, intervention
Incubation Process	Structure	Intake, cohorts, proactivity, graduation
	Value creation	Development, customization
Resources and Services	Infrastructure	Space, tools, business services
	Training	Mentoring, education, peer consultation
	Networking	Inbound (customer, supplier, investor, capability), outbound (marketing, PR)
	Capital	Own funds, partner funds, referral
	Culture	Legitimacy, community
Socioeconomic Effects	Classes	University, faculty, new venture, founders, investors, governments, community

We pilot tested the application of this typology by encoding three UBIs at our home institution, Ryerson University. In particular, we confirmed that the typology is comprehensive enough to capture the differences between the *Digital Media Zone* (one of the world's top-ranked UBIs, focused on STEM commercialization through company creation, with strong partnerships with investment funds and local governments, and with multiple revenue streams), the *Design Fabrication Zone* (focused on student experiential learning through one-off project installations, with strong faculty member involvement, but with a more limited range of support services, and supported in-kind by the university), and the *Social Innovation Zone* (focused on community development through creation of social ventures, with strong student leadership, and supported largely by grants).

5.2 Implications

Our proposed typology allows researchers to capture variation across UBIs while comparing their features systematically along a common set of dimensions. It reveals the heterogeneity of UBIs as reflected in their key stakeholders, dominant institutional logic, objectives, strategic focus, incubation process, resources and services, and their socioeconomic effects. Several compelling insights emerge from this classification scheme.

First, not all stakeholders want the same things from a UBI. Stakeholders can create competing institutional logics that need to be reconciled in establishing the objectives and strategic focus of the UBI. While it is possible to have multiple institutional logics, it also is important to ensure that they are reconciled so that the UBI can move forward with a clear set of values and beliefs that can guide resource allocation decisions. Failure to resolve tensions between competing institutional logics risks leaving the UBI manager to steer a rudderless ship.

Second, UBIs may not be focused solely on commercialization for economic gains. While the initial concept of UBIs focused on their role in commercializing intellectual property originating in academic labs, it is clear that they also serve other functions. Most notably, as a mechanism for bringing together sources of innovation and sources of entrepreneurial knowledge developed both inside the university and externally, through the support of new ventures that have direct as well and indirect university affiliations.

Third, UBIs can support start-ups that do not have a focus on science, technology or engineering. The concept of the entrepreneurial university embraces and supports innovations across all university departments, including social sciences, humanities, and liberal arts.

Fourth, UBIs are not concerned only with new venture creation. In an effort to provide students with experiential learning in entrepreneurship, UBIs may also admit students/teams in the early stages of opportunity creation and validation, before a viable market opportunity has been demonstrated.

Fifth, there is no 'one size fits all' approach to performance measurement for UBIs. The measures used to assess UBI performance (at the venture-level and at the incubator-level) should be consistent with the UBIs institutional logic, objectives and strategic focus.

We acknowledge that the dimensions and values in our typology may be Canadian/North American-centric. Thus, the typology may not be collectively exhaustive in capturing the sources of variation in UBIs across all international contexts. We offer the typology as a 'straw man' and invite researchers in other geographic locations to further explore and articulate the dimensions, subdimensions, and values needed to fully reflect the diversity in the form and function of UBIs on a global scale.

References

Albort-Morant, G. and Ribeiro-Soriano, D. (2016), "A bibliometric analysis of international impact of business incubators", Journal of Business Research, Vol. 69 No. 5, pp. 1775-1779.

Autio, E., Kenney, M., Mustar, P., Siegel, D. and Wright, M. (2014), "Entrepreneurial innovation: The importance of context", Research Policy, Vol. 43 No. 7, pp. 1097-1108.

Bakkali, C., Messegham, K. and Sammut, S. (2014), "Toward a typology of incubators based on HRM", Journal of Innovation and Entrepreneurship, Vol. 3 No. 3, pp. 1 - 10.

Barbero, J.L., Casillas, J.C., Ramos, A. and Guitar, S. (2012), "Revisiting incubation performance: How incubator typology affects results", Technological Forecasting and Social Change, Vol. 79 No. 5, pp. 888.

Barbero, J.L., Casillas, J.C., Wright, M. and Garcia, A.R. (2014), "Do different types of incubators produce different types of innovations?", Journal of Technology Transfer, Vol. 39 No. 2, pp. 151-168.

Besharov, M. and Smith, W. (2014), "Multiple institutional logics in organizations: Explaining their varied nature and implications", Academy of Management Review, Vol. 39 No. 3, pp. 364-381.
Bhatli, D. (2016). Top University Business Incubators 2015-2016. UBI Global Benchmark Report. Stockholm, UBI Global.
Clarysse, B., Wright, M., Lockett, A., Van de Velde, E. and Vohora, A. (2005), "Spinning out new ventures: a typology of incubation strategies from European research institutions", Journal of Business Venturing, Vol. 20 No. 2, pp. 183-216.
Dahlstrand, A.L. and Politis, D. (2013), "Women business ventures in Swedish university incubators", International Journal of Gender and Entrepreneurship, Vol. 5 No. 1, pp. 78-96.
Dahms, S. and Kingkaew, S. (2016), "University Business Incubators: An Institutional Demand Side Perspective on Value Adding Features", Entrepreneurial Business and Economic Review, Vol. 4 No. 3, pp. 41-56.
Dee, N.J., Livesey, F., Gill, D. and Minshall, T. (2011). Incubation for growth: A review of the impact of business incubation on new ventures with high growth potential. London.
Etzkowitz, H. (2008), The Triple Helix: University-industry- government innovation in action, Routledge, New York and London.
Etzkowitz, H., Webster, A., Gebhardt, C. and Terra, B.R.C. (2000), "The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm", Research Policy, Vol. 29 No. 2, pp. 313-330.
Fuller, D. and Pickernell, D. (2018), "Identifying groups of entrepreneurial activities at universities", International Journal of Entrepreneurial Behavior & Research, Vol. 24 No. 1, pp. 171 - 190.
Gozali, L., Masrom, M., Haron, H.N. and Zagloel, M.T. (2015), "A Framework of Successful E-Business Incubator for Indonesian Public Universities", The Asian Journal of Technology Management, Vol. 8 No. 2, pp. 118-131.
Guerrero, M. and Urban, D. (2012), "The development of an entrepreneurial university", Journal of Technology Transfer, Vol. 37 No., pp. 43-74.
Hausberg, J.P. and Korreck, S. (2018), "Business incubators and accelerators: a co-citation analysis-based, systematic literature review", The Journal of Technology Transfer, Vol. No., pp. 1-26.
Jamil, F., Ismail, K. and Mahmood, N. (2015), "A Review of Commercialization Tools: University Incubators and Technology Parks", International Journal of Economics and Financial Issues, Vol. 5 No., pp. 223-228.
Kalar, B. and Antoncic, B. (2015), "The entrepreneurial university, academic activities and technology and knowledge transfer in four European countries", Technovation, Vol. 36-37 No. 36/37, pp. 1-11.
Kolympiris, C. and Klein, P.G. (2017), "The Effects of Academic Incubators on University Innovation: Academic Incubators and University Innovation", Strategic Entrepreneurship Journal, Vol. 11 No. 2, pp. 145-170.
Lasrado, V., Sivo, S., Ford, C., O'Neal, T. and Garibay, I. (2016), "Do graduated university incubator firms benefit from their relationship with university incubators?", The Journal of Technology Transfer, Vol. 41 No. 2, pp. 205-219.
Lewis, D., Harper-Anderson, E. and Molnar, L. (2011). Incubating success: Incubation best pratices that lead to successful new ventures. Administration, U. S. D. o. C. a. E. D. Ann Arbor Michigan, University of Michigan.
Lumpkin, J.R. and Ireland, R.D. (1988), "Screening practices of new business incubators: the evaluation of critical success factors", American Journal of Small Business, Vol. 12 No. 4, pp. 59-81.
Markley, D.M. and McNamara, K.T. (1995), "Economic and fiscal impacts of a business incubator", Economic Development Quarterly, Vol. 9 No. 3, pp. 273-278.
McAdam, M., McAdam, R. and Miller, K. (2016), "Situated regional university incubation: A multi-level stakeholder perspective", Technovation, Vol. 50-51 No., pp. 69-78.
Mian, S., Lamine, W. and Fayolle, A. (2016), "Technology Business Incubation: An overview of the state of knowledge", Technovation, Vol. 50-51 No., pp. 1-12.
Pauwels, C., Clarysse, B., Wright, M. and Van Hove, J. (2016), "Understanding a new generation incubation model: The accelerator", Technovation, Vol. 50-51 No., pp. 13-24.
Redondo, M. and Camarero, C. (2017), "Dominant logics and the manager's role in university business incubators", Journal of Business & Industrial Marketing, Vol. 32 No. 2, pp. 282.
Redondo, M.a. and Camarero, C. (2018), "Social Capital in University Business Incubators: dimensions, antecedents and outcomes", International Entrepreneurship and Management Journal, Vol. No.
Roig-Tierno, N., Alcázar, J. and Ribeiro-Navarrete, S. (2015), "Use of infrastructures to support innovative entrepreneurship and business growth", Journal of Business Research, Vol. 68 No. 11, pp. 2290-2294.
Shah, S.K. and Pahnke, E.C. (2014), "Parting the ivory curtain: understanding how universities support a diverse set of startups", The Journal of Technology Transfer, Vol. 39 No. 5, pp. 780-792.
Sherman, H. and Chappell, D.S. (1998), "Methodological Challenges in Evaluating Business Incubator Outcomes", Economic Development Quarterly, Vol. 12 No. 4, pp. 313-321.
Stal, E., Andreassi, T. and Fujino, A. (2016), "The role of university incubators in stimulating academic entrepreneurship", Revista de Administração e Inovação, Vol. 13 No. 2, pp. 27.
Theodorakopoulos, N., K. Kakabadse, N. and McGowan, C. (2014), "What matters in business incubation? A literature review and a suggestion for situated theorising", Journal of Small Business and Enterprise Development, Vol. 21 No. 4, pp. 602-622.
Thornton, P., Ocasio, W. and Lounsbury, M. (2012), The institutional logics perspective: A new approach to culture, Oxford University Press, Cambridge.
Todorovic, Z.W. and Suntornpithug, N. (2008), "The Multi-Dimensional Nature of University Incubators: Capability/Resource Emphasis Phases", Journal of Enterprising Culture, Vol. 16 No. 4, pp. 385-410.

Voisey, P., Gornall, L., Jones, P. and Thomas, B. (2006), "The measurement of success in a business incubation project", Journal of Small Business and Enterprise Development, Vol. 13 No. 3, pp. 454-468.

Wann, J.-W., Lu, T.-J., Lozada, I. and Cangahuala, G. (2017), "University-based incubators' performance evaluation: a benchmarking approach", Benchmarking: An International Journal, Vol. 24 No. 1, pp. 34-49.

Westhead, P., Ucbasaran, D. and Wright, M. (2005), "Decisions, actions, and performance: Do novice, serial, and portfolio entrepreneurs differ?", Journal of Small Business Management, Vol. 43 No. 4, pp. 393-417.

Wonglimpiyarat, J. (2014), "Incubator policy to support entrepreneurial development, technology transfer and commercialization", World Journal of Entrepreneurship, Management and Sustainable Development, Vol. 10 No. 4, pp. 334-351.

Wonglimpiyarat, J. (2016), "The innovation incubator, university business incubator and technology transfer strategy: The case of Thailand", Technology in Society, Vol. 46 No., pp. 18-27.

Wright, M., Siegel, D. and Mustar, P. (2017), "An emerging ecosystem for student start-ups", Journal of Technology Transfer, Vol. 42 No., pp. 909-944.

Determinant Factors and the Impact of ICT on Organizational Creativity Support

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Abstract: The issue of organizational creativity is an important aspect of contemporary management that offers a better understanding of organizational innovation, effectiveness, efficiency, and ultimately organizational survival. Several arguments can be found in the pertinent literature that Information and Communication Technology (ICT) provides organizations with faster and easier access to information, improving creativity in business processes, and better communication between employees and all stakeholders. While the subject of creative problem solving, creative processes, and support for individual or group creativity has been broadly discussed in the literature, studies of organizational creativity support are still fragmentary and scattered. Little guidance has been given to mangers how to develop ICT-based organizational creativity support. The main objective of this paper is to provide organizations a theoretical, conceptual, and applied grounded discussion of ICT-based organizational creativity support. This study identifies the main determinants and factors of the ICT-based support to organizational creativity. The so-formulated objective involves performing a critical analysis of the literature on the subject of the relation between organizational creativity and ICT, as well as conducting an empirical research on factors, determinants and barriers in the field of the ICT-based organizational creativity support. The empirical survey was conducted in the form of in-depth interviews with 24 experts.

Keywords: organizations, creativity, organizational creativity support, ICT, determinant factors, experts

1. Introduction

Organizational creativity is considered one of the most actively developing research areas. It is asserted that it is a main vehicle of organizational development, the basis for staying on the market and innovative success (Amabile, 1988; Elsbach and Hargadon, 2006; McLean, 2009; Mitchell et al., 2003; Shin and Zhou, 2007).

Organizations face the need to constantly generate new and useful ideas that concern products, services, processes, managerial practices as well as competitive strategies. They are required to have a strategic organization's capability, meaning adapting to changing environmental conditions through continuous acquisition of new information resources and the creation of new configurations from them (Sirmon, et al., 2011; Arora and Nandkumar, 2012; Zahra, Sapienza and Davidsson, 2006; Klijn and Tomic, 2010).

Several arguments can be found in the pertinent literature that Information and Communication Technology (ICT) enables organizations faster and easier access to information, improving creativity in business processes, and better communication between employees and all stakeholders (Cooper, 2000; Olszak, Bartuś and Lorek, 2018). ICT enables an organization to search and absorb new knowledge that is needed in organizational creativity and solving business problems. On the other hand, the practice shows that success from ICT-based organizational creativity support is still questionable. Organizations do not achieve the appropriate benefits from ICT usage. Many organizations are not able to make ICT an effective tool for creativity support. The reasons for this failure are not clear and still not well investigated. So, the need for a more systematic and deliberate study of ICT to organizational creativity is crucial.

The main goal of this paper is to identify the main determinants and factors of the ICT-based support to organizational creativity. The so-formulated objective involves performing a critical analysis of the literature on the subject of the relation between organizational creativity and ICT, as well as conducting an empirical research on development determinants and barriers in the field of the ICT-based support to organizational creativity. The empirical survey in the form of in-depth interviews with 24 experts, was conducted at the turn of November and December 2015. The experts represented science (12 respondents), business (7 respondents) and ICT (5 respondents).

In order to achieve the research goal, the logic of the discourse is as follows. At the start, a critical review of the relevant literature is conducted to identify an essence of organizational creativity. Next, a link between organizational creativity and ICT is investigated as well as the role of ICT in supporting organizational creativity

is described. Then, the assumption of a qualitative survey in the form of in-depth interviews with experts is presented. Finally, determinants and barriers to the ICT-based organizational creativity support in the light of conducted study are discussed. In conclusion, theoretical contributions and practical implications of the study are presented.

2. The essence of organizational creativity

The term "creativity" is rooted in psychology. It concerns mainly individual and group creativity (Amabile, 1983). However, today creativity is increasingly used in different organisational contexts – business strategies, business processes, strategic management, competitive advantage, organisational development, leadership and innovation. According to many researchers (Gong, Huang and Farh, 2009; Klijn and Tomic, 2010; Choi, Madjar and Yun, 2010; Zhou and Ren, 2012), organizational creativity is the organisation's capability to generate ideas that can contribute to development of new products, services, business practices, as well as competitive strategies. Woodman et al. (1993) define organizational creativity as new ideas that drive the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system. These "new ideas" are a response to the demand from the organization, e.g. its various departments or customers (Parjanen, 2012). Amabile (1988), on the other hand, stresses that creativity is an important source of organizational innovation, as well as competitive advantage. Creativity means a collaborative, intellectual, psychological and social process that takes place in an organization and is affected by contextual and organizational factors (Blomber, 2014). According to Brennan and Dooley (2005), creativity within an organizational context can be regarded as the sum of the following functions: the creative person, creative task and the organizational context (culture). A similar approach is presented by Amabile et al. (2004) and by Sundgren and Styhre (2007), who emphasize that organizational creativity is more than merely a collection (sum) of creative individuals. The mere presence of creative individuals in an organization does not guarantee organizational creativity. Development of organizational creativity is largely determined by the organizational environment. The authors referred to above claim, that a crucial role in supporting organizational creativity is played by managers and leaders. Evidence is given to prove, that managerial styles based on agility, perceptiveness and rapid decision making are conducive to organizational creativity.

Stenmark (2005) argues that the most important factors enhancing organizational creativity include: motivation, autonomy, work setting, organizational climate and various additional elements, such as time to experiment, for example.

An interesting view on the problem of organizational creativity is demonstrated within the strategic resource-based approach and dynamic capabilities of organisations, where the success of organization's strategy is determined by the configuration of its resources and skills, as well as the by capability to continually acquire new resources and create new configurations of these (Zahra, Sapienza and Davidsson, 2006). Acquiring, reconfiguring and developing an organization's resources is critical to winning competitive advantage and creating value. It is hardly surprising, therefore, that organizational creativity is also likened to the system of knowledge and to the capability to create new knowledge from the existing stock of information (Baron, 2012; Basadur, Basadur and Licina, 2012) When following the line of thinking about the essence of organizational creativity referred to above, it is hard not to take notice of the role of the organisation's infrastructure that drives new ideas and makes it easier to bring them to life (Birkinshaw, 2010; Ford, 2002). Nowadays, ICT tools can be an important contributor to development of such an infrastructure.

3. The role of ICT in supporting organizational creativity

According to the report published by the US National Academy of Science (Mitchell et al., 2003), ICT unquestionably influence our economic, social and private life. They not only improve business processes, products and services, but also facilitate transformations and the new value creation for organizations and society at large (Nunamaker et al., 1996; Olszak, 2016). The authors of the report emphasize that ICT support creative practices in art, design, science, engineering, education and business through enabling development of original creative production types. ICT play a key role in developing new markets, products and services, as well as in competition and in the emerging of new creative sectors (art, computer games, music, publishing). It is worth stressing that ICT have an immense impact on other sectors and on the creation of new jobs, occupations and specializations. ICT are considered to have become a binder for different fields of study, science, business and culture, that triggers creative practices in these domains.

Studies conducted by different authors (Dewett, 2003; Olszak and Kisielnicki, 2018; Shneiderman, 2007; Woodman et al., 1993) indicate certain relationships between ICT and organizational creativity (Table 1).

Table 1: Links between ICT and creativity

ICT and creativity	Authors
Improvement of information and communication flow	Dewett (2003), Woodman, Sawyer and Griffin (1993)
Collecting information, information analysis, problem classification	Greene (2002), Indurkhya (2013), Klijn and Tomic (2010), Lubart (2005), Nakakoji (2006), Proctor (2010)
Discovering new knowledge, discovering associations, learning, searching new ideas	Greene (2002), Indurkhya (2013), Klijn and Tomic (2010), Saldanha (2012)
Information visualization	Lubart (2005), Greene (2002), Proctor (2012), Shneiderman (2007)
Knowledge coding	Dewett (2003), Shneiderman (2007), Saldanha (2012)
Group cooperation	Dewett (2003), Greene (2002), Shneiderman (2007), Saldanha (2012)
Conducting brain-storming sessions, stimulating imagination, modelling creative processes, problem-solving	Dewett (2003), Hewett et. al. (2005), Lubart (2005), Mitchell, Inouye and Blumenthal (2003), Nakakoji (2006), Proctor (2010), Saldanha (2012)
Creating knowledge maps, thesauruses, libraries	Proctor (2010), Shneiderman (2007)
Human-computer interaction	Ulrich and Mengiste (2014), Lubart (2005)
Dissemination of creative effects	Indurkhya (2013), Klijn and Tomic (2010), Mitchell, Inouye and Blumenthal (2003), Lubart (2005)

Source: (Olszak and Kisielnicki, 2018).

The following issues deserve special attention (Olszak and Kisielnicki, 2018):

- improved information flow and communication between employees,
- enhanced codification of organizational knowledge,
- expanded limits to employees' knowledge and abilities.

Electronic media are claimed to intensify and improve communication between employees in organizations. Databases, workflow systems, intranet portals, electronic mail and videoconferences enable employees to exchange opinions and suggestions, to work together on documents, as well as to contact different experts, while also facilitating communication within virtual teams, thereby improving their productivity and creativity.

Many a time, ICT have been proved (Hayen et al., 2007; Kim, 2006; Pissarra and Jesuino, 2005) to be suitable for supporting such activities as brainstorming, categorization of ideas, analysing alterative solutions, sharing knowledge, evaluating ideas, making decisions, as well as planning and group decision support. Today, communication and collaborative group work can be effectively supported using a variety of web technologies.

These include: WebDemo, Sametime, eRoom, Microsoft NetMeeting, Interwise, Groove, PlaceWare, WebEx, GroupSystems, Google Groups, MSN, Yahoo and others. These technologies enable development of (Saldanha, 2012): (1) www platforms (open innovations, integrated team support platforms), (2) e-learning platforms for teaching foreign languages at schools, (3) web 2.0, social software that facilitates access to specialist knowledge, exchange and dissemination of knowledge, as well as new knowledge generation.

To be able to understand the weightiness of ICT in knowledge coding, it is worth remembering the imperfections of human memory, that manifest themselves through the limited ability of memorizing large volumes of information. ICT enable the storage of an immense stock of information in different databases, data warehouses and knowledge bases that are referred to as organizational memory. In particular, much attention is given to data warehouses that integrate historical data and knowledge, both internal and sourced from the organization's environment. Here, many authors emphasize the role of OLAP (On-line Analytical Processing) and data mining techniques that are used to analyse information and discover new knowledge, as well as data visualization techniques that make learning and understanding newly discovered knowledge easier. The tools used for this purpose include conceptual graphs, diagrams, visual metaphors and knowledge maps (Eppler and Burkhard, 2008), as well as image processing systems (Cooper, 2000).

Studies confirm (Shneiderman, 2007) that access to a variety of knowledge repositories and knowledge discovery techniques facilitates the process of overcoming mental barriers and contributes to knowledge expansion. Greene (2002) stresses that organizational creativity support software tools enable exploration and

better understanding of problem domains, learning, discovering new ideas (classifying and storing them), collaboration and visualizing interdependencies between processes (phenomena). Heweet et al. (2005), Indurkhya (2013) and Nakakoji (2006) argue that ICT facilitate brainstorming, merging ideas and ranking them.

Proctor (2010), on the other hand, claims that ICT accelerate the process of moving through the creative process stages and problem solving. Furthermore, they stimulate thinking and creating mind maps. ICT enable employees to reach new sources of knowledge (both within the organization and outside it). Such external repositories as databases, Open Access bases and social media provide extremely valuable knowledge. Exploring them using ICT enables one to break barriers to knowledge.

Arif et al. (2010) argue that ICT may not only support operationalization of different business activities (through providing guidelines, prompts and suggestion methods) but also enable language translations and enhance user's confidence in the system through offering a friendly human-computer dialogue. Similarly, Ulrich and Mengiste (2014) emphasize the role of ICT in human-computer interaction, as well as in supporting business plans and in development of personalised services for users. Lubart (2005) and Klijn and Tomic (2010), on the other hand, appreciate the role of ICT in supporting "what-if" analyses, visualization processes, dissemination of creative effects and visualization of ideas. Shneiderman (2007) adds, that ICT may offer work progress measurement and alert generation tools, support development of libraries of ideas, thesauri, maps of ideas and mind maps. Finally, Saldanha (2012), whose focus is on innovation, describes a wide range of areas that can be supported by ICT. These include in particular: knowledge management, group collaboration, information processing including process coordination and uncertainty reduction, as well as supporting creativity, which includes creative thinking.

4. Research method

The main objective of this study is to identify the most important elements and factors that determine ICT-based organizational creativity support. A qualitative approach is used to address this objective. A qualitative approached is suggested when: (1) there is little known in a particular research area; (2) existing research is confusing, contradictory, or not moving forward; and (3) the topic is highly complex (Yin, 1994).

The qualitative survey in the form of in-depth interviews with 24 experts was conducted at the turn of November and December 2015. The experts represented science (12 respondents), business (7 respondents) and ICT (5 respondents) – all of them being recognized authorities from Polish economic and technical academic institutions, managers representing successfully growing enterprises, and valued ICT professionals. The in-depth interviews were mainly focused on the following eight topics:

- experts' interpretation of the organizational creativity term,
- organizational creativity development (activation) factors,
- opportunities for and threats to organizational creativity development,
- main determinants of computer-based support to organizational creativity,
- development barriers to computer-based support to organizational creativity,
- functionalities of the organizational creativity support systems,
- types of organizational creativity support systems,
- the future of organizational creativity development and computer-based creativity support systems.

Each in-depth interview was transcribed with a word processor, with the interview date, time, and codes relating to organizational creativity support as well as reflective remarks. These notes were then combined with similarly coded notes including written documents, and formed a case database. The analysis presented in the next section is formulated from this database. This study is a part of bigger research project concerning the issue of a methodology for computer-supported organizational creativity.

5. Determinants and barriers to the ICT-based organizational creativity support – findings from the survey

Presenting the research results, it is worth to stress that experts differed in their definitions of the term "organizational creativity". Those who represented academic institutions, most often described it as the organization's ability to change or to learn. Business practitioners viewed creativity as nothing else than organization's competences in generating different ideas that could provide a basis for enhancing the

attractiveness of products and services, or even that of management procedures. ICT specialists, similarly as other respondents, emphasized the strong link between organizational creativity and innovation. When asked about the organizational creativity drivers, the experts indicated four key elements. These included: organizational climate and culture, motivation, support from the management and employees' competences (Table 2).

Table 2: Creativity drivers in the light of the survey

Creativity drivers	
Organizational climate and culture	– climate conducive to knowledge sharing, collaboration, acceptance of new ideas, even those where high risk is involved, – atmosphere of self-realization, – maximum flexibility of the organization, freedom of action, good communication, – willingness to implement changes, – long-term thinking, – high level of independence in action.
Motivation	– adequate employee rewarding mechanisms, – workplace arranged in a manner that promotes organizational creativity (relaxation rooms, libraries, access to repositories, databases, magazines).
Support from the management	– management support to employee initiatives, – supporting high-risk projects.
Competences	– capability of building information resources (e.g. customer data), – capability to make use of new technologies (BI, BD, social media), – organization's analytical skills (understanding and analysing the factors that determine internal and external resources), – organization's ability to make use of its human resources, – organization's ability to attract talented employees and to support their further development.

Source: Own elaboration

According to the experts, organizational climate and culture are the most important organizational creativity drivers. Organizational culture should encourage knowledge sharing, collaboration on different levels (within different employee groups), communication and sharing new ideas (even those that seem risky). The experts agree that organizations need to sent a clear message to their employees, that they are not afraid of changes and that, on the contrary, they are open to them. Employees should perceive themselves as enjoying a high level of independence in their actions and believe that their unconventional thinking is not a waste of time.

Many respondents stressed that organizational creativity should be built on a reward and promotion oriented motivation system. The system should promote individuals who are willing to generate ideas and share ideas. To be innovative, organizations need to provide their employees with access to a variety of libraries, bases of journals and magazines, patent bases, as well as to brainstorming rooms. Attention was given to the increasing requirements and competences expected of employees, particularly as regards being creative in collecting, analysing, processing and interpreting data. In addition, the respondents stressed that employees should be confident that their ideas would be supported by the management.

The interviews with the experts confirm that their opinions on the most important opportunities and threats to the ICT-supported organizational creativity development are consistent with the studies referred to in the literature of the subject (Table 3). First of all, the respondents indicated the role of efficient communication and group work, as well as development of adequate and user-friendly ICT tools. The experts emphasized that information technologies cannot be used solely for the automation and acceleration of routine tasks.

Organizations should be looking for such tools that will enable them to create unique value for the organization and for its customers. Yet, the experts also pointed to numerous threats that accompany the organizational creativity development. These include: the lack of adequate ICT tools that would provide comprehensive support to organizational creativity, the employees' reluctance to accept changes and to share ideas, too much focus on short-term tasks, as well as financial problems experienced by many companies.

Table 3: Opportunities and threats to organizational creativity development support systems

Opportunities for development of the organizational creativity support systems	Threats to development of the organizational creativity support systems
– communication and group work, – development of new technologies (young generations growing together with ICT), – automation of routine processes and focus on more ambitious activities, – improving quality and speed of decision-making processes, and business process mapping and monitoring, – competitive advantage, – innovation, – integration of knowledge resources, improved access to information, better use of silent knowledge.	– ICT tools and ICT infrastructure inadequate to the needs and operation of the organization, – employees' resistance to changes, – fear that ideas can be stolen, – low level of information culture and insufficient professionalism of ICT developers, – ICT tools impose schematic thinking, – schematic, formalised procedures/processes, – financial barriers and time barriers, – employees' low awareness of how ICT can be used in development of organizational creativity, – focus on short-term problems; no long-term thinking; focus on operational activities; "chasing quick money".

Source: Own elaboration

When asked about determinants of computer-supported development of organizational creativity, the respondents mentioned: high quality of the ICT infrastructure (high speed data transfer, high-performance computers, intuitive solutions, data security), openness to innovation and new ideas, Open Access promotion, and development of analytical tools (including in particular Big Data analytics).

The experts believe that the future of organizational creativity and its ICT-based development will greatly depend on the organizations' ability to integrate different ICT tools with the creative thinking and acting techniques, to work effectively in large, interdisciplinary teams and to recognize that human resources are organization's best investments. The respondents emphasize that the future belongs to Business Intelligence Competitive Intelligence and Big Data software, to group work and communication systems, web analytics software and Cloud Computing technologies. According to the experts, the applications referred to above may provide fast access to a wide range of databases and knowledge repositories (20 responses), group work and exchange of ideas (18), computer simulations (18 responses), analysing and discovering new knowledge (15 responses) and visualization of information (13 responses). The experts are most sceptical about the current usefulness of ITC in: knowledge mapping (11 responses), knowledge prioritization and decomposition (10 responses), generalization of new knowledge (6 responses) and identification of creative needs (4 responses).

Eventually, the experts voiced their opinions about barriers to ICT-based development of organizational creativity. Those most commonly referred to included mental (cultural) barriers, organizational barriers, poor quality of data and insufficient development of data repositories, as well as technical barriers (Table 4).

All experts agree that the organizational creativity support needs to be developed on a continual basis and adapted so as to meet new challenges and organizations' expectations. The failure to develop the organizational creativity support may result in depreciation of the latter and, consequently, in withdrawal from use. Furthermore, the respondents highlighted that in terms of expenses, building such ICT-based support involves not only the cost of technology, but also the funds needed to appoint a project team, to provide expert support, change management and staff training. These are also the challenges faced by the organizations that see their future in developing ICT-supported creativity.

Table 4: Barriers to development of organizational creativity support systems – findings from the survey

Barrier type	Specification of barriers
Organizational/ economic	– little motivation to be creative, – scarce budgets for innovation development in organizations, – low level of support from the top management, – hierarchical management styles, low autonomy level at work, – fear of risk.
Mental	– reluctance to use ICT in collaboration, exchange of ideas and information, – lack of confidence in effectiveness of ICT tools, – insufficient knowledge of ICT tools and how they can be used to support organizational creativity, – lack of knowledge about access to patent bases, libraries, knowledge portals.
Technological	– high cost of purchasing software and of ICT infrastructure maintenance, – difficulties with integrating different applications, poor quality of Internet connections.
Quality of data and access to data repositories	– poor quality of data (incomplete, obsolete, inconsistent data), – insufficient access to commonly accessible databases, government platforms and patent bases.

Source: Own elaboration

6. Conclusion

The literature of the subject proves that ICT may play an important role in supporting organizational creativity. Yet, practice shows that organizations and managers do not fully use all the benefits that ICT tools offer as regards supporting organizational creativity. This study shows that the main constraints to development of ICT-based support to organizational creativity include mental and organizational barriers, poor quality of data, as well as insufficient development of data repositories. The study also illustrates that an appropriate organizational climate and culture are the most vital organizational creativity drivers. No less important is a reward and promotion oriented motivation system, as well as employees' competence in creatively collecting, analysing, processing and interpreting data.

This study makes both theoretical and practical contributions to the field. The current study contributes theoretically to the emerging literature on organizational creativity by investigating the issue of ICT to support organizational creativity. Practical aspect of this study is manifested in discovering various elements and factors that can have an influence on ICT-based organizational creativity.

This study suffers from some limitations. Firstly, generalization is not justified because the findings are based only on 24 experts from Poland. Secondly, the study was based on the semi-structured interview conducted by the author. Using multiple informants might be recommended for further research.

Future research might take some of the following directions: (1) it would be valuable to examine more experts in Poland and compare them with other experts in different countries; (2) further research might explore the detailed paths of building the organizational creativity support through ICT; (3) in exploring the phenomenon of organizational creativity and its ICT-based support should be quantitative tests that would cover a much greater number of organizations.

References

Amabile, T.M. (1983) The social psychology of creativity, Springer-Verlag, New York.

Amabile, T.M. (1988) "A model of creativity and innovation in organizations", in Staw, B. M. and Commungs, L. L. (ed), Research in Organizational Behavior, Vol. 10, pp 123-167.

Amabile, T. M., Schatzela, E.A., Monetaa, G.B. and Kramer J. (2004) "Steven Leader behaviors and the work environment for creativity: perceived leader support", The Leadership Quarterly, Vol. 15, No. 1, pp 5-22.

Arif, M., Aburas, H., Al Kuwaiti, A. and Kulonda, D. (2010) "Suggestion Systems: A Usability-Based Evaluation Methodology", Journal of King Abdulaziz University: Engineering Sciences, Vol. 21, No. 2, pp 61-79.

Arora, A. and Nandkumar, A (2012) "Insecure advantage? Markets for technology and the value of resources for entrepreneurial ventures", Strategic Management Journal, Vol. 33, pp 231-251.

Baron, R.A. (2012) Entrepreneurship. An evidence-based guide, Edward Elgar, Cheltenham.

Basadur, M., Basadur, T. and Licina, G. (2012) "Organizational Development, in: Mumford, M.D. (ed), Handbook of organizational creativity, Academic Press/Elsevier, London/Waltham/San Diego, pp 667–703.

Birkinshaw, J. (2010) Reinventing management. Smarter Choices for getting work done, Wiley, Chichester.

Blomberg, A. (2014) "Organizational creativity diluted: a critical appraisal of discursive practices in academic research", Journal of Organizational Change Management, Vol. 27, No. 6, pp 935-954.
Brennan, A. and Dooley, L. (2005) "Networked creativity: a structured management framework for stimulating innovation", Technovation, Vol. 25, No. 12, pp 1388-1399.
Choi, W., Madjar, N. and Yun, Y. (2010) "Perceived organizational support, goal orientation, Exchange ideology and creativity", Proceedings of Academy of Management, Montreal.
Cooper, R.B. (2000) "Information technology development creativity: A case study of attempted radical change", MIS Quarterly, Vo. 24, No. 2, pp 245-276.
Davies, N., Zook, A., O'Neill, B., Headrick, B., Riedl, M., Grosz, A. and Nitsche, M. (2013) "Creativity Support for Novice Digital Filmmaking", Proceedings of the SIGCHI Conference, ACM, New York, pp 651-660.
Dewett, T. (2003) "Understanding the Relationship Between Information Technology and Creativity in Organizations", Creativity Research Journal, Vol. 15, No. 2-3, pp. 167-182.
Elsbach, K.D. and Hargadon, A.B. (2006) "Enhancing creativity through "mindless" work: A framework of work day design", Organization Science, Vol. 17, pp 470-483.
Eppler, M. and Burkhard R. (2008) "Knowledge Visualization", in Jennex, M. (ed), Knowledge Management: Concepts, Methodologies, Tools, and Application, pp. 781-7930), IGI Global, Hershey.
Ford, C.M. (2002) "The futurity of decisions as facilitator of organizational creativity and change", Journal of Organizational Change Management, No. 15, pp 635-646.
Gong, Y.P., Huang, J.C. and Farh, J.L. (2009) "Employee learning orientation, transformational leadership, and employee creativity: The mediating role of creative self-efficacy", Academy of Management Journal, Vol. 52, pp 765-778.
Greene, S. (2002) "Characteristics of applications that support creativity", Communications of the ACM, Vol. 45, No. 10, pp 100-104.
Hayen, R., Swaby, S., Huang, Z. (2007) "Use of Group Support Systems in Today's Society", Issues in Information Systems, VIII(2), pp 120-126.
Heweet, T., Czerwinski, M., Terry, M., Nunamaker, J.F., Candy, L., Kules, B. and Sylvan E. (2005) "Creativity Support Tools Evaluation Methods and Metrics", in Creativity Support Tools, A workshop sponsored by the National Science Foundation, Washington, downloaded March 2013 from http://www.cs.umd.edu.hcil/CST.
Indurkhya, B. (2013) "On the role of computers in creativity-support systems", in Skulimowski, A. (ed), Looking into the Future of Creativity and Decision Support Systems, Progress & Business Publishers, Kraków, pp 233-244.
Kim, Y. (2006) "Supporting Distributed Groups with Group Support Systems: A Study of the Effect of Group Leaders and Communication", Journal of Organizational and End User Computing, Vol. 18, No. 2, pp 20-38.
Klijn, M. and Tomic, W. (2010) "A review of creativity within organizations from a psychological perspective", Journal of Management Development, Vol. 29, pp 322-343.
Lubart, T. (2005),"How can computers be partners in the creative process: classification and commentary on the special issue", International Journal of Human-Computer Studies, Vol. 63, No. 4-5, pp 365-369.
McLean, J.A. (2009) "Place for creativity in management", The British Journal of Administrative Management, Autumn, pp. 30-31.
Mitchell, W.J., Inouye, A.S. and Blumenthal, M.S. (2003) Beyond Productivity: Information Technology, Innovation and Creativity. Technology and Creativity, National Research Council, National Academy of Science, Washington.
Muller, S. D. and Ulrich F. (2013) "Creativity and Information Systems in a Hypercompetitive Environment: A Literature Review", Communications of the Association for Information Systems (CAIS), Vol. 32, No. 1, pp 175-201.
Nakakoji, K. (2006) Meanings of Tools, Support, and Uses for Creative Design Processes, CREDITS Research Center: International Design Research Symposium'06, Seoul, pp 156-165.
Nunamaker, J. F., Briggs, R. O., Mittleman, D. D., Vogel, D.R. and Balthazard, P.A. (1996) "Lessons from a dozen years of group support systems research: a discussion of lab and field findings", Journal of Management Information Systems - Special Issue: Information technology and its organizational impact, Vol. 13, No. 3, pp 163-207.
Olszak, C.M. (2016) Toward better understanding and use of Business Intelligence in organizations, "Information Systems Management", Vol. 33, No.2, pp. 105-123.
Olszak, C.M. and Kisielicki, J. (2018) "A conceptual framework of information systems for organizational creativity support. Lessons from empirical investigations", Information Systems Management, Taylor & Francis, Vol. 35, No. 1, pp. 29–48.
Olszak, C.M., Bartuś, T. and Lorek, P. (2018) "A Comprehensive Framework of Information System Design to Provide Organizational Creativity Support", Information & Management, Elsevier, Vol. 55, pp. 94-108.
Parjanen, S. (2012), "Experiencing creativity in the Organization: From individual Creativity to collective Creativity", Interdisciplinary Journal of Information, Knowledge, and Management, Vol. 7, pp 109-128.
Pissarra, J., Jesuino, J. (2005) "Idea generation through computer-mediated communication: The effects of anonymity", Journal of Managerial Psychology, Vol. 20, No. 3, pp 275-292.
Proctor, T. (2010) Creative problem solving for managers. Developing skills for decision making and innovation, 3th edition, Taylor & Francis e-Library, New York.
Saldanha, T.J.V. (2012) Mechanisms Underlying IT-Enabled Business Innovation: Review, Theoretical Framework, and Empirical Analyses, downloaded March 2015 from http://deepblue.lib.umich.edu/handle/2027.42/93844.
Shin, S.J. and Zhou, J. (2007) "When is educational specialization heterogeneity related to creativity in research and development teams? Transformational leadership as moderator", Journal of Applied Psychology, Vol. 92, pp 1709-1721.

Shneiderman, B. (2007), "Creativity Support Tools: Accelerating Discovery and Innovation", Communications of the ACM, Vol. 50, No. 12, pp 20-32.

Sirmon, D.G. , Hitt, M.A., Ireland, R.D. and Gilbert, B.A. (2011) "Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects", Journal of Management, Vol. 37, pp 1390-1412.

Stenmark, D. (2005) "Organizational creativity in context: learning from a failing attempt to indroduce IT-support for creativity", International Journal of Technology and Human Interaction, Vol. 1, No.4, pp 80-98.

Stundgren, M. and Styhre A. (2007) "Creativity and the fallacy of misplaced concreteness in new drug development. A white headian perspective", European Journal of Innovation Management, Vol. 10, No. 2, pp. 215-235.

Ulrich, F. and Mengiste S. (2014) "The challenges of creativity in software organizations", in Bergvall-Kareborn, B. and Nielsen, P. (ed), Creating value for all through IT, pp 16-34, Springer, Berlin Heidelberg.

Woodman, R. W., Sawyer, J.E. and Griffin, R.W. (1993) "Toward a theory of organizational creativity", Academy of Management Review, Vol. 18, No. 2, pp 293-276.

Yin, R. K. (1994) Case study research: Design and methods, Sage Publications, Newbury Park.

Zahra, S.A., Sapienza, H.J. and Davidsson, P. (2006) "Entrepreneurship and dynamic capabilities: A review, model, and research agenda", Journal of Management Studies, Vol. 43, pp 917-955.

Zhou, J. and Ren, R. (2012) "Striving for creativity. Building positive contexts in the workplace", in Cameron, K.S. and Spreitzer, G.M. (ed),The Oxford Handbook of Positive Scholarship, Oxford Press, Oxford/New York, pp 97-109.

NGOs Perception of Social Entrepreneurship in Kazakhstan

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Abstract: In Kazakhstan, social entrepreneurship activity begins its first steps. There are some initiatives and growth points in the non-governmental sector and small business. The purpose of this paper is to identify NGOs understanding of this new phenomenon and their readiness to launch such activity. In our study, we used online survey methods such as Survey monkey and via e-mail. In addition, interviews were conducted with ten social entrepreneurs in Shymkent and Almaty cities. International organizations, business associations, and academic institutions became the drivers of SE development in the country, considering it as an effective solution to the local social problems. The research shows that in the non-governmental sector, there is an awareness of SE, of its dual nature, its commercial and social components. Nevertheless, the wide range of the answers underlines the complexity of this phenomenon and the lack of experience. An experience in providing paid services by the interviewed representatives of NGOs indicates their entrepreneurial potential since commercial activities require the ability to plan revenues and expenditures, calculate the cost, maintain records, and ensure competitive quality of services, i.e. skills, which are peculiar to business. However, respondents found it difficult to identify themselves as social entrepreneurs, which reveals the novelty of this term in the NGO sector, in contrast, to the academic community. Lack of contacts with existing social entrepreneurs shows undeveloped horizontal links and the lack of media coverage of the social entrepreneur's activity. According to expert's opinion, there is a misunderstanding of the nature of SE by the state structures and inadequate support from local administrations, as well as, the difficulties of legislative and administrative promotion of the idea. Summarizing all above, we can say that NGOs are new actors in SE activity in Kazakhstan. NGOs leaders understand the promise of SE as a type of activity that can ensure sustainability and effectiveness when they move to a new commercial approaches dealing with social problems.

Keywords: social entrepreneurship, non-governmental sector, NGO, new phenomenon, commercial approach.

1. Introduction

The theory and practice of social entrepreneurship (SE) has been attracting close attention of practitioners and researchers, as evidenced by the fact that the search engine Google in 0.42 seconds shows 3 160 000 results.

In only the English-language academic literature, there are more than 300 definitions of the SE, where the key words, most often, are: the organization's social mission, business approach, innovation, social problem, sustainability. Interest in this problem is connected with the increase in the importance and presence in the social sphere of non-profit organizations that are becoming an important component of service economy in developed countries.

One of the popular trends in the focus of analysis is the study of blurring of the boundaries between classically separated sectors (state, market and public). This is due to the change of social management models and promotion of activities of organizations of the third sector in addressing social issues through social innovation (Evers, Laville, 2004). The concept of "hybrid organizations "is intended to describe the emergence of such organizational forms, which have characteristics of more than one sector, for example, SE. However, they are not a simple mixture of the characteristics of several spheres, but differ in other principles of management and functioning (Billis, 2010, p. 3). As research shows, "hybrid organization "is not only an Anglo-Saxon phenomenon, they are common in Europe, and in other parts of the world (Billis, 2010, p.3). Changing paradigms for sector roles, increased blurring of traditional roles, emerging of hybrid organizations, where business with social purpose and civil society as market actors has become a favorite topic for discussion at the World Economic Forum (World Economic Forum, 2013, p.10).

2. Literature review

The idea of SE has generated wide interest and academic inquiry. A wide used definition of SE in literature is as «a business solution to a social problem", which, however, does not disclose all its characteristic features.

Gregory Dees, former director of the Center for Social Entrepreneurship at Duke University, believed that the popularity of the idea of SE was because "many of the results of public and charitable organizations were far from our expectations, and most public-sector institutions are increasingly seen as ineffective and irresponsible. Social entrepreneurs are necessary in order to create new models of social activity for the new

century (Dees 2001). He gave the following definition: "Social entrepreneurs play the role of agents of change in the social sphere, by:

- The adoption of a mission to create and maintain social values,
- Recognizing and creating new opportunities for serving this mission,
- Participation in the process of continuous innovation, adaptation and training,
- Acting boldly, not limited by resources available in hands,
- Manifestations of high responsibility for services and for results of activities (Dees, 2001)

Roger L. Martin and Sally Osberg in the article "Social Entrepreneurship: The Case for definition" show SE as a process determined by the following three characteristics:

1. stable, and inherently inequitable balance that causes alienation, marginalization, or suffering of a particular group of people who lack the financial means or political influence to achieve any transformative benefits for themselves;
2. extracting opportunities from this unfair balance, developing social values, inspiration, creativity, active action, courage and strength of mind, thereby challenging the hegemony of a stable state;
3. by creating a new, stable equilibrium that frees up the accumulated potential or alleviates the suffering of the target group, and by simulating and creating a sustainable ecosystem around the new equilibrium, providing a better future for the target group and even for society as a whole (Martin, Osberg, 2007,13).

They believe that it is necessary to narrow the scope of the SE and to define its distinctive features, not confusing them with the notions of social activity and social services, believing that it will help “to better understanding and more informed decision making among those committed to advancing positive social change”(Martin, Osberg, 2007,17).

Georgia Levenson Keohane, an adjunct associate professor of the SE program at Columbia University Business School, defines SE as systems and ecosystems that allow social entrepreneurs of the non-profit, private and public sectors to flourish (Keohane, 2013, p.1).

Pamela Hartigan, former director of the Skoll Centre for Social Entrepreneurship at Said Business School at the University of Oxford, claimed that there must be a change in the understanding of the SE terminology. She believed that “Social Entrepreneurship is not a field – it's an approach, a mindset, a way, how you approach the problem of solving a problem. This way of thinking and approach can be defined as the ability to combine innovation, opportunity and ingenuity to form and evolve a solution to a very specific problem” (Hartigan, 2005). She also believed that “the way of thinking does not belong to any of one sector and can be found both in the private and public sectors, in the mass media and academia” (Hartigan,2006). According to Hartigan, the terms “social entrepreneurship” and “social enterprise” continue to be divided into commercial and social spheres, “when the reality is that” all commercial enterprises should be responsible for the social and environmental impact that they exert and all social enterprises must be in some sort financially stable (Elkington, J. and Hartigan, P., 2008)

Despite the similarity of the overall trends and ultimate goals of the SE in different regions of the world, the driving forces and organizational forms of the SE are largely different due to political, legal, socio-economic and cultural factors. According to Curlin J.A., in the USA, the SE is focused mainly on the commercial activities of non-profit organizations (Curlin, 2006, p.3). In Europe, with the exception of Great Britain, the term “social enterprise” is generally used in relation to a cooperative or association created to open new workplaces or provide certain types of services to its participants (Curlin, 2006, p.6). Despite the lack of a clear definition, SE developed in last decades as a new phenomenon.

A review of the literature on the issues of the research problem makes it possible to identify the primary evidences of SE, to which researchers include:

- Aiming to the solution of a specific social problem.
- The predominance of social mission over commercial profit.

- Commercial activities, the profit from which is used to a social problem solving and the stability of the organization.
- Innovative approach to the solving of a social problem.

In addition, in the most countries where social enterprises are growing, representatives of small business and the nonprofit sector are involved. There is a debate among authors about who is playing a main role in this activity, non-profits or for-profits? Some of them (Mair and Marti, 2006; Perrini, 2007) consider that it is activity of social oriented business. Many well-known western researchers consider SE as a new stage in the development of the non-profit sector, which seeks to reach efficiency applying business approach, business skills in their activity (Taylor et al. 2000; Elkington and Hartigan, 2008; Keohane, 2013). We think, this is not accidental opinion and there are many evidences to prove it.

As it well known, the non-profit sector is a source of important social innovations and development. The sector introduces new mechanisms for ensuring public participation in decision-making processes, provides social services, protects human rights, deals with environmental issues and youth policy, monitors the activities of public authorities and commercial companies, and is generally actively involved in public and political processes in the country. Thus, the non-profit sector gives social stability and sustainable development to the society.

Despite the fact that there are many researches on the SE, the issues of its real content, forms of organization, main actors are not sufficiently studied, especially in the countries with developing economies, where this is a new phenomenon that has not yet been widely disseminated and theoretically comprehended.

In Kazakhstan, the SE begins its first steps. There are some initiatives and growth points in the non-profit sector and among small businesses that are not particularly stable. First, which organizations are considered as non-profits, non-commercial one? According to Kazakhstani legislation, «Non-commercial organization is a legal entity that does not have the goal of deriving profit and not distributing received net income among members». [Law of the Republic of Kazakhstan of 16 January 2001 No. 142-II. About non-profit organizations. (With amendments and additions as of February 27, 2017. Article 2]. Moreover, there is more wide used term as "non-governmental organizations" (NGOs) which according to the legislation means "non-profit organization (with the exception of political parties, trade unions and religious associations), created by citizens and (or) non-governmental legal entities on a voluntary basis to achieve their common goals in accordance with the legislation of the Republic of Kazakhstan."[Law of the Republic of Kazakhstan On the state social order, grants and bonuses for non-governmental organizations in the Republic of Kazakhstan (with amendments and additions as of April 18, 2017), Article 1.]

3. Methodology

The theoretical basis for this research are drawn from existent literature on SE. A mixed approach for data collection has been used. A survey with 15 open-ended and close-ended questions was prepared to reveal existing cases of SE. In our study, we used online survey methods such as through Survey Monkey and via e-mail. In addition, interviews were conducted with ten social entrepreneurs during visit to Shymkent city and in Almaty city. The evaluation of data began with the data collected from secondary sources, such as websites and official documents, followed by analysis of data collected from the primary sources, which are the interviews of NGO representatives. The secondary information offered insights into contemporary activities, thus providing a basis for developing the primary survey questionnaires.

A goal of this research was to understand the perception of Kazakhstani NGOs about SE and to define their capacity to become the social entrepreneurs. Do NGOs of Kazakhstan know about SE? How much do they understand the essence of this phenomenon? Is there any interest and desire of Kazakhstani NGOs to change their grant-dependent status and move on to new entrepreneurial approaches in solving the problems of their target groups? Can non-governmental non-profit organizations that operate in a modern environment, characterized by a high degree of competition, political and economic risks, changes in the legislation, governing the activities of the non-profit sector, change the traditional methods of their activities, and become social entrepreneurs?

3.1 Limitations and Constraints

The sample of respondents and the percentage of return of completed questionnaires is due to the methodological limitations of Internet research and the nature of the object of research. Since increasingly cautious email systems block many emails, recipients are routinely unaware of them. Moreover, the fact that NGOs in Kazakhstan are objects for research from many various government agencies does not increase their enthusiasm to respond for another questionnaire from academic institutions. This circumstance resulted in the small number of participants in the questionnaire-based survey. The number of organizations to which questionnaires randomly have been sent was 300. Responses have been received from representatives of 82 non-governmental organizations. A telephone interviews also were have been organized later with some NGOs for clarifications to the online survey questions and three interviews conducted with experts from SE promoting institutions provided the detailed information required for this research.

4. Results

According to official statistics in Kazakhstan, there are more than 18,000 NGOs of various formats and activities, nevertheless, this figure is not confirmed by the published database of these organizations and is always questioned by both the expert community and NGOs themselves. The "Overview report on the state of the non-governmental sector in Kazakhstan: problems and prospects" [2016, p.17] states, that the conducted research reveal that the number of registered organizations and the number of operating organizations do not coincide. The number of actually operating organizations is no more than 30% of the registered one.

The organizations that participated in the survey work in different sphere of social activity: educational (54%), human rights (37%), social protection (32%), charity (30%), gender, and other. Some of them pointed out two or three types of activity, which is typical to many NGOs who are multifunctional.

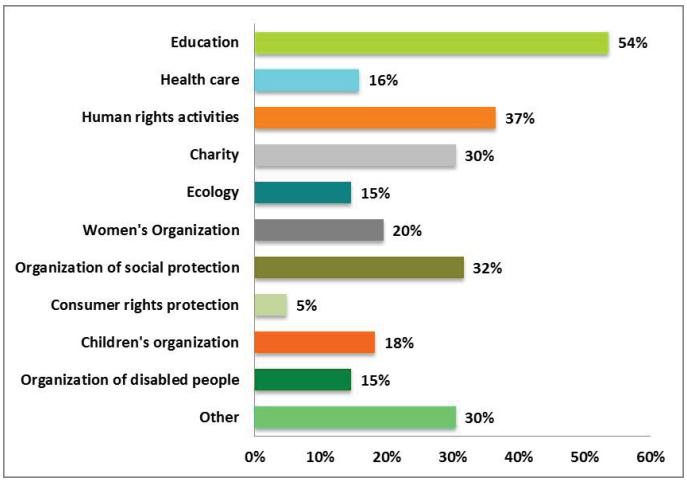

Figure 1: Sphere of social activity of respondents.

Answers to the question about familiarity of NGOs about SE show the following results: 98% of respondents give a positive response, and only a tiny proportion of respondents (2%) never heard about it, which indicates that the SE issues were the subject of discussion among NGOs network.

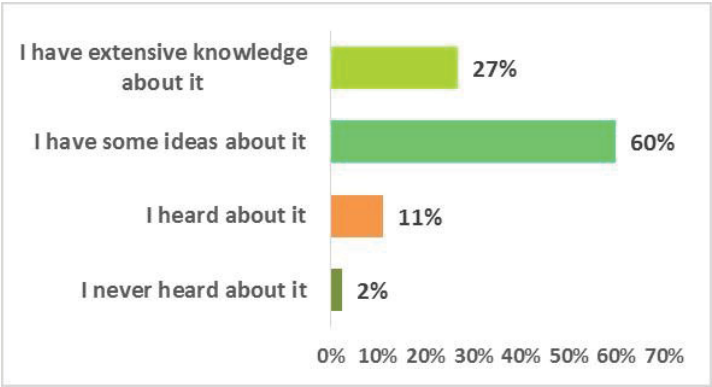

Figure 2: NGO's familiarity with the social entrepreneurship.

Moreover, only 16% of respondents refused to give own definitions of the SE, 18% of them find this task difficult but 66% shared with their understanding of SE.

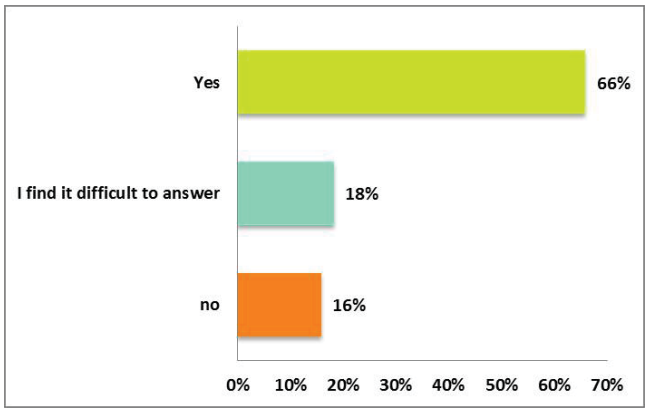

Figure 3: Capability to give a definition of the social entrepreneurship.

In most of the presented definitions, respondents emphasize the dual nature of the SE, underlying the commercial and social components of this phenomenon:

- This is a business solution to the social problem.
- Entrepreneurial initiatives aimed at solving social problems.
- Business with a social component, focused on solving specific social problems of society, the state.
- SE is the solution of some social problems of society by investing without profit.
- When profit from SE activity of NGOs will be directed to solve social problems of the region.
- SE, entrepreneurial activity, aimed at mitigating or solving social problems.
- NGO earns profit for the realization of social activities.
- SE is a way of carrying out social and economic activities that connect the social mission with achieving economic efficiency and entrepreneurial innovation.
- This activity makes profit, but at the same time is aimed at solving social issues (this is a priority).
- Provide social services on a fee basis, but not for profit, but for expanding the services provided.

Separate answers show that respondents distinguish the SE from charity: "Activities that differ from charity, related to entrepreneurship. It is aimed at solving social problems".

At the same time, some respondents do not see the specifics of the SE, giving the following definition: *Under entrepreneurship, I understand the initiative, independent activity of citizens aimed at obtaining profit or personal income, which carried out on their own behalf, under their property responsibility or on behalf of and legal liability of a legal entity.*

Some answers show that the SE is understood as a social partnership: *NGO-State partnership on improving the social status of certain organizations or individuals, while the NGO earns money.*

- Social partnership - a system of institutions and mechanisms for coordinating the interests of participants in the production process: employees and employers, based on equal cooperation.

Despite the fact that only 66% of respondents answered affirmatively about their ability to give a definition to the SE, even those who replied that it is difficult to answer, sent their own definitions. Many respondents underline the complexity of SE phenomenon and the lack of familiarity with it in the practical activities of the non-profit sector.

At the same time, the majority of organizations participating in the survey (60%) have experience in providing paid services to the state structures, businesses and public, which in principle does not contradict to the legislation of the Republic of Kazakhstan, which not prohibits NGOs from carrying out income-generating activities, but under certain conditions and restrictions. Providing support to NGOs in connection with the implementation of their socially oriented activities, the state simultaneously imposes restrictions on

permissible activities. NGOs can only carry out activities stipulated by legislation and by the organization's charter. A received income from commercial activity should be spent to achieve the statutory goals of the organization. The experience in providing paid services by the NGOs indicates the demand for their services, the professional level of employees, since the commercial activities require the ability to plan revenues and expenditures, to calculate the cost of services, maintain records, and provide a competitive quality of services, i.e. to have those specific skills that are peculiar to business.

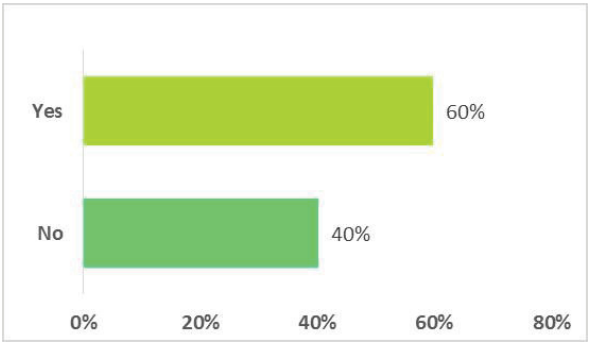

Figure 4: NGOs experience in providing paid services.

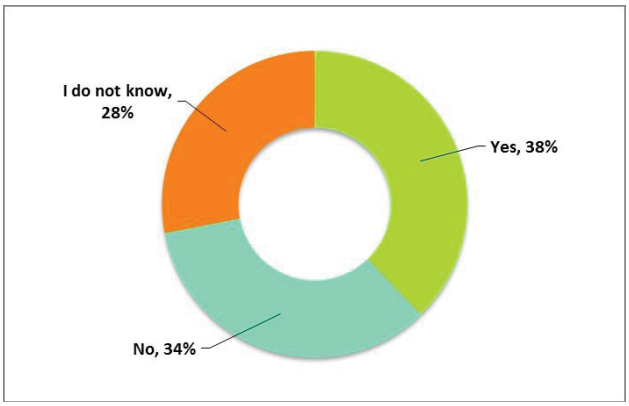

Figure 5: Respondent's self-perception as the social entrepreneurs.

However, to the question whether respondents consider themselves as the social entrepreneurs, only 38% people perceived themselves as social entrepreneurs, 34% respondents do not perceived themselves to be in this category, and 28% do not know the answer to this question.

For Question 9, where respondents asked were they familiar with the social entrepreneurs of their city, district or region, only 26% gave a positive answer.

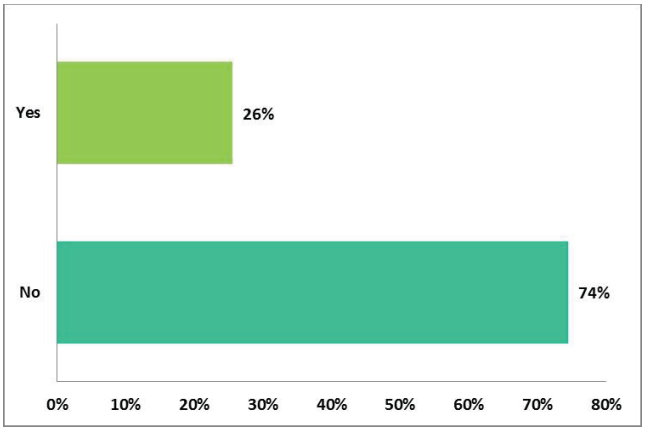

Figure 6: An acquaintanceship with the social entrepreneurs of their city, district, and region.

On the other hand, for the question, do they have an interest to become a social entrepreneur, 89 % gave a positive answer, only 2 % do not want to be engaged in SE, and 9 % are not sure about this.

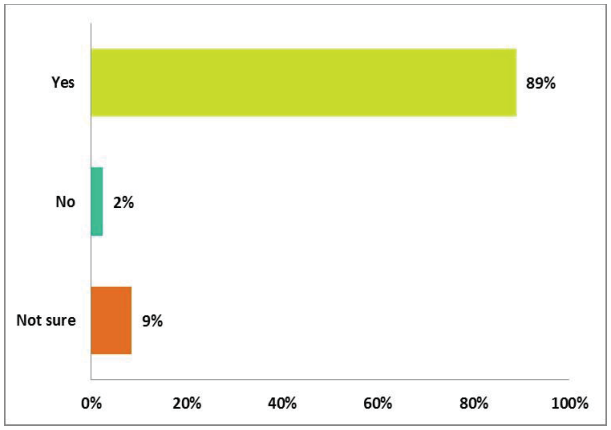

Figure 7: Expression of the interest to become a social entrepreneur.

The answers to the question to which organizations will you apply for consultations if you are engaged in SE shows that respondents chose business structures. The majority of the respondents (54) indicated the Damu Fund (Damu Entrepreneurship Development Fund JSC was established based on the Decree of the Government of the Republic of Kazakhstan of 26.04.1997 № 665 "On the establishment of small business development fund"). 49% pointed out the Entrepreneurs Service Centers, which once again confirms the understanding of respondents of the commercial nature of the SE, well awareness about the activities of these organizations, and, possibly, previous experience with them.

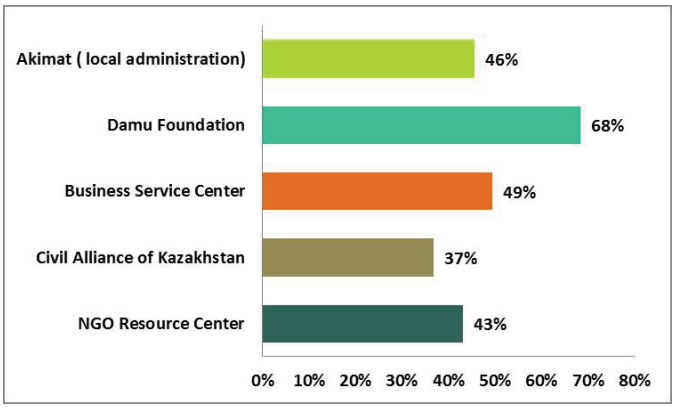

Figure 8: The NGOs preference of the organizations where they could apply for assistance if they will be engaged in social entrepreneurship.

To the question: Do you think that SE is a matter of business, not an NGO, almost 72 % of respondents do not agree with this statement, only 13% agree with it and about 15 % do not know an answer for this question.

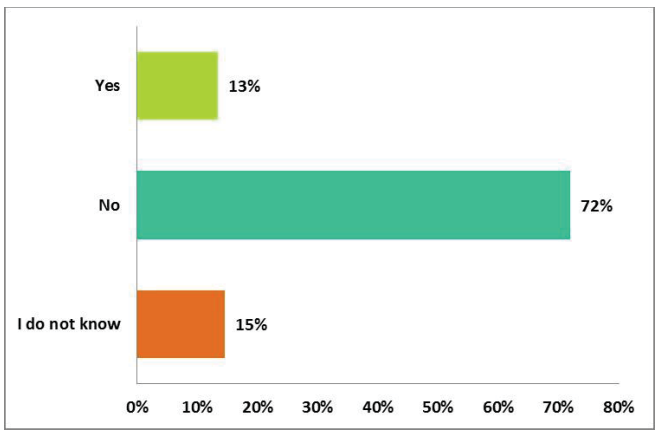

Figure 9: NGOs opinion about whose social entrepreneurship is a matter, of business or NGOs.

At the same time, respondents recognize the existence of following serious barriers and challenges in the transition to the social entrepreneurship activities:

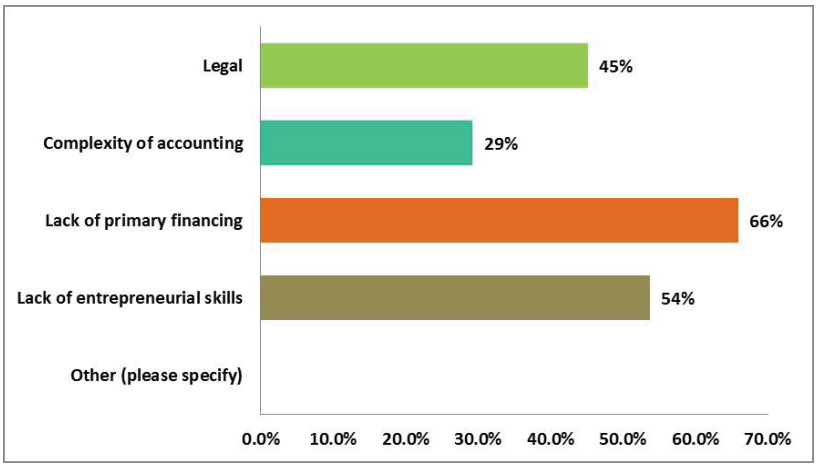

Figure 10: The barriers, which NGOs consider as essential for engaging in social entrepreneurship

The most significant barrier, considered by 66% of NGOs is a lack of primary funding for start-up the entrepreneurial activity; the second most important barrier is a lack of entrepreneurial skills among NGOs - 54% , and the third most important one, legal issues, as 45% respondents consider. About 30% note as the barrier a complexity with accounting, because when doing commercial activity, NGOs should pay an income tax as the business entities.

How NGO consider overcoming these challenges?

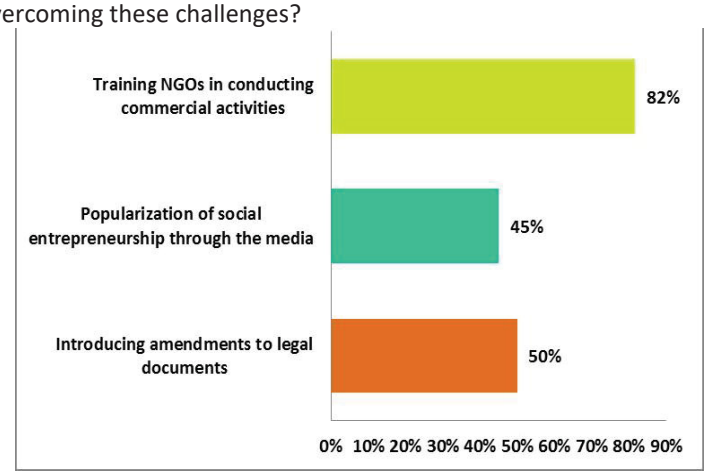

Figure 11: The ways to overcome barriers.

The solution for overcoming the above-mentioned problems is seen primarily in the necessity to train NGOs in conducting business activity 81.7%, to introduce some amendments to relevant laws- 50% and popularize the SE through the mass media 45.12%. These results show the expectations of NGOs from other stakeholders of the SE as a state, business, media, and academic institutions.

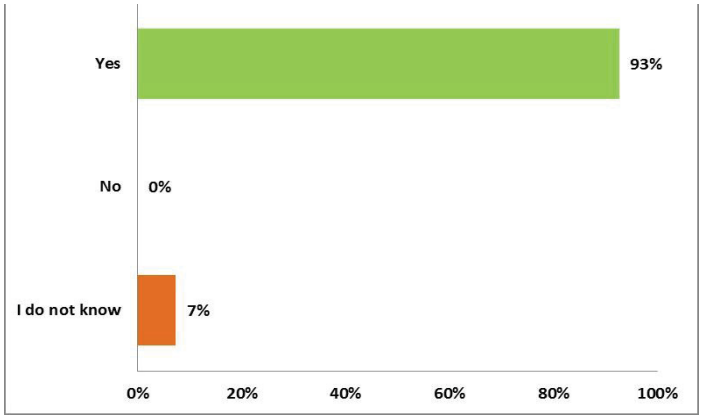

Figure 12: NGO's perception about necessity of state assistance.

Majority of respondents (93%) answered positively for the question about necessity of assistance from the state and only 7% deny the necessity of it.

What kind of assistance from state NGOs are expecting?

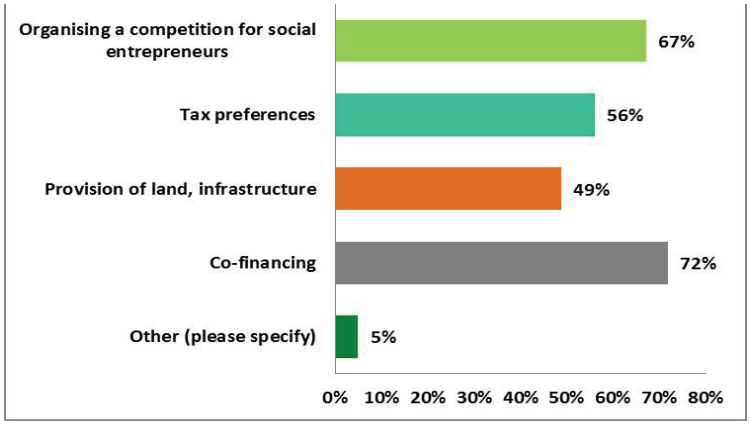

Figure 13: The forms of the state assistance.

Almost 72 % expected that the state could co-finance social activity of entrepreneurs. 67% of respondents consider that the state could organize the competition for social entrepreneurs, 56% of respondents consider that state could provide a tax preferences, 49% of them want provision of land or infrastructure.

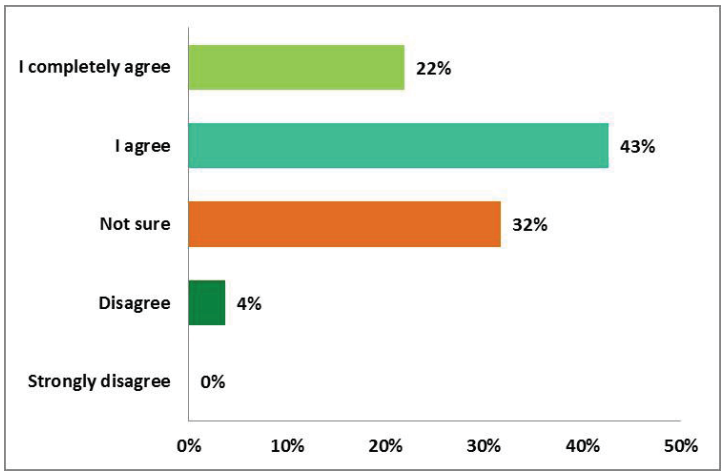

Figure 14: Awareness about NGOs sufficient potential for engaging in social entrepreneurship

65% of respondents gave a positive answer for the question about potential of NGOs from their area to be engaged in SE.

5. Discussion

The findings indicate that there is an awareness about SE in the non-profit sector. The respondents perceive the intended meaning of dual nature of SE, and its commercial and social components. However, SE definitions given by NGOs, see it as an efficient approach to solving and mitigating of social problems, but not consider it as an opportunity to increase institutional sustainability, to provide a transition from a grant-dependent status to a social enterprise. Nevertheless, the wide range of the answers underlines the complexity of this phenomenon and the lack of practical experience.

An experience in providing paid services by the interviewed representatives of NGOs indicates their entrepreneurial potential since commercial activities require the ability to plan revenues and expenditures, calculate the cost, maintain records, and ensure competitive quality of services, i.e. skills that are peculiar to business. However, respondents found it difficult to identify themselves as social entrepreneurs, which reveals the novelty of this term in the non-profit sector. Law number of contacts with existing social entrepreneurs shows undeveloped horizontal links and the lack of media coverage of the social entrepreneur's activity. As reflected in the Figure 8 NGOs understand that to be social entrepreneur they need to acquire business skills that is why they prefer business structures in the case if they plan to be social entrepreneurs. Figure 12 illustrates how much NGOs people rely on a state assistance, which is so typical for organizations, whose institutional stability depends mostly from state grants. There is a negative wide spread NGO image among society as "feeding on grants", which shows NGOs activity where a grant hunting is their main purpose. Leasers of NGOs should change their attitudes, their mentality, should take more initiatives and risks to find innovative solutions. Acquainting with SE ideas and approaches will enhance NGO leaders to work at a high professional level, having in addition to motivation, developed business models, using modern social and business technologies.

Moreover, there are international organizations, business companies and associations, academic institutions, who are contributing in forming SE culture among NGOs. Especially important the role of British Council, which includes Kazakhstan in its Global Social Enterprise programme among 29 countries over the world and providing social entrepreneurs with access to training, mentoring and funding opportunities.

According to the opinion of ex-chair of "Atameken", National Chamber of Entrepreneurs, Nurzhan Altayev, "there is a misunderstanding of the nature of SE by the state structures and inadequate support from local administrations, the difficulties of legislative and administrative promotion of the idea"(Altayev,2016). Moreover, a president of the Association of Social Entrepreneurs, Gulzira Amanturlina, considers that "there is no infrastructure to support SE, credit resources are expensive, and there are no legislative bases for such activities" (Amanturlina, 2016). "Atameken" organizing dialogue platforms with government structures to introduce distinct criteria for SE activity, to discuss adoption of the amendments to relevant laws.

Eurasia Foundation of Central Asia conducing trainings among NGOs to empower the capacity of social entrepreneurs and to provide them with revenue-generating skills. Academic institutions like Almaty Management and Suleyman Demirel universities introducing new curriculum on SE for graduate students. Therefore, various dialogue platforms - conferences, round tables, and trainings have been organized to promote SE ideas among businesses, government agencies and the non-profit sector, considering the SE as an effective approach to social problems.

Summarizing the study, we can say, that results lead us to believe, that the SE is a new activity in the non-profit sector of Kazakhstan, which could bring effectiveness to NGOs to address social problems and help foster a sustainability of non-profit sector.

References

Altayev, N. (2016) [Social Entrepreneurship in Kazakhstan]. Available at: http://agkipr.kz/archives/816 [Accessed 15.04. 2017].

Amanturlina,G. (2016) [Social Entrepreneurship in Kazakhstan]. Available at: http://agkipr.kz/archives/816 [Accessed 15.04. 2017].

Billis, D. (2010) Hybrid organizations and the Third sector. Challenges for Practice, Theory and Policy. Palgrave Macmillan.

Cisc.kz., (2016) [Overview report on the state of the non-governmental sector in Kazakhstan: problems and prospects.] [online] Available at: http://cisc.kz/upload/iblock/246/obzornyy-doklad-o-sostoyanii-npo-sektora.pdf [Accessed 15.04. 2018].

Curlin, J.A. (2006) Social enterprises in the US and Europe: Understand the differences and learn from them. International Community of Third Sector Studies and Johns Hopkins University.

Dees, J.G. (2001) The meaning of Social Entrepreneurship. Center for the Advancement of SE, Duke University's Fuqua School of Business. (Revised vers.). Available at: https://entrepreneurship.duke.edu/news-item/the-meaning-of-social-entrepreneurship/ [Accessed 12.11.2017]

Elkington, J. and Hartigan, P. (2008) The Power of Unreasonable People: How Social Entrepreneurs Create Markets That Change the World. Harvard Business Review Press.

Evers, A. and Laville, J. (2004) The Third Sector in Europe. Edward Elgar Publishing.

Hartigan, P. (2006). It's about people, not profits. Business Strategy Review, 17(4), 42–45.

Hartigan,P.(2015) Perception of Social Entrepreneurship must change. Pioneer Post. Available at: https://www.pioneerspost.com/news-views/20151109/perception-of-social-entrepreneurship-must-change-says-skoll-centre-boss [Accessed 10.11.2016]

Keohane, G.L. (2013) Social Entrepreneurship for the 21st century: Innovation across the Nonprofit, Private, and Public Sectors. McGraw Hill.

Mair J. and Marti J. (2006). Social Entrepreneurship's research: A source of explanation, prediction and delight. International Journal of World Business, 1, 36–44.

Martin, R.L. and Osberg, S. (2007) Social Entrepreneurship: the Case for Definition. Stanford Social Innovation Review. Spring. Available at: http://ssir.org/articles/entry/social_entrepreneurship_the_case_for_definition#sthash.uvY6WCSt.dpuf [Accessed 25.11.2017]

National report on the status and prospects of development of the non-governmental sector in Kazakhstan. Available at: http://online.zakon.kz/Document/?doc_id=31325856 [Accessed 27.11.2017]

Perrini, F. (2007). Social Entrepreneurship. Milano: Egea.

Taylor, N., Hobbs, R., Nilsson, F., O'Halloran, K., and Preisser, C. (2000). The rise of the term Social Entrepreneurship in print publications. In Frontiers of Entrepreneurship Research: proceedings of the annual Babson College Entrepreneurship Research Conference (Vol. 466).

World Economic Forum (2013). The future role of civil society, January 2013. In collaboration with KPMG International. World Economic Forum.

Zakon.kz., (2017)"[Law of the Republic of Kazakhstan On the state social order, grants and bonuses for non-governmental organizations in the Republic of Kazakhstan (with amendments and additions as of April 18, 2017), Article 1.] [online] Available at: https://online.zakon.kz/document/?doc_id=30008578#pos=0;0 [Accessed 15.04. 2018].

Zakon.kz., (2017). [Law of the Republic of Kazakhstan of 16 January 2001 No. 142-II. About non-profit organizations. (with amendments and additions as of February 27, 2017. Article 2.] [online] Available at: https://online.zakon.kz/document/?doc_id=1021519#pos=0;0 [Accessed 15.04. 2018].

Innovation and Entrepreneurship: Successful Experiences in Brazil and Peru

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Abstract: Entrepreneurship plays an important role in the development of economies. In Latin America, specifically, public and private incentives for innovation are fundamental to enhance competitiveness and to strengthen new businesses. In this context, the paper aims to show the scenario of innovation and entrepreneurship in Brazil and Peru from the perspective of development programs, as well as to highlight the policies aimed at improving the quality and impact of the enterprises. In this context, we analyse the government, private and non-profit sector initiatives that deal with programs, projects, and actions to stimulate entrepreneurship and innovation, along with public policies that have an impact on the creation of positive environments for business development, and innovation networks. The focus of the study will be on the policies that are developed throughout the national territory in the studied countries, especially the exchange of experiences in Latin America. Preliminary results point out the importance of public power in the process of encouraging and consolidating innovation and entrepreneurship in these territories. It should be noted that institutions with business activities are essential in the ecosystem of innovation and corporate structure, especially in the smaller ones. Therefore, research in this field is fundamental for guiding development policies and stimulating business competitiveness. In summary, this paper proposes a relevant research on innovation and entrepreneurship, which is very useful to the public and private sectors and to the academic field since it aims to encourage the development of more effective research on the subject.

Keywords: Innovation, entrepreneurship, public policy, programs, competitiveness, development.

1. Introduction

Local development is linked to a number of sociocultural, political, economic, and institutional factors. In this scenario, incentives to foster entrepreneurship are a fundamental attitude in emerging and / or developing economies. In this sense, this paper contextualizes the scenario of innovation and entrepreneurship in Latin America, with an emphasis on Brazil and Peru, in order to guide development policies and stimulate the competitiveness of companies.

Peru and Brazil share records of exports of raw materials, which makes the economy dependent on the price of commodities in the international market. For the Economic Commission for Latin America and the Caribbean (CEPAL), the region's greatest structural challenge is to diversify the export pattern and reduce dependence on raw materials (CEPAL, 2015). In recent years, the industry has not been able to add value to its products and services, nor to improve its productivity through technology and innovation.

Currently, Latin America continues to have a few technological exports. The “high technology” category in Peru represents 0.5% of its total shipments, secondly, the Exporters Association (ADEX). Peruvian shipments in this category are below those of Brazil with 4.5% and Argentina with 2.6% (PERU21, 2017). Peruvian high-tech exports reached US$ 165 million, while in Brazil they reached US$ 9.775 billion (World Bank, 2016).

David Kupfer, professor at the Federal University of Rio de Janeiro (UFRJ), who pointed out that important segments—such as extractive or food production—require investments in R&D at relatively modest levels, while innovation-intensive sectors—such as pharmaceuticals and electronics—have a strong presence of multinationals that produce little R&D in Brazil, opting to import them from the matrices (Marques, 2017).

According to Clamanovici (2011), it is fundamental to analyze the profile of products and services that are offered by a country to measure the technological level of the economy. It is important to note that, according to the “Science and Engineering Indicators 2018”, Brazil achieved a 29% share of the technology-intensive and

knowledge-intensive industries (KTI) in relation to the GDP in 2016. During the same period, the United States reached 39%; the gross domestic product was based on these industries (NSF, 2018).

Olavarrieta and Villena (2014) indicated that Latin American countries and companies seek to increase innovation and entrepreneurship but face challenges and barriers, and that policies and practices in the public and private sectors need to be improved to increase innovation. Alternatively, the authors suggested increasing business research and university-business partnerships. Similarly, Aydogan (2009) recommended that government innovation and entrepreneurship policies should be adequate to meet the specific needs of different groups of countries.

Then the paper aims to present the scenario of innovation and entrepreneurship in Brazil and Peru from the perspective of development programs, in addition to highlighting policies aimed at improving the quality and impact of entrepreneurship. To achieve these objectives, the manuscript is organized as follows: Section 2 presents the concepts and reflections on entrepreneurship and innovation. Section 3 presents an assessment of innovation policies. Section 4 provides the conclusions of the manuscript, the suggestions for its continuity, followed by the used bibliographical references.

2. Entrepreneurship and Innovation: Concepts and Reflections

Entrepreneurship and innovation are related terms and the latter is a fundamental attribute of entrepreneurship (Schumpeter, 1934; Drucker, 1993). In this context, it is mentioned that "...entrepreneurship is not only about small companies and new ventures. It does not only address the creation of new products or services, but rather innovations in all areas of the business" (Chiavenato, 2007).

Innovation can occur in any sector of the economy and it is essential for a country's productivity growth (OECD, 2005). This may be related to processes, products, services, organizational or marketing, and it can be categorized into: (i) disruptive / radical innovation (generates creative destruction of existing products, causing profound changes in the market and society), and (ii) incremental innovation (improvements that increase the good / service, whether through adaptation; an open network that connects several stakeholders in an incremental and / or radical innovation process) (Arbix, 2007; Tidd & Bessant, 2015).

When thinking about entrepreneurship and innovation, it is important to think about competitiveness. In this sense, we emphasize Porter's (1999) statement: "National prosperity is not something inherited, but the product of human creative effort. It is not something that emanates from the natural endowments of a country, from its labor force, from interest rates, or from the value of money as the classical economists insisted. The competitiveness of a country depends on the ability of its industry to innovate and improve". For Zahra and George (2002), innovations increase competitive advantages by stimulating the learning processes.

In Brazil and Peru, studies and reflections on innovation and entrepreneurship are increasingly important (Ketelhöhn and Ogliastri, 2013). Guzmán-Alfonso and Guzmán-Cuevas (2012) confirmed that the entrepreneurial intentions are antecedents of the entrepreneurial behavior related to the creation of ventures in Latin America. For Chaston and Scott (2012), Peruvian companies involved in open innovation reported higher sales growth and indicated greater confidence in the use of double-loop learning. The same authors noted that engaging in open innovation can improve business performance.

Another line of study indicates the importance of the instruments and agents of public policies as inducers of conditions that can facilitate innovation in micro and small enterprises in Brazil (Barboza et al., 2017).

However, affiliation of business groups can be an interesting solution that facilitates the development of entrepreneurial ventures in emerging markets (Mingo, 2013).

Brenes et al. (2016) identified the effects of organizational and marketing innovations on market performance, using data from companies in fast-growing emerging economies in South America (Colombia, Peru, and Chile). The study stated that innovation is a very important capacity for companies that generates rare, valuable, inimitable and non-replaceable goods and services and leads to superior performance. For Pino et al. (2016), organizational innovations have more influence on market performance than marketing innovations and

confirm the importance of innovative performance as an intermediary between organizational innovation and market performance.

It is important to highlight the value of university incubators (Silva et al., 2017) and incubators in Minas Gerais, Brazil (Iacono and Nagano, 2014). This study discusses the critical behavioral pattern in management in the areas of innovation processes, learning and interaction with other actors, and the divergence in the focus and disconnected actions among the incubator, government, companies and university. Some of the roles and tasks of each of these important actors partially meet the needs of companies.

For Rauch et al. (2013), innovation can be effective in each country. The owners' cultural orientations and the national culture explain the variation in innovation-growth relationships. In this way, the authors stated that interactions in different levels of culture have theoretical and practical implications for cross-cultural entrepreneurship research.

In this sense, it is justified to know and exchange experiences on innovation and entrepreneurship between Brazil and Peru in order to guide development policies and stimulate the business competitiveness.

2.1 Global Entrepreneurship Monitor (GEM)

According to the latest GEM study (2017/2018), and based on a World Economic Forum classification, countries are categorized into three major groups: "factor driven countries" predominantly dependent on labor factors and natural resources; "efficiency-driven countries" that are characterized by the advance of industrialization and gains in scale, predominantly capital-intensive organizations; "Innovation-driven countries" that are characterized by knowledge-intensive enterprises and the expansion and modernization of the service sector (GERA, 2018). According to these studies, Brazil and Peru are in the second group: "countries driven by efficiency" (GERA, 2018, p.20).

Also according to the study "... entrepreneurship in countries driven by efficiency or factors occurs more markedly because they have few job opportunities and low GDP per capita, leading the population to venture into entrepreneurship." The main indicator in this study is the Initial Entrepreneurship Rate (TEA), with Brazil reaching 19.1 in 2016 and Peru in the same period, 25.1. In Brazil, the Rate of Established Entrepreneurs (TEE) and the sum of the two rates, the Total Entrepreneur Rate (TTE = TEA + TEE), are also relevant in the analysis due to the impact in terms of employment and income (SEBRAE, 2017). It is worth noting that, in 2016, there were 36% of the adult population involved in the entrepreneurial activity in Brazil and 31% in Peru. It is also important to point out that Brazil has a higher rate of established entrepreneurs, namely 16.9, while in Peru, in the same period of analysis, 6.1.

The analysis of the GEM stated that, "in relation to TEA and TEE, Brazil is ahead of countries like Argentina, Mexico and the other BRICS components (Russia, India, China and South Africa). In terms of entrepreneurship rates it is also ahead of countries such as United States, France, Spain, Germany and Italy. This shows that, comparatively, in Brazil, there is a relatively large portion of adult individuals involved in entrepreneurship. The quality of this, however, still lags behind that of many of these countries" (SEBRAE, 2017).

In Brazil, small business deals are made up of micro and small enterprises (SMEs) and individual micro entrepreneurs (MEI). "Micro and small companies account for 98.5% of the total number of companies in Brazil, account for 27% of GDP and generate more than half of the country's jobs" (Carta Campinas, 2017).

Innovation is fundamental to ensuring greater participation of micro and small enterprises in GDP. In Peru, informality is also a problem that affects the performance of companies, since 88.02% of microenterprises are in the informal sector. According to data from the Foreign Trade Society of Peru (ComexPerú), "the productivity of the formal sector is eleven times that of the informal sector" (Gestión, 2017).

2.2 Brief History of Entrepreneurship and Innovation in Brazil

The term entrepreneurship has been used in Brazil in the last decades, especially in the late 1990s and early 2000s. The importance of this concept in the country is closely related to the need to create lasting companies, as well as to the decrease of high mortality rates of ventures (Dornelas, 2014).

The Brazilian Government has acted more effectively on this agenda since 1999, the year the Brazil Entrepreneur Program was created. This Program involves three sectors, in addition to the government sector (first sector) - represented by the Ministry of Labor and Employment and Banco do Brasil; the private sector (second sector) - represented by the Micro and Small Business Support Service (SEBRAE); and the corporate social responsibility sector (third sector) represented by the Cape Center - Entrepreneurship Training and Support Center, a non-governmental institution (Elache, 2003). The Brazil Entrepreneur Program is aimed to foster micro and small businesses through lower interest financing, as well as to train entrepreneurs.

In 2007, the Entrepreneurial Friend Institution (IAE) Program was launched, as an initiative of the federal government and it aimed to promote the qualification and professionalization of entrepreneurs for entrepreneurship, with the support of public and private educational institutions. Another initiative to formalize the labor market was the launch of the Individual Entrepreneur Program in 2008 that aims to formalize entrepreneurs who kept their business in the informal sector.

As far as innovation is concerned, it started early in the country. In 1951, the National Council for Scientific and Technological Development (CNPq) was created, which carries out a series of programs and actions to promote innovation and the development of science in the country, mainly in the training of researchers. In 1972, the Brazilian Agricultural Research Corporation (Embrapa) was created to encourage innovation in the agribusiness sector; in 1996, Finep was consolidated in the public promotion of Science, Technology and Innovation in companies, universities, technological institutes and other public or private institutions, providing repayable, non-refundable financing to companies of all sizes.

In 2004, one of the first public policies to promote innovation was drawn up, namely Law No. 10,973, which establishes measures to encourage innovation and scientific and technological research in the productive environment, with a view to technological autonomy and the development of the national and regional productive system of the country.

"Over the last 15 to 20 years, Brazil has greatly improved the policies that are intended to foster innovation. Indeed, the country has implemented a series of measures and policies to reinforce its innovation capacity.

Among the new policies are research and development (R&D) tax incentives and subsidized credit for innovation, as well as some regulatory measures that ease the university-enterprise relationship" (The Global Innovation Index, 2017, p.121).

In 1998, the sectorial funds were created to increase funding to foster innovation in the country and, together with the National Fund for Scientific and Technological Development (FNDCT), helped finance priority scientific and technological development programs and projects. For instance, a fund for the oil sector—which is financed by a share of oil and gas royalties—and the Energy Fund—which is particularly concerned with improving energy efficiency and fostering renewable energy, such as biofuels. From the 16 sectoral funds, 14 are linked to economic segments such as oil, energy, health, biotechnology. Each of them is fueled by specific recipes. The energy, for example, receives between 0.3% and 0.4% on the revenues of electric utilities (Marques, 2017).

From the regulatory point of view, several improvements have been made in Brazilian legislation in the last decades. Important laws were approved in the 90's which contribute to enhance the investments in R&D.

Several new technological institutes of Brazilian National Service for Industrial Training (SENAI) and SEBRAETEC Program (SEBRAE) give small businesses access to technological and innovation support, as well as programs to support innovation, such as the Brazilian Company of Research and Industrial Innovation (Embrapii) in 2013.

Finally, another governmental initiative to foster innovation is the National Technological Entrepreneurship Plan, which has been under development since the beginning of 2017 by the Ministry of Science, Technology, Innovation and Communications (MCTIC).

2.3 Brief History of Entrepreneurship and Innovation in Peru

In 1999, the Ministry of Agriculture initiated a reform in the country's agricultural science, technology and innovation system through the creation of the Program for the Innovation and Competitiveness for Agriculture

in Peru (INCAGRO). But it was not until 2001 that, in collaboration with the World Bank, the project began in three phases (Huamán, 2014). A long-term (12 years) vision: establishing a system of science, technology and innovation for the agricultural sector that is demand-based, pluralistic, decentralized, led by the private sector, and made up by a network of producers, firms, academia, government entities, and NGOs. According to the World Bank, the main results included 610 projects, many innovation success stories, over US$60 million mobilized, 1200 institutions, 23 types of products covered (export and subsistence crops), 388 extension projects of which 43% with indigenous peoples / women groups, High rates of economic impact, environmental sustainability, etc. (World Bank, 2011).

When the Science and Technology Program of Peru was funded in July 19, 2006, the Government of Peru and the Inter-American Development Bank (IDB) signed a Loan Agreement to create the Fund for Innovation, Science and Technology (FINCyT) in order to improve the country's competitiveness (FOMITEC, 2018).

The National Science and Technology Council (CONCYTEC) is the governing body of the National System of Science and Technology and Technological Innovation (SINACYT), which consists of the Academy, the State Research Institutes, business organizations, communities and society civil. It is the leading public institution for science, technology and innovation responsible for formulating policies and promoting and managing actions to generate and transfer scientific knowledge and technologies in favor of social development and economic of the country. For this, one of the first tasks is to articulate all the organisms and resources of the sector in function of the objectives and national development policies established in compliance with the laws and policies regulated by the current Government, particularly within the framework of the "National Plan for Science and Technology and Innovation for Competitiveness and Human Development 2006-2021" (CONCYTEC, 2018). An important instrument to promote innovation in the country is Law N ° 30309 - Law of Tax Benefits. This law regulates companies that invest on Research, Technological Development and Technological Innovation (SUNAT, 2018).

In 2014, the National Innovation Program for Competitiveness and Productivity (Innóvate Peru) of the Ministry of Production was created with economic, administrative, financial and technical autonomy. The program aims to increase business productivity by strengthening the actors of the innovation ecosystem and by facilitating the interrelation between them.

In 2015, the MIPYME Fund was created in order to strengthen the productive development of micro, small and medium-sized enterprises. In 2016, the IDB makes a loan of 40 million dollars and the government loans 60 million dollars from the Treasury to improve the levels of productive innovation nationwide.

The resources managed by Innóvate Perú are awarded through national tenders for the non-reimbursable co-financing of projects of Research, Development and Innovation, in all productive sectors. Innóvate Peru covers several areas such as financing offers, business innovation, technological absorption, entrepreneurship, and services to innovation. Up to now, 60 projects have already been financed by FIDECOM, 60 projects by FINCyT, and 14 by other institutions (FOMITEC, 2018).

In 2018, CENTRUM Católica Graduate Business School's Center for Innovation and Sustainability of was launched in Peru in order to stimulate applied research and promote innovation and the development of sustainable businesses. It is also intended with this initiative to increase the exchange of experiences in the Latin American sphere and strengthen the ecosystem of innovation and structuring of companies.

3. Evaluation of innovation policies

According to the study conducted by FINEP (2018), both Brazil and Peru have provided economic subsidies for innovation in companies since 2006, following the rules of the World Trade Organization. Even so, the invested resources are still insufficient, and the effectiveness of the incentive policies is still restricted due to the applicants' lack of knowledge or lack of positive results.

The scarcity of resources invested in innovation is a reality in Latin America. In recent years (2005-15), Peru has invested 0.12% of GDP in innovation, science and technology (CTI). In the same period, 1.17% of GDP was invested in R & D activities in Brazil. Nevertheless, the average of the countries of the Organization for Economic Cooperation and Development (OECD) was 2.4% of GDP in 2015 (World Bank, 2017).

Another problem is the limited effectiveness of instruments to stimulate innovation, such as laws and incentive policies. According to the National Association of Research and Development of Innovative Companies (Anpei) of Brazil: "These instruments did not have the force to encourage innovation in companies and sectors traditionally refractory to this type of effort. Nor were they able to leverage innovation in companies that were already innovative - to a large extent, the stimulus granted by the government replaced the investments that these companies might already have made, rather than multiplying them. The challenge is not exactly to increase companies' R & D spending, but to mobilize segments that invest little" (Marques, 2017).

Finally, another barrier that is founded is the low participation of firms in innovation investments. In Brazil, the participation of companies in the national R & D effort reached 47.1% of investments in 2014, below that of the United States (64.1%), Germany (65.8%) and Japan (77.9%). São Paulo is an exception in the Brazilian scenario, with 60% of state investments in R & D made by companies (Marques, 2017). This can be related to the lack of knowledge of policies to encourage innovation. In Brazil, even though the "Law of Good" is already almost fifteen years old, the demand for tax reductions granted to companies that invest in Research, Development and Innovation (P & ID) is still low. According to the most recent survey by the Ministry of Science and Technology (MCTI), only 991 companies benefited from the tax incentives granted by the federal government, a number included in the national universe (600,000, an amount that refers only to industry and services, to investment in R & D, according to data provided by IBGE) that represents a profit for less than 1% of companies (Macedo, 2018).

According to the Global Innovation Index (GII), Brazil is ranked 69th in the GII 2017, the same position as 2016, has 33.10 as index of innovation, but shows a retraction of 0.27% from last year. According to the study, Brazil's strongest pillar ranking is in Business sophistication (43rd), where it sees one of its highest rankings in IP payments (8th). Peru is ranked 70th in the GII2017; it has improved one position since last year, and obtained an index of innovation of 32.90, 1.2% more than last year. But, its best result was in 2013 when it was ranked 69th and obtained an index of innovation of 35.96 (The Global Innovation Index, 2017).

4. Conclusions

This paper presented the scenario of innovation and entrepreneurship in Brazil and Peru from the perspective of development programs and policies aimed at improving the quality and impact of entrepreneurship. The following are the main conclusions of this work:

First, it is pointed out that countries and companies seek to increase innovation and entrepreneurship but face challenges and barriers, and that policies and practices of the public and private sectors need to be improved.

Second, concepts and reflections on entrepreneurship and innovation are introduced. Through a brief history on the subject in Brazil and Peru, it is indicated that the implementation of several policies aims to stimulate innovation and entrepreneurship, and that entrepreneurship occurs more markedly in countries with fewer work opportunities and with a low GDP per capita.

Third, when evaluating innovation policies, it is perceived that the invested resources are still insufficient, and the effectiveness of the incentive policies is still restricted due to the lack of applicants' knowledge or to the lack of positive results.

Finally, this paper warns about the importance of public power in the process of encouraging and consolidating innovation and entrepreneurship in these territories. It is also recommended to increase business research and university-business partnerships. It should be noted that the institutions that act to stimulate entrepreneurship and sustainable business development are essential in the ecosystem of innovation and structuring of companies.

Therefore, research in this area is fundamental to guide development policies and stimulate business competitiveness. It is considered that this paper will be very useful to the public and private sectors and to academia since it aims to stimulate future research on the subject.

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References

Arbix, G. (2007) Inovar ou inovar: a indústria brasileira entre o passado e o futuro. São Paulo: Papagaio.

Aydogan, N. (2009) Innovation policies, business creation and economic development: a comparative approach. Colección: International Studies in Entrepreneurship, 21, pp 1-299. Springer, New York, United States.

Banco Mundial (2011) What is INCAGRO Peru?, [online], http://siteresources.worldbank.org/INTARD/Resources/INCAGRO.pdf.

Banco Mundial (2016) World Bank Open Data. [online], https://data.worldbank.org.

Banco Mundial (2017) Gasto en investigación y desarrollo (% del PIB), [online], https://datos.bancomundial.org/indicador/gb.xpd.rsdv.gd.zs.

https://datos.bancomundial.org/indicator/TX.VAL.TECH.CD?end=2016&locations=BR&start=1989&view=chart.

Barboza, R.A.B.; Fonseca, S.A.; Ramalheiro, G.C.F. (2017) "The role of public policies to enhance innovation in low-tech small firms", REGE - Revista de Gestão, 24, pp 58–71.

Brenes, E.R.; Camacho, A.R.; Ciravegna, L.; Pichardo, C.A. (2016) "Strategy and innovation in emerging economies after the end of the commodity boom—Insights from Latin America", Journal of Business Research, 69, pp 4363–4367.

Calmanovici, C. (2011) "A inovação, a competitividade e a projeção mundial das empresas brasileiras". Revista USP, [online] (89), http://rusp.scielo.br/scielo.php?script=sci_arttext&pid=S0103-99892011000200013&lng=es&nrm=iso&tlng=es.

Carta Campinas (2017) 54% dos empregos gerados no Brasil estão em micros e pequenas empresas, [online], http://cartacampinas.com.br/2017/09/54-dos-empregos-gerados-no-brasil-estao-em-micros-e-pequenas-empresas/.

Cepal.org. (2015) Panorama de América Latina y El Caribe, [online], https://www.cepal.org/sites/default/files/presentation/files/150420_final-panorama_economico_y_social_de_la_region_lima.pdf.

Chiavenato, I. (2007) Empreendedorismo: dando asas ao espírito empreendedor: empreendedorismo e viabilidade de novas. 2nd ed. São Paulo: Saraiva.

Concytec (2018) [online], https://portal.concytec.gob.pe/index.php/concytec/quienes-somos.

Datos.bancomundial.org. (2016) Exportaciones de productos de alta tecnología (US$ a precios actuales)

Datosmacro.com (2018) Índice Mundial de Innovación 2017, [online], datosmacro.com., https://www.datosmacro.com/estado/indice-mundial-innovacion?anio=2017.

Datosmacro.com (2018) PIB Producto Interior Bruto 2017, [online], datosmacro.com., https:// https://www.datosmacro.com/pib.

Dornelas, J. (2014) Empreendedorismo: Transformando Ideias em Negócios, 5, Rio de Janeiro: Empreende/LTC.

Drucker, P.F. (1993) Post-Capitalist Society. New York: HarperCollins, ISBN: 978-0-7506-0921-0.

EFE, A. (2017) Perú confía en batir récord de exportaciones en el 2018 llegando a US$ 50,000 millones, [online], Gestion, https://gestion.pe/economia/peru-confia-batir-record-exportaciones-2018-llegando-us-50-000-millones-221894.

Elache, F.L. (2003) Qualidade do atendimento aos clientes do Programa Brasil Empreendedor em Curitiba/PR. Universidade Federal do Rio Grande do Sul. Mestrado profissionalizante em Engenharia, Rio Grande do Sul, [online], http://hdl.handle.net/10183/3743.

Finep.gov.br. (2018) Histórico, [online], http://www.finep.gov.br/a-finep-externo/historico.

FOMITEC (2018) FOMITEC - Innóvate Perú, [online], https://www.innovateperu.gob.pe/quienes-somos/nuestros-fondos/fomitec.

GERA (2018) Global Report 2017/2018, [online], http://www.gemconsortium.org/report.

Gestión (2017) ComexPerú: Mypes siguen aumentando pero formalización no avanza, [online], https://elcomercio.pe/economia/negocios/informalidad-micro-pequenos-negocios-peru-noticia-noticia-448518.

Guzmán-Alfonso, C.; Guzmán-Cuevas, J. (2012) "Entrepreneurial intention models as applied to Latin America". Journal of Organizational Change Management, 25(5), pp721-735, https://doi.org/10.1108/09534811211254608.

Huamán, J. (2014) Impacto del Programa INCAGRO en la formación de redes de innovación en el periodo 2005-2010, Msc. Pontificia Universidad Católica Del Perú.

Iacono, A.; Nagano, MS (2014) "Innovation management in technology-based enterprises: evidences in an enterprise incubator in Brazil". Interciencia, 39(5), pp 296-306.

Ian Chaston, Gregory J. Scott, (2012) "Entrepreneurship and open innovation in an emerging economy", Management Decision, 50(7), pp 1161-1177, https://doi.org/10.1108/00251741211246941.

IBGE - Instituto Brasileiro de Geografia e Estatística (2016) Pesquisa de Inovação Tecnológica (PINTEC), IBGE, Rio de Janeiro.

Ketelhöhn, N.; Ogliastri, E. (2013) "Introduction: innovation in Latin America", Academia Revista Latinoamericana de Administración, 26(1), pp 12-32, https://doi.org/10.1108/ARLA-05-2013-0037.

Macedo, F. (2018) Benefícios da "Lei do Bem" não são aproveitados, [online], http://politica.estadao.com.br/blogs/fausto-macedo/beneficios-da-lei-do-bem-nao-sao-aproveitados/.

Marques, F. (2017) Financiamento em crise, FAPESP, [online], http://revistapesquisa.fapesp.br/2017/06/19/financiamento-em-crise/.

Mingo, S. (2013) “Entrepreneurial ventures, institutional voids, and business group affiliation: the case of two Brazilian start-ups, 2002-2009”, Academia Revista Latinoamericana de Administración, 26 (1), pp 61-76, https://doi.org/10.1108/ARLA-05-2013-0040.

Nsf.gov. (2018) Report - S&E Indicators 2018 | NSF - National Science Foundation, [online], https://www.nsf.gov/statistics/2018/nsb20181/report/sections/industry-technology-and-the-global-marketplace/patterns-and-trends-of-knowledge--and-technology-intensive-industries.

OCDE – Organização para Cooperação Econômica e Desenvolvimento (2005) Manual de Oslo: diretrizes para coleta e interpretação de dados sobre inovação, OCDE/FINEP, Paris.

Olavarrieta, S.; Villena, M.G. (2014) “Innovation and business research in Latin America: An overview”. Journal of Business Research, 67, pp 489–497.

PERU21, R. (2017) Exportaciones con alta tecnología aún son pocas, [online] Peru21, https://peru21.pe/economia/exportaciones-alta-tecnologia-son-373545.

Pino, C.; Felzensztein, C.; Zwerg-Villega, A.M.; Arias-Bolzmann, L. (2016) “Non-technological innovations: Market performance of exporting firms in South America”. Journal of Business Research, 69, pp 4385–4393.

Portal.concytec.gob.pe. (2018) Primer Censo revela baja inversión en investigación y desarrollo en el Perú, [online], https://portal.concytec.gob.pe/index.php/noticias/1051-primer-censo-revela-baja-inversion-en-investigacion-y-desarrollo-en-el-peru.

Porter, M.E. (1999) Competição = On Competition: estratégias competitivas essenciais. Campus, Rio de Janeiro.

Rauch, A., Frese, M.; Wang, Z-M.; Unger, J.; Lozada, M.; Kupcha, V.; Spirina, T. (2013) “National culture and cultural orientations of owners affecting the innovation – growth relationship in five countries”, Entrepreneurship & Regional Development, 25 (9–10), pp 732–755, http://dx.doi.org/10.1080/08985626.2013.862972.

Schumpeter, J. (1934) The Theory of Economic Development, Harvard University Press, Boston, MA.

SEBRAE (2017) O empreendedorismo e o mercado de trabalho. Relatório especial. Brasília, [online], http://www.bibliotecas.sebrae.com.br/chronus/ARQUIVOS_CHRONUS/bds/bds.nsf/70d1237672d36de1ba87890e4cb251cc/$File/7737.pdf.

Silva, ALS; da Cruz, CAB; Gomes, IMD; Paixao, AEA (2017) “Best University Incubation Programs in Latin America”, Revista Tecnologia e Sociedade, 13(29), pp 85-102.

SUNAT (2018) Beneficio Tributario Ley N° 30309, [online], http://orientacion.sunat.gob.pe/index.php/empresas-menu/impuesto-a-la-renta-empresas/preguntas-frecuentes-impuesto-a-la-renta-empresas/6757-05-preguntas-frecuentes-beneficio-tributario-ley-n-30309-gastos-en-investigacion-desarrollo-tecnologicoe-innovacion-tecnologica-i-d-i.

The Global Innovation Index (2017) Innovation Feeding the World. Tenth edition, [online], http://www.wipo.int/publications/es/details.jsp?id=4193.

Tidd, J., Bessant, J. (2015) Gestão da inovação, 5 ed. Porto Alegre: Bookman.

Zahra, S.A.; George, G. (2002) “Absorptive Capacity: A Review, Reconceptualization, and Extension”, The Academy of Management Review, 27 (2), pp 185-203.

The Institutional Analysis of Development of Social Entrepreneurship in the USA, UK and Germany

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Abstract: Since the beginning of the world economic crisis the level of unemployment across different countries increased significantly and so did social and welfare polarization of people. Under these conditions the emergence of social entrepreneurship could be viewed as an additional opportunity for the disadvantaged people to enhance their welfare and improve their living quality. As all the phenomena of such kind its activity should be coordinated by some special institutions in order to develop successfully, thus enhancing its aggregate performance. According to the rating of the Global Entrepreneurial Monitor (GEM), the United States have the highest rank in the growth rate of social enterprises for a short-time perspective, which can be determined by the effect of such factors as Community Development Financial Institutions (CDFI), which provide some incentives for the business as well as for the communities to take part in the social projects. The paper reviews different kinds of economic systems inherent to certain types of integration between financial and industrial resources. So, the system of industrial development of the USA relies in most part on the stock market, while that of several European countries, such as the United Kingdom and Germany prefer to use credit resources, or the loan capital, though the United Kingdom is known as a country that has a highly developed stock market system. In contrast to that, the financial systems of the developing economies, such as the Russian one, present to use both types of the financial systems aforementioned and combine the microcredit institutions with those of stock market. The paper contains some implications for such countries suggesting them to consider some opportunities of evolving their market-based institutions and bank sector to create a more suitable institutional system to support the development of social entrepreneurship.

Keywords: social entrepreneurship, institutions, market-based systems, ethical markets.

1. Introduction

Social entrepreneurship has become a very popular phenomenon among different scholars nowadays. It presents a great interest not only because of its extraordinary nature, but also due to the paradigm crisis of the neo-liberal economic model, whose features are becoming increasingly evident for the recent times. The events which happened on 17 September 2011, when the protest movement 'Occupy Wall Street' began in Zuccotti Park, were impressionable by their scale and impact. The wave of protest movements all over the world that followed this action showed that the social discontent with economic inequality of people has been growing. According to the U.S. Census Bureau data, the proportion of overall wealth — a measure that includes home equity, stocks and bonds and the value of jewelry, furniture and other possessions — held by the top 10% of the population increased from 49% in 2005 to 56% in 2009 (Morin, 2012). At the same time the share of economically excluded people is growing steadily, which is evidenced by the recent data on the high rates of unemployment in Portugal and Spain. It is interesting to note that the left movement ideology has attracted lots of new followers which reflects, in particular, in the Marxism revival. 'Why Marx was right?' by T.

Eagleton proved to be a bestseller since lots of problems, connected with the system peculiarities of the paradigm being criticized by the contemporary scholars, were efficiently elaborated in the Marxist' terms and some disturbances in the social and economic system resulted from the current trends of the mainstream policy were emphasized against the same disturbances the world economy faced more than a century ago (Eagleton, 2011). Such analogies have become of a great importance allowing for the crisis of methodological tools in the modern economics. Besides, the legitimacy of the left political movement in Europe is increasing, which is evidenced by the victory of the social-democrats at the last parliamentary elections in several European countries. These are, in turn, the signs of poverty growth, labor migration, social exclusion and the failure to solve such problems by means of traditional ways of applying market mechanisms. Such challenge suggests to think about social entrepreneurship as a possible way to mitigate the distortions stated above. It can be viewed not only as an economic or social phenomenon, but also as a political movement, as it challenges the dominating paradigm at all the levels of its pervasion, forcing the governments to introduce some important radical measures aimed at supporting its development.

2. The classification of institutions fostering the development of social entrepreneurship

The available literature on social entrepreneurship allows us to argue that there were several attempts to classify this phenomenon, though they were based upon a certain criterion, regardless of the fact that it might have different scales of development. In this context the classification provided by A. Nicholls (2007) seems to be successful, as it challenges the dominant paradigm at different dimensions. According to it, social enterprises challenge the dominant paradigm at three levels, micro (the enterprises), meso (new markets; intermediaries) and macro (socio-economic impact; policy implications). These refer to social enterprises that (1) respond to market failure and/or "institutional void" by developing new products and services, (2) contribute to the reconfiguration of markets to generate new or increased social value and (3) challenge institutional arrangements through political action. From Nicholls' point of view, the third level of institutions should be presented by social enterprises. Though it is rather an excessive assumption, as in addition to social enterprises they should also involve the ways of mitigating social problems at the micro-level, which become embedded into an original institutional form. Thus, in order to enable an adequate reflection at micro-level, different ways of eliminating social cataclysms within a given micro-environment should be included into this concept, which don't necessarily have the form of social enterprises. Thus, if we imagine the hierarchy of social entrepreneurship institutions, we'll get the picture as that presented in Figure 1. It's an improved version of Nicholls' classification as a pyramid with three levels, the first of which should present the macro-level institutions, the second deals with the activities of intermediaries and markets, e.g. social capital markets, and the third one presents the myriad of the local country- and region-specific institutions which are inherent to the particular place shaping its origins and nature, while contributing in some way to forming the relative institutions at the meso-level. The intermediaries presenting a nexus of some financial institutions designed to support social enterprises can be viewed as meso-level structures coordinating the activities of those from the bottom level. So, Community Development Financial Institutions (CDFIs) in the United States can exemplify this kind of institutions, as they present a network of special innovative financial mechanisms embedded in the current institutional structure surrounding communities. The macro-level institutions are those which influence much the dynamics of social entrepreneurship as a socio-economic phenomenon in the given country or worldwide. They can be embedded in certain regulations, laws, policies or some original institutions, which are capable to change the existing status quo at the level of a given country, not within certain communities or districts.

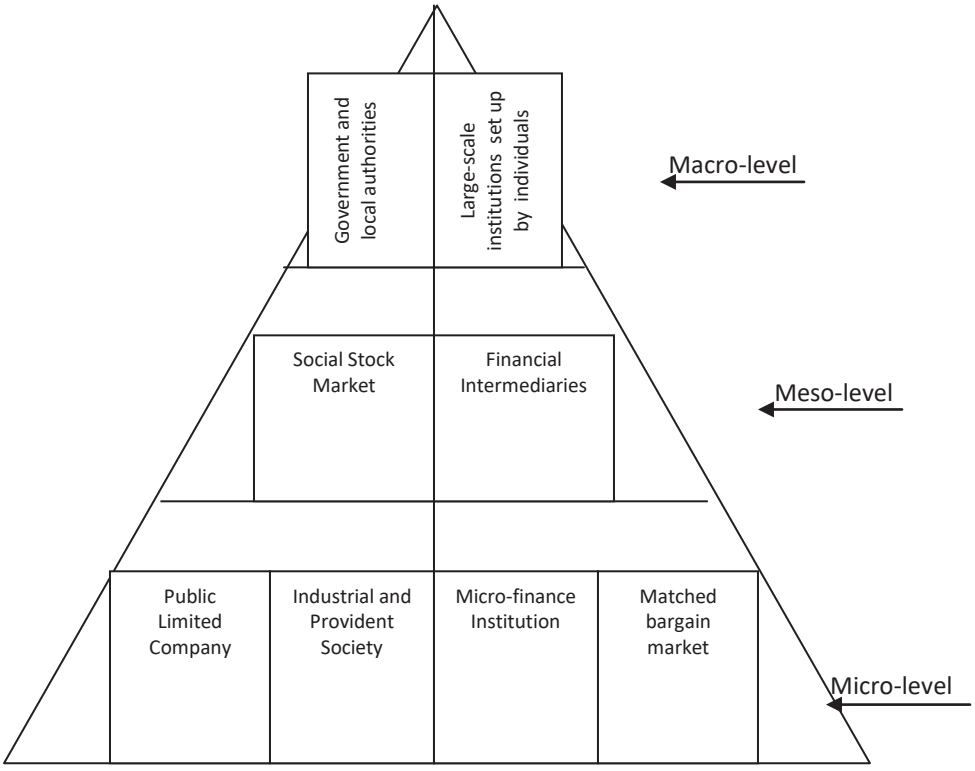

Figure 1: Three levels of social entrepreneurship institutions

2.1 Social reforms as macro-level institutions

The macro-level institutions of social entrepreneurship can be presented as the result of the impact executed by a politician or a public figure. It can be formalized into the system of certain institutions, as well as be realized within a certain political strategy. The first case can be exemplified by a famous public figure Elena Panaritis, who initiated the property rights reform in Peru, which improved significantly the life quality not only of the residents, but of the immigrants as well. Allowing for that the system of regulating property rights was rather disorderly and hazardous in this country, as the houses of people were not secured properly against any fraud, she undertook a special reform designed to improve the situation in this area and to fill the institutional gap with a special agency called "Registro Predial". It was a special registry designed to refine the system of securing and enforcing the property rights. In 1996 Peru's government agreed to extend the property rights reform nationwide, with funding from the World Bank. The government created a new commission, Cofopri, which would work in tandem with "Registro Predial", sharing the process of transforming Peru's property market, which Panaritis called transforming the "Unreal" to Real. The reform did more than change perceptions, however. The security created by the new property rights system generated tangible social and economic benefits for formal property owners that were not available to informal owners and the formal property rights led to the increasing of entrepreneurial activity in those communities as the formal documentation enabled significant increasing in private-sector loans (Panaritis, 2007). It is not surprisingly that due to such action Panaritis is called "a social entrepreneur" (Panaritis, 2018).

Another case of social entrepreneurship at the macro-level is connected with some political measures introduced by the former US president Bill Clinton. Like Panaritis, Clinton managed to improve the live-being of the poorest people through a political initiative. He managed to force the financial institutions to provide loans for the low-income communities, while most of them refused to do that before. According to the amendment of 1995 to the Community Reinvestment Act of 1933, they might be closed in the case of refusal. Such measure can be treated not only as social, but also as entrepreneurial, as it had the same effect as that implemented by Panaritis. As a result, the early-stage social entrepreneurial activity (SEA) increased greatly and achieved the level of 4,2 % by 2009 in the United States, being the highest rate among different countries (see Figure 2). SEA is the social equivalent of the total early-stage entrepreneurial activity index (TEA) which is measured as the percentage of a country's working-age population who are actively trying to start a new business (nascent entrepreneurs) and those who at least partially own and manage a business less than 3.5 years old (a baby business). The highest rate of early stage social entrepreneurial activity can be explained in part by the environment encouraging people to engage in business of such kind. That environment for the most part was formed under the period of Clinton's presidency.

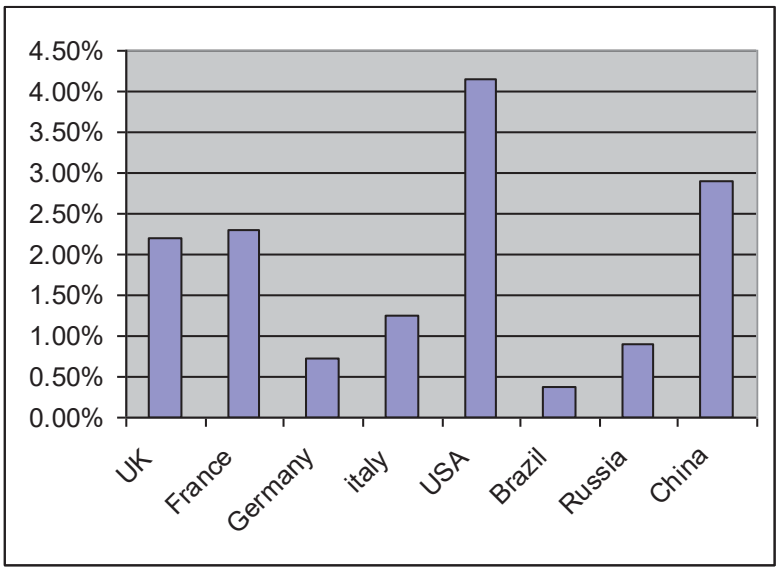

Figure 2: Early-stage social entrepreneurial activity (SEA) rate in different countries, 2009

Source: GEM (2009)

2.2 Social stock market and loan stock institutions at the meso-level

The meso-level institutions present the intermediary level in this structure. Marking this group of institutions as a specific category is of great importance because it is not only a superstucture over that beneath, but is also a factor which shapes and determines the behavior and performance of the micro-level institutions. So, for instance, the social capital market which is coordinated by a network of international financial organizations, such as the International Association of Investors in the Social Economy which was thoroughly investigated by Mendell and Nogales (2009), can be viewed as a cluster which originated from the bottom of this pyramid, but it can influence significantly the subsequent trends of development of micro-institutions worldwide. In this context the emergence of a social stock market should be mentioned. For the recent decade there were several attempts in the world aimed at constructing some mechanisms to enable social enterprises to act as conventional business enterprises – that is to provide them with the opportunity to issue shares, but allowing for the high-level risk connected with their trading at an ordinary stock exchange, it should be advisable to let them trade at a special stock exchange designed for that. So, the United Kingdom and Germany can play a pivotal role in installation and deployment of such mechanisms. Whereas the former belongs to the market-based countries range, the latter belongs to another group, consisting of bank-based countries, but it didn't miss the chance of adopting such mechanisms which seem to be effective. A special meso-institution, such as the Social Stock Exchange Association (SSEA), has been operating in Germany for the recent 5 years. It is designed not only to ensure forming the social stock market within this country, but also expands its influence abroad to help other countries which are engaging in such difficult and controversial process. Though this institution is implementing a pilot project in Germany, it is also engaged in similar activities in Portugal, where the processes of launching a social stock exchange are well underway. Moreover, it organizes different events for similar initiatives to get involved, collaborate and learn from each other's experience (SSEA, 2013). The initiators of such project are deemed to be aware of the financial risk connected with the assets of social enterprises, implying the low return rate on the capital invested. The main task of SSEA project in Germany is to create a platform that will offer investors some clear comparability on the social and technological impact on their investments, which will yield a slightly lower (single digit) financial return. Though this platform is not launched yet, it has a preliminary stage which expressed in the meeting which was held on 25 March 2011. At this meeting five social ventures were pitching to a dozen investors for a financing volume of roughly € 20 million (Kuhlemann, 2011). We should think that taken such event as the first indicator characterizing the activity of social stock market in Germany nowadays, we can make a conclusion that in any case Germany leaves behind the UK where the total sum raised from the ethical issue shares amounted £ 50.1 million by 2005 (Hartzell, 2007) that equals € 58.6 million which is about three times as many as this value.

Table 1: Number of Ethical Share Issues and Total Raised in the UK

Period	Number of issues	Total raised (£ million)
1984-1990	6	3.35
1991-1995	8	4.17
1996-2000	13	10.55
2001-2005	16	32.03
Total	43	50.1

Source: Hartzell (2007)

The process of launching the social stock exchange in the United Kingdom is also still ongoing, as well as in Germany. Nevertheless there are several ways of executing such operations beyond such exchange. Such operations are possible due to a three-step system of ethical share investment in the UK which presents a way for social enterprises to adopt their abilities within a less stringent environment than that for the existing business enterprises. So, these steps are: the Off-Exchange (OFEX), the Alternative Investment Market (AIM) and the London Stock Exchange (LSE). All of them can be considered as a hierarchical tree, in which companies graduate from one level to the next as they grow in size. Indeed, AIM was established by the LSE for companies being at their earlier stages of development. The markets which are higher up the tree offer greater liquidity, but are more expensive to list on and the listing requirements are more stringent in terms of disclosure of the price sensitive information. Thus a company might first choose to list on OFEX, where the cost of listing is only around £ 10,000 a year or less, but trading there can be deceptive, as some OFEX shares are not traded at all for long periods. The share price then remains static and may not reflect the value that a share might achieve in a more liquid market. The lack of competition and the absence of due confidence among investors cause the fall in the share price. Although many companies go straight to AIM, a listing on OFEX is often a first step towards an AIM listing. But AIM is a very important step for social enterprises, as it is a chance for them to attract some major institutional investors. However, fees for listing on AIM are likely to

be between £ 300,000 and £ 500,000 even excluding marketing costs (Hartzell, 2007). For a social enterprise, where a high profit level is not to be expected, share issues therefore need to be in the range between £ 10 to £ 20 million to stand a chance of covering the costs of fees. Raising this level of investment is often unrealistic, allowing for the financial condition of social enterprises. The larger of the AIM companies move to the London Stock Exchange. Some of them have a balance sheet as small as £ 10 million, but most are much larger. However there is a threat of a hostile takeover for the enterprises seeking to attract large amounts from the institutional investors or venture capitalists. That is also the reason which prevents social businesses from being the actors on the mainstream market.

While the UK demonstrates an example of enhanced activity in the field of social stock operations, Germany appears to be one of the leaders on the development rate of microfinance institutions (see Table 2) and in this sense matches its position as a bank-based country absolutely. In most part Germany's successes in the development of microcredit system can be explained by the effective performance of such meso-institution as the German Microfinance Institute, as it provides a wide range of different services, in particular, counseling and training for MFIs (e.g. their loan officers), designing electronic loan processing tools and accrediting MFIs for the risk capital fund which is called "Microfinanzfonds Deutschland" (El-Zoghby, Gähwiler, Lauer, 2011).

Table 2: Main microfinance indicators in selected European countries in 2007

	Microfinance Indicators			
Country	**Number of loans disbursed**	**Total value of loans disbursed (EUR M)**	**Average Loan Size (EUR)**	**Average Interest Rate (%)**
Germany	4,625	52,276,375	11,303	6.92
Italy	3,223	22,451,418	6,966	5.80
Spain	8,773	97,800,000	9,943	5.00
UK	1,252	13,420,000	10,718	13.40
Romania	2,496	18,847,296	7,551	-
Bulgaria	68,348	432,890	6,334	-
Czech Republic	-	-	4,500	-
Slovakia	982	155,000,000	157,841	6.50
France	121,000	852,500,500	7,045	0.5
Poland	130,888	-	2,024	11.00
Netherlands	43,508	739,636,000	17,000	-
Hungary	104,754	371,876,700	3,550	-

Source: Kraemer-Eis and Conforti (2009)

2.3 Matched bargain market in the UK as an example of micro-level institutions

As in the United States and Germany the social capital market is only at the stage of installation, while in the United Kingdom it is at the stage of deployment yet, we'll focus only on the English institutions as having settled fundamentally and providing a very valuable experience on this point. In this country a company not listed on the mainstream markets can usually only trade its shares through a matched bargain market. This is usually run by a broker or a recognized financial institution, and involves holding a list of buyers and sellers of the shares and matching them at the price they both wish to pay. So the matched bargain market for a certain enterprise can be viewed as a micro-level institution. Matched bargain markets usually operate for one company in isolation rather than for several companies. Moreover, the Financial Services and Markets Act limits the extent to which the investment can be marketed. Price-setting on a matched bargain market is usually a haphazard affair. Quite often it is left to buyer and seller to agree, but if any price at all is recommended, it is usually the broker running the market who would recommend a price, based on information provided by the company. Thus in a matched bargain market, the company itself has much more control over the share price. This is usually regarded as an unsatisfactory situation open to abuse, as two conditions necessary for an efficient stock market are not met. The first one is that the market is sufficiently liquid for expectation of value to be quickly reflected in the current price. The second is that investors have all and equal information available to them surrounding the situation of a company. When these conditions are not met, anomalies occur and some individuals can benefit over others due to the drop in the share price as stated in the previous subsection.

Speaking about matched bargain markets, it's interesting to note that those companies which didn't list on OFEX and AIM have achieved wonderful results. To approve our suggestion derived in the previous section that the division of countries according to the criteria, whether it is a market- or a bank-based system, coincides with the development of the same kind institutions for social enterprises in these countries, we'll

provide some data concerning the growth of capital amount raised as a result of share issues by three most successful social enterprises of the United Kingdom: Ttaidcraft, Shared Interest and Wind Fund.

Table 3: Three leading social enterprises in the amount of shares issued

Company	Year	Legal form	Type of investment	Amount raised (£M)
Traidcraft	1984	PLC	Share	0.3
	1986	PLC	Share	1
	1991	PLC	Share	0.4
	2002	PLC	Share	3.25
Shared Interest	1995	IPS	5 Year Loan stock	0.65
	1996	IPS	5 Year Loan stock	0.85
	1997	IPS	5 Year Loan stock	1.2
Wind Fund	1995	PLC	Share	1
	1998	PLC	Share	1.3
	2005	PLC	Share	4.75

Source: Hartzell (2007)

Thus, according to these indicators, we can conclude that all the three companies achieved such great results, having issued their shares beyond the mainstream market, but whereas Traidcraft and Wind Fund are public limited companies (PLCs), Shared Interest is an industrial and provident society (IPS) which has a limited ability to attract funds. Moreover, the redemption period for the bonds issued by IPSs is rather short. So, the investors usually have less opportunities to buy and sell such bonds, as they would have dealing with bonds issued by a conventional business enterprise. Wind Fund happened to be the most successful among these companies, as it managed to raise its capital from £ 1 million in 1995 to £ 4.75 million в 2005, which is comparable with AIM in its scale. Though Traidcraft managed to have even 2,400 shareholders, while the average number of the AIM company' shareholders is around 800 (Hartzell, 2007). This fact suggests that a matched bargain system presents something like an economic miracle, which is developing intensively, according to its immanent laws, and has an ability to surpass the existing formal markets.

3. The system of microcredit institutions and social stock exchange in the USA, Germany and the United Kingdom

The model of institutions presented here is a sophisticated version of Nicholls' classification, which enables us to make it clear, what kind of financial institutions are best developed in the particular country at the particular level. So we can compare the respective institutions of social entrepreneurship in these countries with their profiles – whether it is a market-based or a bank-based system, according to the classification presented by Demirguc-Kunt and Levine (2003). In bank-based financial systems, such as Germany and Japan, banks play a leading role in mobilizing savings, allocating capital, overseeing the investment decisions of corporate managers, and in providing risk-management vehicles. In market-based financial systems, such as England and the United States, securities markets share center stage with banks in terms of getting society's savings to firms, exerting corporate control, and easing risk-management. Table 3 presents three countries, two of which are market-based (the United States and the United Kingdom) and the third is bank-based (Germany). The distribution of the respective institutions for social entrepreneurship looks like that for the commercial sector in these countries.

Table 4: The loan capital and social stock institutions in the USA, Germany and the United Kingdom

	USA		Germany		United Kingdom	
	Loan Capital Institutions	Social Stock Institutions	Loan Capital Institutions	Social Stock Institutions	Loan Capital Institutions	Social Stock Institutions
Macro-institutions	Community Reinvest-ment Act of 1977 as amended further	The United States Securities Act of 1933	The Act amending the German Investment Act of 2003 (the Amendment Act, 2007)	The Stock Exchange Act of 1896 as amended further	Community Investment Tax Relief, Credit Unions Act	Financial Services and Markets Act; AIM Rules for Companies
Meso-institutions	Community Develop-ment Financial Institutions	Green Stock Exchange (launched in 2014)	The German Microfinance Institute (Deutsches Microfinanz Institut); The Microfinance Fund Germany	Social Stock Exchange (launched in 2013)	Community Development Loan Funds	OFEX, AIM, LSE, Social Stock Exchange (launched in 2013)

			(Microfinanzfonds Deutchland)			
Micro-institutions	Web-resource 'www.kiva.org'	Impact investing organiza-tions	GLS Bank	NExT SSE	FINCA UK	Triodos mathed bargain market

Different laws, regulations and standards coordinating the activity of the respective fields of social investment systems presented here are treated as macro-institutions. Community Reinvestment Act of 1977 with the amendment of 1995, which resulted in increasing the opportunity window for the low-income households, is worth mentioning first. The Act amending the German Investment Act of 2003 (also known as the Amendment Act of 2007 played a major role in forming an environment for the development of microfinance institutions in Germany. It enabled the emergence of two meso-institutions in microfinance area: the German Microfinance Institute and the Microfinance Fund "Germany". As for the system of regulating social stock exchange, it should be stressed once more that the most successful pattern of it is represented by the UK financial system which is, in turn, a market-based country. Maybe that is the reason of its leadership among all the other European countries. In addition, the system of regulating transactions in AIM is simplified so that AIM companies are supervised by a nominated adviser (referred to as a "nomad") rather than by a securities regulator (in the UK, this is the Financial Services Authority (FSA). All the transactions of AIM companies are subject to the AIM Rules for Companies (AIM Rules). AIM's simplified admission procedures generally result in savings in time and cost for an AIM admission as compared to a main market or other listing. In most part the creation of such institution was predetermined by the increased activity of matched bargains, which was, in turn, caused by the traditions of using stock exchange as a leading mechanism to support industrial development in this country.

4. In conclusion

So, in conclusion we can say that the results of the paper suggest that we shouldn't draw any compelling conclusions in such way that in the market-based countries only social stock institutions can evolve or in the bank-based environment only microfinance institutions can emerge. The situation is much more complicated than it seems to be. The results of the study in some way are surprising. We see that despite the fact that the United Kingdom belongs to the category of market-based countries, the amount of its microcredit market is impressive and in Germany we see the active attempts to create the social stock market, though it is considered to be a bank-based country. So, the environment is not so strict that it should foster only those institutions that are typical for its kind, but at the same time the mainstream trend in the respective financial system belongs to that kind of institutions, which are more suited for that environment. So, the level of development of the social stock market institutions in the United Kingdom is higher than those in Germany, and the institutions of the social stock market operate more efficiently in the United Kingdom than in Germany.

Besides, one should say some words about the way of attributing these implications to the analysis of the situation in developing countries. For instance, Russia might be subsumed under the group of bank-based, rather that market-based countries because of its path dependence connected with long traditions of bank monitoring system, which originated in the Soviet Union and was performed by the State Bank. To speak about Russia as a market-based country presents a great difficulty, because it lacks the established class of social investors which is well represented in such countries as USA and UK thereby contributing to their image as market-based countries. Moreover, Russia has one of the lowest positions in the ranking of social responsibility of business across different countries, occupying the 37th place (Belova, 2011). Only Turkey has a worse position being at the bottom of the list. The implications derived in the paper could be valuable when planning the strategy of development for different countries. The link between the kind of economic system and the respective institutions of supporting social entrepreneurship should be taken into account when projecting the strategy of development of financial mechanisms for social enterprises in the respective countries. As the amount of the paper is rather limited we hadn't the opportunity to reinforce our implications by an empirical research. This task faces a problem of collecting data on the development rates of bank and market institutions in the respective countries, but it seems rather realistic to perform. So, maybe further it would be possible to construct a regression model showing the link between the level of development of market- and bank-based economies and the respective rates of social entrepreneurship' institutions in those countries.

References

Belova T. (2011) “The most socially responsible countries”, [online], RBK Rating, http://rating.rbc.ru/article.shtml?2011/06/09/33318359

Demirguc-Kunt, A., Levine R. (2003) “Bank-based and market-based financial systems: cross-country comparisons”, [online] World Bank, www-wds.worldbank.org/external/default/WDS ContentServer/WDSP/IB/1999/09/14/000094946_99072307505320/additional/126526322_200411172106.pdf.

Eagleton T. (2011) Why Marx was right, Yale University Press, London.

El-Zoghby, M., Gähwiler, B., Lauer, K. (2011) Cross-border funding of microfinance, Focus Note, No. 70, April, pp. 1-3.

GEM (2009) “United Kingdom 2009 Monitoring Report”, [online] Global Entrepreneurship Monitor, http://strath.ac.uk/media/departments/huntercentre/research/gem/GEM_UK_2009.pdf.

Hartzell J. (2007) “Creating an ethical stock exchange”, [online] Skoll Centre for Social Entrepreneurship, www.sbs.ox.ac.uk/Skoll/Ethical_Stock_Exchange.pdf.

Kraemer-Eis H., Conforti A. (2009) “Microfinance in Europe. A Market Overview”, [online], EconStor // https://www.econstor.eu/bitstream/10419/176631/1/eif-wp-01.pdf

Kuhlemann, A.-K. (2011) “NExT SSE to promote ‘crowd investing’ in Germany”, Alliance, Vol. 16, No. 2, 2 June, p. 10.

Mendell M., Nogales, R. (2009) “Social entrepreneurs in OECD member countries: what are the financial streams?” in The changing boundaries of social enterprises. Ed. A. Noya, Seoul, Work Together Foundation.

Morin, R. (2012) “Rising share of Americans see conflict between rich and poor”, [online], Pew Social & Demographic Trends, www.pewsocialtrends.org/2012/01/11/rising-share-of-americans-see-conflict-between-rich-and-poor/.

Nicholls, A. (2007), What is the Future of Social Enterprise in Ethical Markets?, Office of The Third Sector, London.

Panaritis Elena (2018) CV, [online], Elena Panaritis (personal webpage), www.elenapanaritis.com/cv

Panaritis, E. (2007) Prosperity Unbound. Building Property Markets with Trust, Palgrave Macmillan, New York.

SSEA (2013) “Two major lines of SSEA work”, [online], Social Stock Exchange Association, www.socialstock.eu/what/

How to Build Entrepreneurial Knowledge for University Students? Approaches from an European Perspective

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Abstract: Subjects concerning entrepreneurship are at the heart of European Union concerns. With growing international student mobility for decades now, many higher education institutions (HEIs) face a more diverse student body. The change of mobility patterns means that students' professional future is not necessarily anymore in their home country. At the same time higher education institutions are under increasing pressure to 'guarantee' the employability and a successful access to labor markets of their graduates. One of the challenges for HEIs, is to deliver a comprehensive education, to develop their graduates' employability relevant skills and support them with structures that ease either their integration in the national and the international labor markets. Entrepreneurship is as an engine for economic growth for young and senior people to create new business opportunities and corresponding jobs while increasing markets' competitiveness and innovation. Some higher education institutions provide with comprehensive trainings and courses, as well as guidance for those who want to become an entrepreneur. Therefore, the purpose of this paper is to show a case study about building entrepreneurial practices and knowledge together with a community of international partner universities, in order to enhance student's competences in relation to labor market, mainly focusing on entrepreneurship skills. Higher education institutions can foster entrepreneurship and, consequently, be entrepreneurs incubators by delivering a comprehensive and interactive education, developing their students' entrepreneurial relevant skills, as well as supporting them with infrastructures and guidance. In particular, HEIs can educate tomorrow' entrepreneurs by offering entrepreneurial summer schools. Summer schools have been key in this ongoing process of teaching students how to be entrepreneurs. We highlight the essence of the research as an innovative scenario for students to innovate and enhance the development of their business skills beyond our borders within educational atmospheres.

Keywords: entrepreneurship, entrepreneurship in business, higher education, summer school, innovation

1. Introduction

Providing optimal support for students and graduates when entering the labor market has become an integral part of the role of HEIs. The Bologna process led to an increase in the implementation of career services at European HEIs in order to strengthen the employability of their institution's graduates. In fact, in the 2014-2016 period, traineeship has showed an upward trend (European Commission, 2018a). Universities have developed strategies to internationalize their structures and to favor international mobility (study and placement). The number of students abroad doing an internship has grown a 14%, from 73,338 students (and recent graduates) in the first year of the Program implementation to 84,190 students in 2016 (European Commission, 2015; European Commission, 2018a).

The provision of student services, including career services, has become a key topic among academics and different stakeholders due to the growing numbers of mobile students (Perez-Encinas, 2017). A good provision of support services can attract and retain international students and meet their expectation as to provide with better structures and opportunities locally and internationally can enhance their general experience (ACE, 2016). To this respect, this paper explores how placement mobility as well as career services operate in an international and national level, where they normally focus on local. Two central questions are addressed, how fit are HEIs to facilitate international work mobility and how could international career service consortia support HEIs global ambitions?

2. Literature review

The increasing number of internationally mobile students reflected the expansion of tertiary education systems worldwide (OECD, 2013). Consequently, it is claimed that a more comprehensive approach to internationalization of higher education (Hudzik, 2014) will increase the awareness that internationalization has to become more inclusive and less elitist by not focusing predominantly on mobility but more on the

curriculum and learning outcomes (European Parliament, 2015). One indicator of the inclusiveness and the change of focus is the recent definition of internationalization by the Internationalization of HE study requested and published by the European Parliament (2015, p. 33):

> *"the intentional process of integrating an international, intercultural or global dimension into the purpose, functions and delivery of post-secondary education, in order to enhance the quality of education and research for all students and staff, and to make a meaningful contribution to society".*

In 2014 the ERASMUS + program was launched as the successor of the ERASMUS program, integrating other mobility schemes that were previously separate. The EU's program with a budget of €14.7 billion provides opportunities for more than 4 million Europeans to study, train, gain experience and volunteer abroad. It contributed to the achievement of strong, sustainable and balanced region's growth. In particular, it aims to tackle high levels of (young) unemployment and reduce poverty by promoting education system modernization and encourages cooperation and partnership of higher education providers, aside from serving as a vehicle for social inclusion, intercultural comprehension, and networking (European Commission, 2018a).

3. Benefits for students to work abroad

By moving abroad to work, participants face up to new challenges and unfamiliar situations related to live in a new environment that requires them to act with creativity, at the same time that enables them to develop autonomy and self-confidence. Moreover, students are more eager to work abroad once their traineeship experience was finished. Erasmus+ beneficiaries can be seen as more employable by promoting the acquisition of knowledge and competences that may not be taught at home and are demanded by employers to satisfy today's business needs (European Commission, 2015; European Commission, 2018b). In this sense, working abroad is a valuable opportunity for students to improve their CVs (European Commission, 2014), for instance by stressing newly developed skills, understandings and personal attributes (Yorke 2006, p. 8).

The *Erasmus for traineeship* has gradually grown in importance since Erasmus+ was launched. In the three years of implementation, around 235,000 students went abroad on traineeship, 20,500 of them being recent graduates (Erasmus+ annual report 2018b).

During this period, in the European context, the international dimension of higher education came to be managed less by incidental and individual initiatives and began to be structured into organized activities, projects and programs based on political rationale and driven more by national governments than by higher education itself (De Wit & Merkx, 2012). It was also at that time that internationalization started to be seen as a process that affected the institutional strategies of universities and a time to rethink support service structures. In particular, career services play a key role in supporting students in their school-to-work transition and in the acquisition or improvement of crucial skills and competences to gain an initial employment. A way career services may do so is by providing them with seminars, workshops, career counseling and information (Do Céu and de Nazaré, 2014). Moreover, career services help students to be aware about the existence of mobility programs to study or train abroad that allows them to enhance employability. Knight and Yorke (2003) suggested that employability improvement might be achieved through work experience, entrepreneurship modules, portfolio of achievement, and (good quality of) career advisers.

Yet, the delivery of support services varies significantly across European HEIs, having students getting information and support from different sources instead of a central and unified structure. For instance, international students may have to ask for information, advice or support on offices which originally where create to support only exchange students or on their enrollment department (Kelo & Roger, 2010).

Additionally, especially for European institutions there seems to be a lack in research literature around the internationalization of career services, which is not written from an Anglo-American perspective and that provides more in-depth knowledge about the heterogenic developments (cf. for American universities e.g. Kenyon & Rowar-Kenyon, 2014). How beneficial a broader view would be shows Kelo and Roger's (2010) innovative work, which analyzes student support provision in six European countries (Denmark, France, Germany, Italy, Poland, and UK) and found out that while Denmark has a well-established provision of international students support and advise - a task entrusted to each Danish HEI -, in Poland student services

provision has more room to improve. When it comes to international students' needs, still many European HEIs *find it difficult* to satisfy them.

4. Method

This paper is exploratory in nature and does not aim to generalize or to evaluate with statistical certainty. Instead it is as a first step based on desk research combining and interpreting already known statistics and surveys about careers services mainly in Europe under a new research interest – hence outlining main issues and challenges in the European careers service landscape with regard to global student work mobility facilitation. Based on the presentation of the current state of career services – we followed a case study approach to explore the benefits of a careers service consortium model for addressing some of the issues of part one. Part two follows generally Yin's guidelines for case study design. We applied an exploratory holistic single case analysis (Yin 2017, p. 26-32; see also Ridder, 2016). The case was chosen because the authors are involved with the career consortium implementation, which allowed us in-depth insights and produced intimate knowledge regarding the unit of analysis but it leads to the danger of bias. Yet, the danger of bias is rather limited since the purpose of the study is to develop propositions for further research and not to judge or assess overall impact or quality of the work conducted. The data was gathered mainly during evaluation sessions, where project participants discussed the stage and progress made during the project and through evaluation surveys for the different activities of the consortium. Additionally we had access to funding proposals, internal documentation and project outputs. We worked through the material "ground up" (Yin, 2017, p. 168-169) and analyzed it using a hermeneutical approach close to Yin's "logic models" (Yin, 2017, p. 194-195).

5. Context: How fit are HEI structures to facilitate global student work mobility?

As the literature review has shown, there are still many white spots if one wants to assess and compare career service work internationally, especially when it comes to something as specific as the internationalization of careers services. Relatively well documented is the structural situation of career services in Germany and their internationalization efforts. In the following section, we will examine the case of Germany in detail and contextualize it with findings from other countries (Netherlands, Sweden, Canada, Romania, Spain, Italy, France, UK, USA). Whilst this proceeding does not offer sufficient knowledge to give a quantitative global answer to the question, it helps to outline where further research is needed, what it should focus on and support the initial argument, that more intra- and inter-institutional cooperation is needed.

5.1 The German Case

In 2014 conducted the German rector's conference a survey amongst German career services and international offices, asking about their internationalization attempts (Böhm & Brandl, 2014). The same stakeholders published in 2015 a general report on the structural situation of career services in Germany (CSND, 2015). Additional valuable data to compare the German case internationally can be derived from the Expert Council of German Foundations on Integration and Migration's (ECGFIM) study "Train and Retain. Career Support for International Students in Canada, Germany, the Netherlands and Sweden" (2015) and data published by the Qareer-project (2017), which conducted a cross-national study with special focus on Italy, Romania, Spain and Poland. The main findings serve as a good indication for the current state of affairs but show as well that there is a dire need for more reliable academic research:

The HRK-survey (Böhm & Brandl, 2014) results show that German HEIs have started to internationalize their career services. More than 78 % of the answering institutions state that they already provide activities aiming to internationalize their services (e.g. trainings, projects, specific classes), which shows that these institutions recognize to a certain extend that facilitating support for the international dimension of careers is part of their responsibilities.

When asked about their main target group, about 61 % of the institutions identified international students trying to integrate into the German labor market, whilst 39 % stated that the focus of their internationalization activities aims at local graduates.

The responsibility for the integration of international students into the German labor market is largely assigned to career services (57 %), which are in Germany usually central departments (78,9 %). This is also reflected in the budget shares (without personnel). There is no target group specific activity receiving larger budget shares

than career service activities aimed at international students compared to activities specifically for i.e. men, women, doctoral students, disabled students, drop outs (cf. CSND, 2015).
The main challenge is a student body that might not be accustomed to the specifics of the German labor market, that might face prejudices and that might struggle with language barriers – so most career service's offers somehow aim to minimize the effects of these "disadvantages". The usual formats are application trainings, individual coaching for international students, language trainings and intercultural trainings (Böhm & Brandl, 2014). This is true for most countries according to the "Train and retain"-report (ECGFIM, 2015, p. 24-25). German HEIs, similar to Swedish universities, focus rather on students which are about to graduate with their services, whilst Canadian and Dutch HEIs tend to start early after enrolment and offer support throughout the study circle (ECGFIM, 2015, p. 22-23). Even though German institutions score high in targeting their services on international graduates compared to Canada, Sweden and the Netherlands, it is only in the Netherlands that using international alumni strategically in job market integration is a popular activity of career service work (ECGFIM 2015).

Unfortunately, there is not enough data to directly assess the extent of these measures and their impact. A problem which is quite common, when addressing the impact of career service work (Eimer, 2014). Whilst offering these services surely is a useful undertaking – we simply don't know – if for example supply and demand matches. In Germany we find for example the situation that on the one side one report states that only 31 % of international students were satisfied with the support received at German universities when looking for an internship (Esser & Gillessen 2014, p. 105; also ECGFIM, 2015 refers to the same report) and on the other side that career services in Germany more often than not are for data protection reasons not able to promote their offerings directly to the relevant target group (ECGFIM, 2015, p. 23).

So from an organizational perspective – communication is an issue. But even more severe is the resource question that makes a continuous need focused, ready-when-demanded service delivery rather unlikely. Thanks to the 'Train to retain'-report (ECGFIM, 2015) and the HRK-survey (CSND, 2015) one has a rough idea of the student-to-staff ratios in career services (Canada: 2,922:1; Germany: 7,283:1; The Netherlands 8,765:1; Sweden: 4,999:1). Though these numbers differ quite a bit from institution to institution, it is fair to say that it is close to impossible to imagine that all students could benefit from individual attention and counseling.

Considering that the student-to-staff ratios at international offices (Canada: 2,770:1; Germany: 2,082:1; The Netherlands 2,445:1; Sweden: 1,941:1) are much lower, it seems that organizational priorities (expressed in funding and resource allocation) do not favor career departments. The answers to the survey questions clearly refer to a lack of resources when asked about sustainability of internationalized services (Böhm & Brandl, 2014).

As the authors of the "Train and Retain" study wrote: "Despite international students' need for more systematic and coordinated job entry support at the local level, most of them encounter a poorly coordinated patchwork of occasional career fairs, job application training and chance acquaintances with service staff or company representatives who may or may not be able to help them" (ECGFIM, 2015, p. 4).

The countries in the above mentioned study belong to the rather well off countries and while in Germany for example the establishment of most career services is about 10 years ago, countries like for example Romania only started in 2014 with the establishment of university career services on a larger scale. The uneven development of careers services in Europe is also a reason that there are no commonly shared international standards of careers service work (Qareer, 2017), which leads also to the question of professional careers qualifications. Whilst the UK within the European context is leading in offering careers qualifications as fully recognized study programs on a university level, such high degree of professionalization is the exception not the rule in Europe (cf. Qareer, 2017).

When we shift our focus towards the outbound perspective, similar aspects way in:

There is a lot of financial support in the EU for students to support mobility. Students can apply for ERASMUS+ internship funds and/or government funding (e.g. BAFöG) in order to get some financial help when they go abroad (in 2013/2014 the National Agency managing ERASMUS funds in Germany alone allocated about 10.000.000 € for 6.500 students to do internships abroad and additional funding schemes are available).

According to the HRK's survey (Böhm & Brandl, 2014) around 39 % of the career services identified home students as their main target group for their internationalization activities. Organizing workshops that aim to enable students to find work abroad and/or intercultural trainings aiming to prepare graduates for a global work environment are the most popular services offered (ibid.). The survey answers suggest however that institutions quite often do not possess the necessary knowledge internally but must rely on external coaches providing these workshops (ibid.). About 29 % provide job boards, where also international job ads are published. Unclear remains how many students can benefit from such workshops and how well-connected career services are internationally. European universities rarely provide structured schemes that aim to place students with companies abroad, contraire to many north-American universities (cf. Kenyon & Rowan-Kenyon, 2014).

All outlined aspects considered, the patch work impression prevails. Though one finds admirable efforts at institutions and surely there was never a time when more has been done to support international work mobility, there still is a great deal of work to be done to improve services to support global work mobility.

5.2 Case study: Benefitting from inner- and intra-institutional cooperation

As shown, the main challenge for institutions to support their students are scarce resources. To build knowledge of foreign labor markets, to produce target group specific activities and resources for international students to integrate into the local economy and to build worldwide company collaborations is a very costly endeavor. Seldom are the necessary institutional resources in place to put a systematic strategy and aligned effective operations into practice.

One answer to limit the expense for individual institutions could be the participation in career service consortia. Considering the amount of HEIs worldwide there is enormous potential to connect and collaborate in order to improve student career mobility. Rooted in the context provided so far, we present in this part learnings of a ERASMUS+ strategic partnership project, that aimed to address many of the outlined challenges and to improve the service offer of the involved institutions – a transnational career service consortium operating under the name "European Centre for Career Development and Entrepreneurship" (ECCE).

The ECCE-consortium was established between Universidad Autónoma de Madrid, Universíta Cattolica del Sacro Cuore, Regent's University London, Paris School of Business and EBC Hochschule. The preparation phase started in 2014, in 2015 the initiative got funding through the ERASMUS+ Key Action 2-strategic partnerships.

The project partners aimed to create a small, operatively minded consortium, which should in its core work like a second-level-support for career officers. Meaning, the goal was not that now all German students would contact directly a Spanish career officer but rather that the colleagues collectively develop and share materials and job offers, train each other on labor market standards in their respective country, regularly liaise with each other, and are open for specific questions from their student-facing colleagues. This approach aimed to improve the availability of international know-how at all times and not only when external coaches where present, the institutional reach (meaning rather share company networks than trying to develop your own) and push inner- and intra institutional cooperation through the involvement of a diverse set of stakeholders.

Besides the classical career service responsibilities, the partners decided to add 'Entrepreneurship'-education to their consortium-portfolio to enhance cooperation within their own institutions and between institutions. The later decision allowed through project based summer schools on Entrepreneurship in Europe to train students. The basic assumption is that the core of entrepreneurship education is to foster problem-solving skills and initiative – both traits beneficial also for students aiming for a corporate career, hence here was a clear link to career service work (ECCE, 2015). The summer school curriculum was developed commonly involving academics and project managers from all institutions – also the summer school delivery is involving all institutions. Doing so allowed career service officers to expand their workshop offer, reach out and collaborate with colleagues from international offices and most importantly involved academics and entrepreneurs, which again brought their entrepreneurship knowledge and networks to the table and gained international teaching experience and the possibility to cooperate with like-minded academics from the partner institutions (ECCE, 2017a).

The heart of this network is a platform where the partners share resources like job-boards, application guides etc. and offer the possibility to match academics, students and other stakeholders who have an interest in

entrepreneurship in terms of research or actual start-up cooperation. This has been accompanied by staff training weeks for career service members, summer schools and the like in order to develop internationally-aware staff and students. The aim remains to keep the network small and foster deep relations between the involved career officers so that they truly benefit from their enlarged network in their day-to-day operations. At the same time, ECCE promotes the model and its experiences, since it wants other institutions to copy the model.

The long-term impact remains yet to be seen but several results indicate that pursuing such models could be worthwhile:

- *Career service.* Officers participating in the training expressed their high satisfaction with the training, and felt better prepared to advise their students and appreciated the exchange with their international colleagues. They also indicated that the work led to increased overall work satisfaction, as they have better target specific materials at hand to advice both inbound and outbound students. The overall international job offer has increased, though language remains a major obstacle for easy mobility.
- *Summer Schools.* Participants in the summer schools expressed very high satisfaction with learning outcomes and execution of the trainings; appreciated the enlargement of their international networks and oftentimes stayed in contact with their peers; several participants went on to put the learned into practice by funding their own business and led to spin-off projects
- *Collaboration.* The collaboration led to increased academic cooperation and to a larger network of entrepreneurs, academics, administrators and students supporting each other with advice and contacts. From initially 5 project managers there have been until now more that 50 people (without students) contributing to the success of the project from across institutions and institutional levels and external stakeholders
- *Institutions.* By now each institution has named fixed liaison career officers, which transform the initiative from project phase into institutionalization. Other institutions outside the network can benefit from the ECCE-experiences in utilizing several outputs which have been produced by the project team, such as a European career advisor curriculum, which synthesizes the learnings of the staff weeks, the ECCE-concept paper, which documents the project and key learnings, parts of the platform in order to enlarge the entrepreneurship community or a career guide for the involved partner countries, specifically written with international students in mind. (ECCE, 2017a)

In the above-mentioned concept paper the ECCE-team stresses the following learnings as most essential, if one wants to implement a similar structure:

"The main challenge for a consortium is not so much the creation of technical resources and tools to share but to foster a team spirit across universities and countries and to keep this spirit alive over time and personnel turnover. The advantage of small consortia compared to larger associations is that the colleagues know each other faster and better" (ECCE, 2017b).

6. Conclusions

Given the challenges of very heterogenic economies and careers service landscapes internationally, smooth global work mobility facilitated by HEI will remain a long-term goal.

The ECCE results indicate that a lot of small actively cooperating networks could have a larger impact and offer truly helpful student-centered support than large associations would have, though they would not necessarily need to compete but could complement each other. Personal relations will be key if we want career officers to not only broaden their perspectives, but also obtain the tools necessary to assist students on a larger scale.

These transnational models have a lot of potential to add a new dimension to already existing EU university networks. The challenge will remain to find sustainable funding models and to scale the operations for a larger input.

References

Altbach, P.G. (2004) The cost and benefits of world class universities. Journal of Higher Education, 5-8.
Altbach, P.G. (1998) Comparative Higher education: Knowledge, the University, and Development, Greenwich, CT: Ablex.

American Council on Education. (2016) Internationalizing the co-curriculum: Internationalization and student affairs. Washington, United States: American Council on Education.
Böhm, T. and Brandl, K. (2014) Umfrage zur Internationalisierung der Career Services [PowerPoint slides]
CSND (2015). Ausgangslage der Career Services an deutschen Hochschulen. Berlin.
Cummins, W.K. (1993) "Global trends in overseas study". In: C.D. Godwin, (Ed.), International investment in human capital: overseas education for development (pp. 31-46). New York: Institute of International Education.
De Wit, H. (2008) Changing dynamics in international student circulation: Meanings, push and pull factors, trends and data. The dynamics of international student circulation in a global context, 15-48.
De Wit, H. (2010) Internationalisation of higher education in Europe and its assessment, trends and issues.
De Wit, H. (2011) Globalisation and internationalisation of higher education. rusc, 8(2), 241-247.
De Wit, H. and Hunter, F. (2015) The future of internationalization of higher education in Europe. International Higher Education, (83), 2-3.
De Wit, H. and Merkx, G. (2012) The history of internationalization of higher education. The SAGE handbook of international higher education, 43-57.
De Wit, H., Hunter, F., Howard, L. et al. (2015) Internationalization of
Do Céu , M. and De Nazaré, M. (2014) Higher Education Quality and Guidance : efficacy of a career celf-management seminar for undergraduates . Revista Electrónica Interuniversitaria de Formación del Profesorado, 17 (3), 93-104.
ECCE (2015) ECCE-Project-Proposal. EBC Hochschule. Unpublished project application for NA-DAAD.
ECCE (2017a) ECCE-Interim-Report. EBC Hochschule. Unpublished project report for NA-DAAD.
ECCE (2017b) ECCE-Concept Paper. Retrieved from: https://www.ecce.network/files/ECCE-transfer-paper.pdf
ECGFIM (2015) Train and Retain Career Support for International Students in Canada, Germany, the Netherlands and Sweden. SVR's Research Unit: Study 2015-2.
Eimer, A. (2014) Erreichen Career Services ihre langfristigen Ziele? Versuch einer indirekten Wirkungsanalyse. career service papers, 12/14, 66-76. Berlin.
Esser, U., Gillessen, M. and Maiworm, F. (2014) Abschlussbericht zur Evaluation des Programms STIBET I und STIBET III Matching Funds des DAAD. In: DAAD Publikationen DOK & MATS, Band 76, 2014.
European Commission. (2014) The Erasmus Impact Study. Luxembourg: Publications Office of the European Union, 2014. doi: 10.2766/75468
European Commission. (2015) Erasmus+ programme annual report 2014. Brussels.
European Commission. (2017) Erasmus+ programme annual report 2015. Luxembourg: Publications Office of the European Union, 2017.
European Commission. (2018a) Erasmus+ programme annual report 2016. Brussels.
European Commission. (2018b) Erasmus+ programme guide. Version 2 (2018): 15/12/2017.
European Union, European Parliament. (2015) Internationalisation of higher education. Brussels.
Higher Education. Directorate-General for International Policies. Policy Department B: Structural and Cohesion Policies Culture and Education. Handbook of latent semantic analysis (pp. 424-440): European Union.
http://dx.doi.org/10.1787/eag-2013-en
http://ec.europa.eu/dgs/education_culture/repository/education/library/statistics/erasmus-plus-annual-report_en.pdf.
http://www.acenet.edu/news-room/Pages/Internationalization-in-Action.aspx
https://ec.europa.eu/programmes/erasmus-plus/sites/erasmusplus/files/erasmus-plus-annual-report-2015.pdf.
https://ec.europa.eu/programmes/erasmus-plus/sites/erasmusplus2/files/annual_report_2016.pdf .
https://ec.europa.eu/programmes/erasmus-plus/sites/erasmusplus2/files/erasmus-plus-programme-guide2_en.pdf.
https://qareer.ro/images/2016/QAREER_O1_O4_Quality_of_career_services_report.pdf
https://www.hrk.de/fileadmin/_migrated/content_uploads/Umfrage_Internationalisierung_Auswertung.pdf
https://www.svr-migration.de/wp-content/uploads/2015/08/Study_Train-and-Retain_SVR-research-unit_WEB.pdf
Hudzik, J. K. (2014) Comprehensive internationalization: institutional pathways to success. Routledge.
Jones, E. (2017) Problematising and reimagining the notion of 'international student experience'. Studies in Higher Education, 42(5), 933-943.
Kelo, M., Rogers, T. and Rumbley, L. E. (2010) International student support in European higher education: needs, solutions, and challenges. Lemmens Medien.
Kenyon, M. A. and Rowan-Kenyon, H. T. (2014) The Globalization of Career Services. New Directions for Student Services, 2014(148), 93–102.
Knight, J. (2003) Internationalization remodelled: responding to new realities and challenges. London: Observatory on Borderless Education.
Knight, P. and Yorke, M. (2003) Assessment, learning and employability. McGraw-Hill Education (UK).
Megha, Roy, Zhengrong Lu, and Bryce Loo. (2016) Report on international student experience. World Education Services. http://wenr.wes.org/2016/10/internationalstudent-experience-crucial-domain-recruitment-retention.
OECD. (2013) Education at a Glance 2013: OECD Indicators, OECD Publishing.
Perez-Encinas, A. (2017) International Student Exchange Experience: Formal and Informal Support Services in the Host University. Autonomous University of Madrid: Unpublished doctoral dissertation.
QAREER. (2017) Quality of Career Services. Toward a European Reference Framework.
Ridder, H.-G. (2016) Case study research: Approaches, methods, contribution to theory. Mering.
Yorke, M. (2006) Employability in higher education: what it is-what it is not (Vol. 1). York: Higher Education Academy.

Relational Social Capital Dimension and Entrepreneurial Intentions in Online Environments

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Abstract: Entrepreneurial intention (EI) is perceived as a key element for understanding the process of entrepreneurship because it is considered a prerequisite of the entrepreneurial action. Once the models that explain the development of this intention are established, the results add new variables that could help deepen the knowledge about this important element of our economies. Among these variables, social capital (SC) gains relevance as an influencer of entrepreneurship because transactions produced with this process depend on social interactions between individuals: their proper development will largely depend on the nature of these social relationships. Thus, our main goal is to explore the way in which relational SC dimension is integrated in the explanatory model of the development of the EI. To analyze the relationship among the model constructs, we use Structural Equation Modelling (SEM) applying Partial Least Squares (PLS). Data is obtained from an online sample of 307 students. The results obtained from this sample show that the three main components of the relational SC dimension exert a different influence on the antecedents of Theory of Planned Behavior (TPB) but indirectly influence EI. The proposed structural model explains 75.8% of the variance of EI and its capacity to predict EI is 63.7%, which is considered highly predictable. One of our principal limitations is that our study is comprised only of students enrolled in online university. This paper contributes to the literature on entrepreneurship because it analyzes the impact of the main constructs of the TPB and the effect of relational SC dimension on the EI of students enrolled in an online environment where lack of physical contact requires higher trust, norms of reciprocity and identification; three of the main components of the relational SC.

Keywords: Entrepreneurship, Entrepreneurial Intentions, Online universities, Social capital, Relational dimension

1. Introduction

Due to its impact on employment, economic growth, productivity, innovation and social cohesion, there is widespread attention in entrepreneurship (Audretsch & Keilbach, 2004). Studies on the birth of entrepreneurs focus on university students because these students tend to show a higher propensity towards entrepreneurship. The university environment plays a key role in motivation and provides opportunities for individuals to create a business based on knowledge and technology (Turker & Selçuk 2009).

An entrepreneur does not emerge simply because of an opportunity in the market but also because of the individual's capacity and intention to exploit it (Fayolle & Liñán, 2014). Hence, our analysis is focused on the study of the factors which influence an individual's intention as intention is considered the best single predictor of entrepreneurship (Kautonen et al., 2015). Despite extensive studies on EI, we have not found any studies analyzing the impact of SC and TPB model in online university students, an aspect supported by Fayolle and Liñán (2014). Lately, studies associate SC with the formation of EI (De Carolis et al., 2009). This justifies why our study focuses on the effect of SC on EI as a facilitator of the entrepreneurship process: we cover the gap.

The main aim of this research is to analyze the link between SC and EI (Davidsson & Honig, 2003; Liñán & Santos, 2007) in the online environment. In 2019, 50% of higher education will be completed through 100% online methodology (Santamans, 2014). Our study develops and integrates intention-based framework and analyzes the impact of the main constructs of the TPB and SC on EI of the online students.

The paper is structured as follows: Section 2 is a literature review presenting the theoretical framework exposed to underpin the model and hypothesis included in Section 3. Section 4 details the methodology, summarizing the sample and the measures employed. Results are presented in Section 5 and discussed in Section 6. Conclusions are presented in Section 7, highlighting the main contributions, implications and paths for future research.

2. Theoretical Background

2.1 Entrepreneurship, Entrepreneurial Intention and the Theory of Planned Behavior

Entrepreneurship represents a planned behavior that is influenced by the individual's intentions, attitudes and beliefs. Those attitudes and intentions are learned and necessarily vary across individuals and situations (Krueger & Brazeal, 1994). Thus, individuals will be more or less enterprising depending on the external and internal influences effect on the EI. This is why higher education plays a role in nurturing and shaping EI and can effectively equip graduates with necessary entrepreneurial skills and capabilities (Nabi et al., 2010).

EI, defined as a "*self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future"* (Thompson, 2009: 687), is considered the most powerful predictor of entrepreneurial behavior (Krueger et al., 2000). The TPB (Ajzen, 1991), the most widely used model when studying EI (Nabi & Liñán, 2013), is considered one of the most robust models for its study (Krueger et al., 2000; Schlaegel & Koenig, 2014). TPB states that three are the attitudes that predict intentions: attitude towards the behavior (ATB), perceived behavior control (PBC) and subjective norms (SN). Despite the robustness of the TPB to predict intentions (Kautonen et al., 2015), the inclusion of other constructs representing the social relationships of the individual will enrich the explanatory capacity of the intentions models (Liñán & Santos, 2007). Thus, we include SC as an antecedent to the cognitive factors; given that intention models assume that external variables do not directly affect the EI of an individual (Boyd & Vozikis, 1994).

2.2 Social Capital and entrepreneur´s environment

SC is a part of an entrepreneur´s environment and entrepreneurial activities are the results of social interaction and the interplay among environments (De Carolis & Saparito, 2006). SC facilitates entrepreneurship and the formation of start-up companies. Scholars have extensively examined the importance of social networks, embeddedness and SC in the creating and formulating EI (De Carolis et al., 2009).

The tenet of Social Capital Theory is that social relationships among people can be productive resources (Coleman, 1988). The concept of SC varies depending on the focus. In our work, we follow the neutral definition where SC is defined as *"the sum of the actual or potential resources embedded within, available through, and derived from network of relationships possessed by an individual or social unit". SC thus comprises both the network and the assets that may be mobilised through that network*" (Nahapiet & Ghoshal, 1998: 243). According to Nahapiet and Ghoshal (1998), relationships are an important element of SC and, more specifically, the strength or the weakness of the linkages in these relationships (Granovetter, 1973).

Nahapiet and Ghosal (1998) established three dimensions to analyze SC: *structural, relational and cognitive*. In our proposal model we use the relational dimension which describes the nature of relationships that people have developed with each other through a history of interactions as manifested in strong versus weak ties (Granovetter, 1973; Nahapiet & Ghoshal, 1998).

3. Model and Hypothesis

3.1 Social Capital Dimensions

There are three dimensions of SC: structural, involving the pattern of relationships between the network actors (Inkpen & Tsang, 2005); cognitive, representing common goals, shared culture, language and codes (Inkpen & Tsang, 2005); and relational (See 2.2).

Although the structural position of an entrepreneur may be necessary, it is not enough to have an impact on the venture creation process (Liao & Welsch, 2005); that´s why relational SC is necessary to capture the extent that an entrepreneur is actually able to receive informational, physical and emotional support in the venture creation process (Chiu et al., 2006; Nahapiet & Ghosal, 1998). That is why we focus our work on the main components of this dimension.

3.1.1 Relational Dimension

Following Chiu et al. (2006), the key elements of the relational dimension are *trust (TRU), norms of reciprocity (NR) and identification (IDE)* as described below:

TRU, plays a key role in the willingness of networks' actors to share knowledge (Coleman, 1988; Inkpen & Tsang, 2005). TRU is essential in the entrepreneurial context because most of the entrepreneurial activities require some level of TRU (Caliendo et al., 2012). Individuals who are unwilling to rely on others will be less able to run a business while people with a higher level of TRU will develop a more favorable attitude towards entrepreneurship and a higher PBC which will translate into higher EI. Given that trusting relations will make individuals more confident when making an entrepreneurial decision, as they think the environment around them is trustworthy, the perception of what the individual´s close circle thinks about the idea of setting up a business will be greater with higher levels of TRU. Though trusting someone can be risky, individuals who are willing to accept risks have a more favorable attitude towards running a business and a higher PBC (Lüthje & Franke, 2003; Nabi & Liñán, 2013). Relationships based on TRU allow better communication, transfer of knowledge and resources and a greater sense of belonging between the individuals which might encourage them to have a favorable attitude towards an entrepreneurial career and feel more secure on one's capacities based on the TRU and support. Based on this argument, we proposed:

H_{1a}: TRU is directly related to ATB
H_{1b}: TRU is directly related PBC
H_{1c}: TRU is directly related to SN
H_{1d}: TRU is indirectly related to EI
H_{1e}: TRU is directly related to IDE

NR refers to knowledge exchanges that are mutual and perceived by the parties as fair. The operative norm in TRU is what Putnam calls *generalized reciprocity* which is "*…I´ll do this for you now, knowing that somewhere down the road you´ll do something for me"* (1993: 182-183).

For entrepreneurs whose activities are based on exchange of factors and knowledge, NR is one of the key prerequisites to develop networks and social interactions (Caliendo et al., 2012). But when entrepreneurs fail to reciprocate, this could lead to reduced trustworthiness (Stewart, 2003). NR generates increased pressure in individuals to reciprocate the favorable behaviour that would lead individuals to be more committed to a common interest and display a higher ATB. In the same way, if it is perceived that this NR exists, individuals would generate a greater PBC as they will feel more secure that someone will provide assistance if they need help. Strong ties contain an implicit principle of reciprocal obligation, so when these reciprocity obligations are stronger it is more likely that family and business logic are at odds and the planned venture's future performance is more likely to be compromised (Sieger & Minola, 2017). Based on literature we proposed:

H_{2a}: NR are directly related to ATB
H_{2b}: NR are directly related to PBC
$H_{2c:}$ NR are directly related to SN
H_{2d}: NR are indirectly related to EI.
H_{2e}: NR are directly related to TRU

IDE is defined as *"the process whereby individuals see themselves as one with another person or group of people*" (Nahapiet & Ghoshal, 1998: 256). IDE refers to an individual´s sense of belonging and positive feeling toward a virtual community. Firm creation is considered a social activity and entrepreneurs shape their behavior in relation to how they perceive themselves in relation to others (Fauchart & Gruber, 2011). IDE is a potential mediator of an entrepreneur's decisions and action (Hoang & Gimeno, 2010) but few studies address social identity in the entrepreneurship context (Sieger & Minola, 2017).

Virtual entrepreneurial context often lacks clear structural mechanism that promotes cohesion or identification with a group or organization (Schenkel & Garrison, 2009: 527); therefore, in online universities where there is a lack of physical contact, the sense of belonging is particularly desirable because it acts to provide a source of "glue" that promotes group cohesion (Fiol & O'Connor, 2005: 19). Thus, those individuals that identify themselves as part of a virtual community with a strong sense of belonging to it, will develop greater PBC and ATB and subsequently, a higher EI. Based on the above we propose:

H_{3a}: IDE is directly related to ATB.
H_{3b}: IDE is directly related to PBC
H_{3c}: IDE is indirectly related to EI.

3.1.2 Main constructs of the TPB

ATB refers to the expectations and beliefs about the consequences of developing a certain behavior, *PBC* reflects the perception of an individual´s self-perceived capacity to undertake an entrepreneurial venture and *SN* represents the perceived pressure of what important people think about adopting this type of behavior (Ajzen, 1991). The individual´s intention to perform a certain behavior is the central construct of the TPB. The PBC is considered one of the most influential constructs of this theory on EI (Krueger et al., 2000) with the ATB (Liñán, Nabi, & Krueger, 2013; Lüthje & Franke, 2003). Regarding SN, several studies have tested its influence over EI (Kautonen et al., 2015; Schlaegel & Koenig, 2014) but other stated that its effect is may be indirect via ATB and PBC (Liñán & Chen, 2009; Liñán et al., 2011). Therefore, entrepreneurial activity can be predicted from the influence of these three factors on EI (Krueger et al., 2000). Based on the above, we propose:

H_{4a}: PBC is directly related to EI
H_{4b}: ATB is directly related to EI
H_{4c}: SN is directly related to EI
H_{4d}: SN is directly related to PBC
H_{4e}: SN is directly related to ATB

The conceptual model is shown in Figure 1.

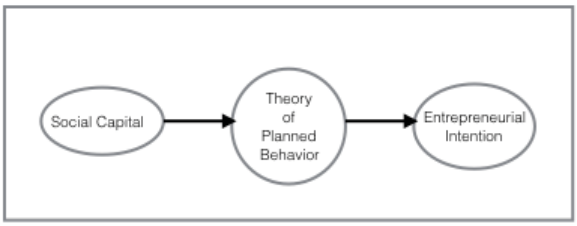

Figure 1: Conceptual Model

4. Method

4.1 Measures

The key-constructs were captured through a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7). This research uses the measures employed in Liñán and Chen (2009) to assess ATB, PBC, SN and EI and the measures of Chiu et al. (2006 to measure the relational dimension of SC. A range of control variables are used (demographic and socioeconomic characteristics) as background factors. These variables have been coded as follows: age (years), gender (1=Male; 2=female; 3=neuter) and self-employment experience (1=Yes; 2=No).

4.2 Sample

The survey was carried out through an online questionnaire given to the students enrolled in an online university from the 15th to the 26th of January 2018. Student samples have been widely used examining EI (Krueger et al., 2000; Liñán et al., 2011). The EI model was tested using SEM-PLS (SmartPLS 3.2.7). The sample comprised 307 respondents engaging in different degrees and masters: 80% university degrees and 20% masters, with a sample error of 5.37% at a confidence level of 95% (Z=1.96 p=q=0.5) and it was determined toward a finite formula. Regarding the students enrolled in university degrees, 18.67% were in their 1st year, 10% in the 2nd, 15.33% in the 3rd and 36% in the last year. Of these respondents, 60.59% were female and 39.41% were male, with an average age of 35 years (*SD=8.314*). Likewise, 95.10% of the respondents have previous working experience and of those 31.25% have previous self-employment experience. Almost 13.36% of their fathers are self-employed while 8.14% of their mothers are and around 41% of their parents are pensioners or retirees which is consistent with the medium age of the sample.

5. Results

5.1 Analysis of the Measurement Model

The results analysis is based on SEM-PLS because the study objective is to predict the key constructs or its antecedents. Our investigation is an extension of an existing theory and the structural model is complex and

the sample size is relatively small (Hair et al., 2011). Also, SEM-PLS has been widely used in entrepreneurship research (Liñán & Santos, 2007; Liñán et al., 2013).

The analysis was developed in two stages: assessment of the measurement model (reliability and validity analysis) and study of the structural relationships among the constructs (once the first stage is accomplished). Reliability analysis was carried out using items loading. To assess the internal consistency of the constructs Composite Reliability (CR) scores and Average Variance Extracted (AVE) have been used. Both achieved (See Table 1).

Table 1: Composite reliability and convergent validity

Construct	*Item*	*Loading*	*AVE*	*CR*
ATB	ATB1	0.858**	0.835	0.962
	ATB2	0.913**		
	ATB3	0.920**		
	ATB4	0.946**		
	ATB5	0.930**		
IDE	IDT1	0.956**	0.876	0.977
	IDT2	0.959**		
	IDT3	0.967**		
	IDT4	0.959**		
EI	EI2	0.893**	0.922	0.979
	EI3	0.949**		
	EI4	0.933**		
	EI5	0.961**		
	EI6	0.916**		
	EI7	0.960**		
NR	NR1	0.977**	0.954	0.976
	NR2	0.977**		
SN	SN1	0.881**	0.818	0.931
	SN2	0.929**		
	SN3	0.903**		
PBC	PBC1	0.806**	0.764	0.951
	PBC2	0.905**		
	PBC3	0.918**		
	PBC4	0.821**		
	PBC5	0.905**		
	PBC6	0.881**		
TRU	TRU1	0.866**	0.854	0.967
	TRU2	0.921**		
	TRU3	0.944**		
	TRU4	0.946**		
	TRU5	0.942**		

Note *p<0.05; **p<0.01; ***p<0.001 based on a one-tailed t-student (499) distribution; t (0.05; 499) = 1.6479; t (0.01;499) =2.3338; t (0.001;499) =3.1066

Discriminant validity has been tested by two criterias: Fornell and Larcker (1981) and heterotrait-monotrait ratio (HTMT) of correlations (Henseler et al., 2015). Both accomplished (see Table 2).

Table 2: Discriminant Validity criteria's

Construct	*ATB*	*EI*	*IDE*	*NR*	*SN*	*PBC*	*TRU*
ATB	*0.914*	0.898	0.285	0.248	0.455	0.622	0.262
EI	0.864	*0.936*	0.277	0.244	0.435	0.618	0.261
IDE	0.274	0.269	*0.960*	0.884	0.255	0.292	0.855
NR	0.236	0.235	0.850	*0.977*	0.293	0.278	0.886
SN	0.417	0.403	0.237	0.270	*0.904*	0.451	0.268
PBC	0.595	0.596	0.283	0.267	0.422	*0.874*	0.338
TRU	0.251	0.253	0.826	0.847	0.248	0.323	*0.924*

Diagonal (italicized values) represent the square root of the AVE
Upper triangle: Ratio HTMT
Lower triangle: correlations between latent variables

5.2 Structural Model Analysis

The second stage, focuses on the structural model. To assess its adequacy two criteria´s are used, the coefficient of determination (R^2), and the Stone-Geisser´s Q^2. Both show that the model explains a high percentage of the variance in EI and its high level of prediction (see Figure 2).

Bootstrapping (5000 samples) has been used to generate standard errors and t-statistics that allow us to verify our hypothesis. Figure 2 presents the results for the sample.

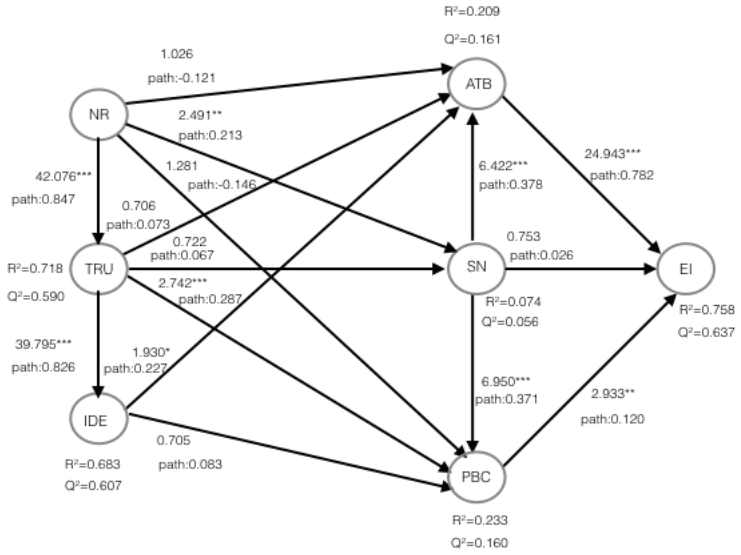

Figure 2: Final structural model results

Figure 2 shows the significant influence of IDE on ATB but not significant on PBC. NR have no significant effect neither on ATB nor PBC but significant influence on TRU and SN. The effect of TRU is significant over IDE and PBC but not over ATB and SN. Concerning TPB constructs we corroborate that ATB and PBC exert a significant influence over EI; however, the direct effect of SN over EI is not significant but it is significant on ATB and PBC. Indirect influences are on Table 3.

Table 3: Structural Model: Total indirect effects

Relationships	***Original Sample***	***Standar error***	***T-statistics***
IDE->EI	0.187	0.101	1.861*
NR->ATB	0.323	0.094	3.438***
NR->EI	0.195	0.054	3.594***
NR->IDE	0.700	0.031	22.431***
NR->SN	0.057	0.079	0.720
NR->PBC	0.401	0.089	4.479***
SN->EI	0.340	0.052	6.513***
TRU->ATB	0.213	0.106	2.013*

Relationships	*Original Sample*	*Standar error*	*T-statistics*
TRU->EI	0.271	0.100	2.709**
TRU->PBC	0.093	0.102	0.912

Through the indirect effects (Table 3) are appreciable, there is significant effect of IDE on EI and high significant effect of NR over ATB, EI, IDE and PBC but not significant on SN. Concerning SN, the study reveals its high effect over EI. Finally, TRU exerts a significant effect on ATB and EI but not significant over PBC.

6. Discussion

Explored the influence of relational SC on the TPB model, we concluded that all of its components exert influence over the antecedents of TPB model but not over the same ones (Table 4).

Table 4: Summary of hypotheses testing

Hypothesis /Description	*Decision*
H_{1a}:TRU->ATB	Rejected
H_{1b}:TRU->PBC	Supported
H_{1c}:TRU->SN	Rejected
H_{1d}:TRU->EI	Supported
H_{1e}:TRU->IDE	Supported
H_{2a}:NR->ATB	Rejected
H_{2b}:NR->PBC	Rejected
H_{2c}:NR->SN	Supported
H_{2d}:NR->EI.	Supported
H_{2e}:NR->TRU	Supported
H_{3a}:IDE ->ATB	Supported
H_{3b}:IDE->PBC	Rejected
H_{3c}:IDE->EI	Supported
H_{4a}:PBC->EI	Supported
H_{4b}:ATB->EI	Supported
H_{4c}:SN->EI	Rejected
H_{4d}:SN->PBC	Supported
H_{4e}:SN->ATB	Supported

The TRU results show its influence in the conformation of an EI through the reinforcement of the PBC. TRU is essential to pursue an entrepreneurial career because entrepreneurial activities require high level of TRU (Caliendo et al., 2012). The higher the TRU the greater the PBC because individuals will perceive more security on the resources and knowledge obtained because TRU enhance the quality of resource flows. Despite the difficulty developing IDE in the virtual communities (Fiol & O'Connor, 2005), the generation of TRU will enhance the approachment between individuals, creating share norms that will act as a mediator in the conformation of attitudes and EI.

Regarding NR, the results show that close relations are characterized by high reciprocity (Malebana, 2016), generating a higher pressure to reciprocate (Sieger & Minola, 2017) which might explain why NR exert an indirect effect on EI through SN and it affect ATB and PBC through SN. Also, the existence of NR generates trustworthiness in what will make individuals feel more secure, reducing the uncertainty which will lead to improve the exchange of resources and knowledge (Malebana, 2016).

Despite that, entrepreneurs have been seen traditionally as individuals who are less likely to identify themselves with conventional practices, norms and values and usually do not follow the same stream as the rest (Liao & Welsch, 2005), IDE has influence on ATB because individuals developed their behavior towards a certain action based on the perception they have of others (Fauchart & Gruber, 2011). However, it does not exert influence on PBC because the sense of belonging does not enhance the perception of the individual of their capacities just for belonging to a community but it does have an indirect effect on EI. So, relational SC exerts a direct influence on the antecedents of the TPB and indirectly on EI (Malebana, 2016).

The results for the main constructs of the TPB model are on line with other studies where ATB and PBC have a high, direct and positive effect over EI and SN exerts a positive influence on EI (Liñán et al., 2011; Liñán et al., 2013; Liñán & Chen, 2009; Lüthje & Franke, 2003) but indirectly through ATB and PBC (Liñán & Chen, 2009; Liñán et al., 2011).

7. Conclusion, Limitation and future lines of research

SC and EI are vital for the development of entrepreneurship. Entrepreneurs can be seen as the engine of economic and social development. Due to the importance of the entrepreneurial figure, it is reasonable that researchers focus their attention on the antecedents of EI; that´s why we have incorporated the influence of the relational SC dimension on the antecedents of the three main components of TPB. The analysis results show that the proposed structural model explains 75.8% of the variance in EI and its capacity to predict EI is 63.7% considered high predictable power.

Our analysis enriches the studying of EI, validating the importance of relational SC in the formation of EI in an online environment where lack of physical contact requires higher TRU, NR and IDE. These variables are important for the development of entrepreneurial activities because starting a business assume that: IDE will enhance the degree of knowledge and sharing contribution easing the discovery of market opportunities, TRU will make individuals engage in social exchange and cooperative interaction increasing their PBC and finally, assuming that people give expecting to receive something in exchange will increase the pressure to correspond the share of knowledge, resources, ideas and so on, enhancing the possibilities of generating EI.

Institutions involved in the system should be aware of the importance of building TRU through the community system. Institutions shape beliefs so if they enhance the communication oriented in the legitimation of entrepreneurs with real changes (improvements on the regulatory and educational system and, for example, enhancing the access to financial and network support), future entrepreneurs will feel that everything said is not just air but real and this TRU will be translated in more EI. Also, as TRU derives from moral values which have been shaped in the early ages by parents or schools, it is essential to build an educational system that considers the elements of relational SC as key. This can be obtained by using a horizontal teaching based on work in groups, doing projects together and asking teachers questions because all these things will improve the social skills and the principal components of relational SC.

It would be interesting to incorporate the other two SC dimensions (relational and cognitive) into the model.

Likewise, it would be interesting to study if SC is a moderator instead of an antecedent between the EI and its antecedents.

References

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179-211.

Audretsch, D. B., & Keilbach, M. (2004). Does entrepreneurship capital matter? Entrepreneurship Theory and Practice, 28(5), the
419-430.

Bourdieu, P. (1985). The forms of capital. In JG Richardson (Ed.), Handbook of theory and research for the sociology of education (pp. 241-258). New York: Greenwood.

Boyd, N. G., & Vozikis, G. S. (1994). The influence of self-efficacy on the development of entrepreneurial intentions and actions. Entrepreneurship Theory and Practice, 18(4), 63-77.

Caliendo, M., Fossen, F. M., & Kritikos, A. S. (2012). Trust, positive reciprocity, and negative reciprocity: Do these traits impact entrepreneurial dynamics? Journal of Economic Psychology, 33(2), 394-409.

Chiu, C., Hsu, M., & Wang, E. T. G. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. Decision Support Systems, 42(3), 1872-1888.

Coleman, J. S. (1988). Social capital in the creation of human capital. American Journal of Sociology, 94(Supplement), S95-S120.

Davidsson, P., & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. Journal of Business Venturing, 18(3), 301-331.

De Carolis, D. M., Litzky, B. E., & Eddleston, K. A. (2009). Why networks enhance the progress of new venture creation: The influence of social capital and cognition. Entrepreneurship Theory and Practice, 33(2), 527-545.

De Carolis, D. M., & Saparito, P. (2006). Social capital, cognition, and entrepreneurial opportunities: A theoretical framework. Entrepreneurship Theory and Practice, 30(1), 41-56.

Fauchart, E., & Gruber, M. (2011). Darwinians, communitarians, and missionaries: The role of founder identity in entrepreneurship. The Academy of Management Journal, 54(5), 935-957.

Fayolle, A., & Liñán, F. (2014). The future of research on entrepreneurial intentions. Journal of Business Research, 67(5), 663-666.

Fiol, C. M., & O'Connor, E. J. (2005). Identification in face-to-face, hybrid, and pure virtual teams: Untangling the contradictions. Organization Science, 16(1), 19-32.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.

Granovetter, M. S. (1973). The strength of weak ties. American Journal of Sociology, 78(6), 1360-1380.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing Theory and Practice, 19(2), 139-152.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115-135.

Hoang, H., & Gimeno, J. (2010). Becoming a founder: How founder role identity affects entrepreneurial transitions and persistence in founding. Journal of Business Venturing, 25(1), 41-53.

Inkpen, A. C., & Tsang, E. W. (2005). Social capital, networks, and knowledge transfer. The Academy of Management Review, 30(1), 146-165.

Kautonen, T., Gelderen, M., & Fink, M. (2015). Robustness of the theory of planned behavior in predicting entrepreneurial intentions and actions. Entrepreneurship Theory and Practice, 39(3), 655-674.

Krueger, N. F., & Brazeal, D. V. (1994). Entrepreneurial potential and potential entrepreneurs. Entrepreneurship Theory and Practice, 18(3), 91-104.

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. Journal of Business Venturing, 15(5), 411-432.

Liao, J., & Welsch, H. (2005). Roles of social capital in venture creation: Key dimensions and research implications. Journal of Small Business Management, 43(4), 345-362.

Liñán, F., & Chen, Y. (2009). Development and Cross-Cultural application of a specific instrument to measure entrepreneurial intentions. Entrepreneurship Theory and Practice, 33(3), 593-617.

Liñán, F., Nabi, G., & Krueger, N. (2013). British and Spanish entrepreneurial intentions: A comparative study. Revista De Economía Mundial, (33), 73-103.

Liñán, F., Rodríguez-Cohard, J. C., & Rueda-Cantuche, J. M. (2011). Factors affecting entrepreneurial intention levels: A role for education. International Entrepreneurship and Management Journal, 7(2), 195-218.

Liñán, F., & Santos, F. (2007). Does social capital affect entrepreneurial intentions? International Advances in Economic Research, 13(4), 443-453.

Lüthje, C., & Franke, N. (2003). The 'making' of an entrepreneur: Testing a model of entrepreneurial intent among engineering students at MIT. R&D Management, 33(2), 135-147.

Malebana, M. J. (2016). The influencing role of social capital in the formation of entrepreneurial intention. Southern African Business Review, 20(1), 51-70.

Nabi, G., Holden, R., & Walmsley, A. (2010). Entrepreneurial intentions amongst students: Towards a re-focused research agenda. Journal of Small Business and Enterprise Development, 17(4), 537-551.

Nabi, G., & Liñán, F. (2013). Considering business start-up in recession time: The role of risk perception and economic context in shaping the entrepreneurial intent. International Journal of Entrepreneurial Behaviour & Research, 19(6), 633-655.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. The Academy of Management Review, 23(2), 242-266.

Putnam, R. D. (1993). The prosperous community: Social capital and public life. American Prospect, 13, 35-42.

Santamans, J. M. (2014). El mercado global del e-learning. Barcelona: OBS Online Business School.

Schenkel, M. T., & Garrison, G. (2009). Exploring the roles of social capital and team-efficacy in virtual entrepreneurial team performance. Management Research News, 32(6), 525-538.

Schlaegel, C., & Koenig, M. (2014). Determinants of entrepreneurial intent: A Meta-Analytic test and integration of competing models. Entrepreneurship Theory and Practice, 38(2), 291-332.

Sieger, P., & Minola, T. (2017). The family's financial support as a "poisoned gift": A family embeddedness perspective on entrepreneurial intentions. Journal of Small Business Management, 55(S1), 179-204.

Stewart, A. (2003). Help one another, use one another: Toward an anthropology of family business. Entrepreneurship Theory and Practice, 27(4), 383-396.

Thompson, E. R. (2009). Individual entrepreneurial intent: Construct clarification and development of an internationally reliable metric. Entrepreneurship Theory and Practice, 33(3), 669-694.

Turker, D., & Selçuk, S.S. (2009). Which factors affect entrepreneurial intention of university students? Journal of European Industrial Training, 33(2), 142-159.

National Ruralities as the Blockchain for Global Agriinnovation System

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Abstract: The paper presents the research results that specify current institutional and economic hurdles to local agriinnovation systems development in rural areas in Russia inhibited by indigenous people. To surmount the obstacles to rural area development, mandatory would be to consider the role of indigenous people in innovative development of the global agrifood system. The research design is based on the survey that was conducted among Bashkir people living in rural areas in Russia. The survey was designed as a combination of Likert Scale. One sample mean comparison test was applied to test the proposed model, which was found satisfied. Results suggest that the lack of information and support from local authorities are named as the most significant hurdles to development of rural areas inhibited by indigeneos people in Russia. The reported research relied on self-reports and on a sample from the one region of Russia. Future research should be multiregional and multinational to test the assumptions of the present study. The paper reveals that local agrifood systems in rural areas in Russia inhibited by indigeneos people could play more significant role in fastening the innovative development of global agrifood system. The research indicated that to develop global agrifood system is possible only supporting innovative activities of rural entrepreneurers. The basis for stimulating of innovative development of global agrifood system should be shaped as a set of divergent national agrifood systems. Enclaves of rural areas inhabited by indigenous people create better opportunity for innovative development of national and regional agrifood systems. Standartization in local agrifood systems organization leads to the decrease of innovative development of the global agrifood system and to the decrease of its efficiency. The present study provides evidence about the hurdles to innovative development of rural areas in rural areas in Russia inhibited by indigeneos people. Results could be of value to policy makers focusing on the development of small businesses and entrepreneurship and the promotion of entrepreneurial and innovative capabilities in rural contexts.

Keywords: agrifood system, innovative development, indigeneous people, Russia

1. Introduction

Food is the basic condition for the existence of mankind as biological species and a factor linking the expanding network of intellectual production, agricultural technologies and technologies for processing agricultural products, consumption, and a system for regulating production and consumption. At the same time, food, more precisely, guaranteed provision of food for the population, is the main goal of the functioning of any socio-economic system, therefore, the production and distribution of food should be viewed as a systemic problem to be solved within the agrifood system (Global food security : challenges for the food and agricultural system, 2013).

The essence of the agrifood systems is that the provision of food is the primary basis for the existence of mankind, civilization and any national socio-economic systems, therefore the agriculture should be built on the institutional principles of a system organization (Science, policy and politics of modern agricultural system, 2014). It can be argued that the national systems of food production and distribution, through their capacities of development, determine capacities of development for any national economic system, hence the main objective of national agri-food policy, on one hand, must be aimed to ensure the national food security, but, on the other hand, to provide the population with the food of the required quality, quantity and variety (Lawrence, Lyons, & Wallington, 2010). This explains the extension of the concept of "agro-food system" for analyzing the system of food production, distribution and consumption (Carolan, 2012).

According to the Organization for Economic Cooperation and Development (Global food security : challenges for the food and agricultural system, 2013), the agrifood system is the set of relationships and activities establishing methods of food production and distribution. In our opinion, this definition does not fully reflect the essence and the main goal of agrifood systems and doesn't clarify the uniqueness of evolving processes in agrifood systems comparative to other economic systems.

The essence of the agrifood system determines its unlikeness to other economic systems. Its social and humanitarian orientation and non-alternativeness should be called as the most important specific feature of the agrifood system. From the first distinctive feature of the agrifood system the second feature is originated:

any national and indegenous socio-economic system can develop only being based on an effectively functioning national or indegenous agrifood system. An efficiently functioning national agrifood system should be considered as the necessary condition for the development of the national economic system (Polbitsyn, 1928).

The main target of this paper is to analyze the agri-innovation system formation in indigenous ruralities to give policymakers the opportunity to carry out the most appropriate actions. The author argues that the more prominent national agriinnovation policy should be based on the development of the rural national identity as the basis for the national agri-innovative development. This approach should be rested on the support of indigenous rural areas. The difference in national identities plays significant role as the basis for rural innocative development because it serves as one of most important sources of innovation. Different nationally based approaches to agrifood system organization create the information basis for the development of the global agrifood system.

For this purpose, an overview is provided on the theoretical foundations outlined in economic literature. Specific emphasis is laid on the survey conducted among indigenous entrpreneurs in rural areas in Russia. The paper finishes with some conclusions and recommendations for agri-innovation system players.

2. Methodology

A comprehensive literature review, different factors and entrepreneurship intentions serves as the basis for the development of conceptual framework for this study. The purpose is to identify the most dominant factors effecting intention of indigenes towards entrepreneurship. The focus of the study is on Bashkirs, gauging their intention towards entrepreneurship.

Recoginzing the high dependence of the very existence of a national economic system, as an organization of society, on the uninterrupted food supply, there is an urgent need for any national government to play a direct role in providing the develpment of the national agrifood system and the unacceptability of the concept of non-interference of the state in the activities of economic entities (Marsden).

After the essence and specific qualities of the agrifood system were determined, elements of the agrifood system can be specified. The list of essential elements should include the population as a consumer of food and agrifood organizations that produce and distribute food. Given different types of agri-food organizations, all agrifood organizations are commercial, so they can be considered as a single element of the agrifood system, named agribusiness. The similar approach can be applied to self-regulating organizations and associations of agricultural producers. Despite the fact that, as a rule, the activities of such associations and associations are non-commercial, they are aimed to increase the commercial efficiency of the agribusnesses.

Lawrence, G., Lyons, K., & Wallington, T. (2010) presented the agrifood system as a relationship of four elements: the agro-technology sector, agricultural production, processing of agricultural products and food consumption. These four components link knowledge, production and consumption. Busch, L. (2007) proposed to consider the technologies of agricultural production, processing, organization and food consumption as agrifood chain.

The above described specific feature of the agrifood system is based on the dominant social orientation of the system and adds public administration to the number of mandatory elements of the agrifood system to observe the balance of social and economic priorities.

Based on revealed essence, specific qualities and elements of the agro-food system the problems of the functioning of the agro-food system a wide range of issues must be examined within the conceptual framework developed by the Organization for Economic Co-operation and Development (OECD).

Since the agrifood industries have specific properties and characteristics that distinguish them from the extractive and manufacturing industries, the form of organization of agrifood systems differs significantly from the forms of organization of other industries (Allen, P., 2008).

It can be argued that the formation and development of global and local civilizations took place on the basis of the prevailing mode of production and distribution of food. In the socio-economic systems that emerged within the framework of European civilization, the goal of an effective system for the production and distribution of food was achieved within the framework of several basic concepts of the organization of production and distribution of food. All the realized concepts can be divided into two groups: systems aimed at providing the physiological needs of the entire population living in the state and systems aimed to satisfy the consumers' demand for food.

Initially, the emerged national food security systems were aimed at preventing famine and, accordingly, the excesses caused by the hunger, so the main purpose of these systems was to ensure the provision of basic food to the population within physiological norms of consumption.

Historically national food supply systems consist of three main elements:

1. Agricultural producers;
2. National and local authorities;
3. The population.

Initially, until about the 19th century, when the majority of the population lived in rural areas and was engaged in agricultural production, the food supply systems were primarily directed to protect the population in crisis situations caused by both negative natural conditions and negative social events (wars, riots, etc.). In the state of predominantly local markets, agricultural producers carried out direct trade operations with end users, i.e. local population (Colbourne, 2017). The role of national authorities was limited to the collection of natural taxes, which allowed to form national reserves, and regulate prices and quality of the main types of agricultural products.

The most vivid indicator of the demonstration of the desire of any state to limit itself to satisfying the basic, physiological needs of the population in food and the inability of the state to provide the population with even basic foodstuffs was the implemention of food cards giving the right to residents of the country to receive a certain extremely limited diet.

To solve the problem of food security by creating national reserves and distributing food in accordance with physiological needs, the national authorities resorted to two main methods: compelling agricultural producers to transfer the ownership to the government, or compulsory selling at unprofitable prices for the agricultural producer of all or part of the grown produce.

For the Soviet Union, the task of providing basic foodstuffs to the population due to historical circumstances remained the most important national problem. Commitment to the command and administrative methods of its solution can be explained by their practical applicability within the framework of the Soviet state management mechanism and by the conformity with the general conceptual approach in the development of the national economy.

Summarizing the argument on the development of the national agrifood systems, it should be noted that the key issues in their development in the second half of the twentieth century was the industrialization of agrifood production and the creation of global trade networks, which led to the standardization of food on a global scale. The genesis of the transnational fast food industry, aggressively implanted by international trade and food chains, can be considered as a neoliberal theory of economic reform, boosted by an extremely aggressive business strategy, which became generally accepted in the second half of the twentieth century (Ritzer, 1996).

The agrarian revolution was the path to implement the civilizational, rational process of industrialization in the agrifood system. The active use of emerged technologies of land reclamation, irrigation and chemical improvement of land and chemical treatment and genetic variation of seed introduced industrial, streamlined new forms of agricultural production aiming to increase the yield.

The industrialization of agricultural production has revealed deep biological differences in products produced by the traditional "artisanal" method and products produced with the help of modern technologies. The consumer qualities of food prepared by traditional and industrialized methods are diametrically opposed.

Agriultural production based on crafted for centuries natural and biological processes can not be standardized and organized as a flow, conveyor production. As a result, capitalist investors are trying to replace natural food production with artificial methods, which, in their opinion, allow them to reduce risks and increase the profitability of investments. This led to a wide use of substitute food, food with a sharply limited set of useful properties.

The industrialization and capitalization of agricultural production can be considered as the consequence to the development of bank lending. The availability of bank loans to agricultural producers, on the one hand, led to the increase of potential investors attractiveness to agricultural production and processing, on the other hand, led investors to adjust the agrarian technologies to the bank requirements of lending, and first of all, the requirements of mandatory and urgent loan payments. Agricultural production, being dependent on natural and climatic conditions, can not be unconditionally inscribed in the system of bank lending, which led potential investors to the need to transform agricultural production and agricultural technologies to the conditions for providing banking services, namely standardization of finished products. The greatest "progress" in the process of industrialization of agricultural production was achieved in poultry farming and processing of agricultural products.

The development of globalization processes in the agrifood system made evident that global, national and local trade networks claiming to develop standards and norms for the food production and designed to ensure the technological effectiveness can not adequately reflect the current processes of the agrifood systems development, production and processing of agricultural products required by popultaion. Even poultry farming, considered to be a highly integrated industry, practically breaks down into poultry farming, focused on the production of deep-frozen products and the production of chilled “home-made” poultry, which can be attributed to quality goods.

A distinctive feature of any national agrifood system is the use of protectionism as the part of the national policy, to a greater or lesser extent, in one form or another, in order to improve the country's food security. The task of ensuring the national food security, as a rule, is solved by methods of economic protection of local producers, which leads to extremely complicated forms of support for national agricultural producers and protection of national food markets. Among local producers, who needs protection from the national government indigenous entrepreneurs must be named. Entrepreneurship is seen as a “major resource ofr the economic development of indigenous people (Croce, 2017).

At the same time, many important issues related to public health, food safety, environmental safety remain under the responsibility of private enterprises, which operate on their own rules with the goal of making a profit. The introduction of private standards leads to a decrease in public efficiency and, ultimately, to a decrease in the level of food security of the country.

Traditional agrifood policy is focused on ensuring the country's food security. Rural entrepreneurs tend to follow the tradional police and “rely mainly on the internal market” (Pato & Teixeira, 2018). The principle of food security, which is treated too narrowly as satisfaction of the physiological needs of the population for food, determines the functioning of the agrifood system. Agriinnovation policy implies a more holistic approach to providing the population with food, based on the priority to ensure the changing and increasing individual needs of the population for food. Agroinnovational policy should be considered as an evolutionary development of agri-food policy that meets the requirements of innovative development of the national economy.

The active participation of the national government in the formation of institutional conditions for the development of an agrifood system based on knowledge is the basic condition for achieving national food security. Thus, a higher degree of organization of food provision for the population is achieved. One of the most striking manifestations of such an organization is the creation of regional and local agriinnovation systems, formed within the framework of a new network model of knowledge development (Dana & Anderson, 2011).

In the modern world, rural entreprenurship is becoming important for increasing the competitiveness and sustainable growth of national economies (Newbery, Siwale, & Henley, 2017). Countries that implement their agrifood policy towards the development of the knowledge economy demonstrate their effectiveness and high level of food security (Brouwer, 1999).

The emergence of a state agriinnovation policy capable of blooming an innovative approach to providing the population with food and rural development is one of the most difficult but important challenges for Russia today. If the traditional agrifood policy for Russia is oriented towards the introduction of new agro-technologies, and to a lesser extent to the creation of new organizational forms for their implementation, then the agriinnovation policy assumes a more holistic approach and focuses both on the creation and practical use of knowledge both of technologies and organization.

The complexity of elaborating and implementing agroinnovational policies is explained not only by the need for qualitative changes in the public consciousness, but also by the need to involve a large number of social, economic and spatial institutions and resources in order to integrate the capabilities of science, business and education (Muller & Korsgaard, 2018).

Although there is a growing interest among researchers in rural entrepreneurship (Gretzinger, Fietze, Brem, & Ogbonna, 2018), only few authors raise the problem of indigenous entrepreneurship (Burnett & Danson, 2017). One of the sounded significant problems is the problem of competition between established business systems and indigenous entrepreneurs (Cahn, 2008).

Rural entrepreneurship is constrained by a number of factors that can not only reduce the innovation activity of enterprises, but also negatively affect the rural social and economic development as a whole (Harpa, 2017). Our research presents a framework for the influence of the rural area indigenes on regional agrifood system innovative development and is based on socioeconomic and structural forces engaged in developing innovations in agrifood organizations (Peredo & Anderson, 2006).

Typologically factors were divided into two groups: external and inner factors. For our research, the following factors were chosen:

F1. Support of indigenes from local administration. Local and regional administrations are awaited to clearly pronounce their position on support of indegenous rural areas (Castelnovo, 2009);

F2. Necessity of marketing information on indigenous production. Rural indigenous entrepreneurs often do not have access to reliable market information on national food. Imperfections of existing rural information infrastructure restrain the flow of information, extremely necessary for entrepreneurs (Morrison, Murray, & Ngidang, 2006);

F3. Neccesity for dissemination of information on specific features of indigenous rural areas development (Maguirre, Portales, & Bellido, 2018);

F4. Necessity for the special education programs on indigenous entrepreneurship (Torri & Herrmann, 2011);

F5. Difficulties in international interaction of indegenes (Muller & Korsgaard, 2018).

The questionnaire for the survey was designed as a combination of Likert Scale directing from “strongly disagree” – 1, to “strongly agree” – 5, and one sample mean comparison test was found as the most useful method in this kind of research in literature. The questionnaires were distributed in different entrepreneurial companies working in rural indigenous areas of the Urals region in Russia. A simple random sample of 30 respondents was generated. The study was conducted according to the principles of the Oslo Manual.

Individual ratings were treated as continuous data (Harpe, 2015). The observed data was analyzed by applying Stata 11 classical tests of hypotheses. One-sample mean comparison test for the 2017 data gave the following results (Table 1). The confidence intervals are sufficiently narrow to take the sample means for the population means.

3. Research results and discussion

Based on the conducted surveys, several conclusions were made, explaining the problems of innovative development of entrepreneurial entities in rural areas. The survey results are presented graphically on Figure 1.

Table 1: One-sample mean comparison test results

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Support of indigenes from local administration	30	3.5	.1841414	1.008584	3.123389	3.876611
Necessity of marketing information on indigenous production	30	3.566667	.189878	1.040004	3.178323	3.955011
Neccesity for dissemination	30	3.233333	.1329016	.727932	2.961519	3.505148
Necessity for the special education programs	30	2.766667	.1491997	.8172002	2.461519	3.071814
Difficulties in international interaction of indegenes	30	2.533333	.1244143	.6814454	2.278877	2.787789

The research was conducted during special session for representatives of Bashkir people in the Ural Federal University, Russia. The Bashkirs are one of small indigeneos Turkic people of Ural region in Russia. According to the official Russian census office Goskomstat they count less then 1% of the regional population. They stand on the strong position of preserving their national culture.

The dynamics of the factor “Difficulties in international interaction” is the most interesting. It was supposed to be one of the main hurdles, but interviewers marked as inessential. In oral conversations, the respondents determined the reason for the downgrading this factor by saying that the idea of innovative development of indegenous rural areas is recognisible and supported by many Bashkirs and in persuit of national identity there is no need to take into account achievements of other nations.

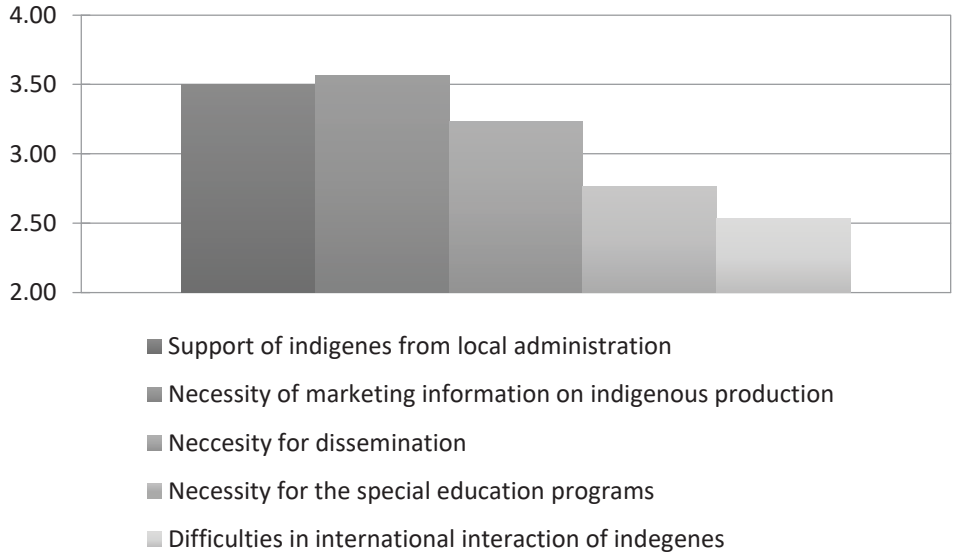

Figure 1: Factors restraining the innovative development of Bashkir rural areas in Russia

The factor “Necessity of marketing information” is valued by respondents as a significant factor. However, its content has undergone significant changes from the statements “hard to find the right information in our

backwoods" to an understanding of the necessity to create an information service. The urgency of the lack of information is determined by rural entrepreneurs as the lack of an information system to request and search for the necessary information. As a result, a number of respondents identified the actual problem as the lack of accessible qualified specialists in the information databases, rather than in information technologies. Cooperation with research organizations having experience in information management was suggested as an alternative solution, but the majority of respondents rejected this possibility, appealing to the need to preserve the confidentiality of information.

When respondents were questioned on "special education progrms" in their indigenous rural areas, they demonstrated a lack of understanding of the need to teach them not only national customs and traditions but also basic entrepreneurial skills.

The information dissemination factor, which should be seen as internal, intersects with the lack of marketing information about potential demand. The increase in value of this factor was supplemented with verbal comments from respondents about the dissatisfaction with the capacity of accessible information chanels. Until now, the inability to conduct high-quality market research, to determine the clear picture of the existing demand for produced goods and also the demand trends on target markets, remains a weakness of Russian marketing specialists. This leads to their incompetence to accurately focus the target audience, and, consequently, this increases advertising costs for enterprises.

Almost all respondents pointed out the lack of support from local and regional administrations, but respondents were requesting this support mainly in the form of subsidies. Most of repondents had no information and were not seeking information on federal and regional programs for national rural areas and entrepreneurship support.

4. Conclusions, proposals, recommendations

The research indicated that indegenous entrepreneurs in Russia view entrepreneruial activity not only as one of many methods for breadwinning but also the way to state their national identity, and therefore their attitude to innovations is based on the perception of innovation as one of conventional forms to sound their national exclusiveness.

The long-established perception of innovation, as it was exposed in the research, is based on a rigid division of the internal and external environment of the enterprises. Indegenous entrepreneurs believe that innovation activity, based solely on internal resources, primarily intellectual, can occur within any enterprise. That is why the interviewed entrepreneurs noted that their employees adequately perceive innovations but have no required qualifications for its' implementation. On the basis of this assumption, it was concluded by respondents that it is necessary to attract qualified employees, meanwhile they do not raise question how appropriate the existing organizational model of the enterprise is for innovative activities.

According to the position of rural indigenous entrepreneurs in Russia, disclosed in the survey, innovative activities at rural entrepreneurial companies are trusted by them to be based on the same principles as any other type of trade activities: the means of innovations are owned by economic entities and results of innovative activities are entirely owned by entrepreneurs. For any common, routine trade activity, the means of production are believed to be fixed assets, mostly material assets, and the right of disposition is possessed by business owners only. However, the main resource for innovative activities is the potential to generate innovations, knowledge and skills of researchers and developers, and entrepreneurs do not have the right to own it.

This attitude of indigenous entrepreneurs to the main resource of innovation as to a resource that should be in their ownership or disposal completely was formed in the twentieth century, and now it suits no longer neither possessors of innovation knowledge and competences nor entrepreneurs willing to implement it. For entrepreneurs, long-term hiring of highly qualified innovators becomes financially burdensome, for qualified innovators a long-term contract with one enterprise, full of bans on professional activity outside the enterprise, is fraught with a loss of innovative skills and, as a consequence, a decrease in qualification as an innovator.

To result the conducted research, it is necessary to acknowledge that hurdles are appearing on all steps of innovative activities of rural indigenous entrepreneurs. Any single entrepreneur is not able to possess all necessary resources to progress in innovative activities to gain effectiveness and provide social development of indigenous rural areas. The main role in developing innovative activities of rural indigenous entrepreneurs to surmount obstacles and overcome difficulties must be played by regional and local authorities. Regional and local authorities must play their important role in supporting rural indegenous entrepreneurs by developing information infrastructure with open access to marketing and technological information. This information will be the most useful resource for rural indigenous entrepreneurs to overcome difficulties and barriers.

References

Allen, P. (2008). Mining for justice in the food system: perceptions, practices, and possibilities. Agriculture and Human Values,25(2), 157-161. doi:10.1007/s10460-008-9120-6

Brouwer, J. (1999). Modern and indigenous perceptions in small enterprises. Economic and Political Weekly, 34(48), M152-M156.

Burnett, K. A., & Danson, M. (2017). Enterprise and entrepreneurship on islands and remote rural environments. International Journal of Entrepreneurship and Innovation, 18(1), 25-35. doi:10.1177/1465750316686237

Cahn, M. (2008). Indigenous entrepreneurship, culture and micro-enterprise in the Pacific Islands: case studies from Samoa. Entrepreneurship and Regional Development, 20(1), 1-18. doi:10.1080/08985620701552413

Carolan, M. (2012). The sociology of food and agriculture. London ; New York: Routledge.

Castelnovo, W. (2009). Supporting Innovation in Small Local Government Organizations. Proceedings of the 3rd European Conference on Information Management and Evaluation, 99-106.

Colbourne, R. (2017). An understanding of Native American entrepreneurship. Small Enterprise Research, 24(1), 49-61. doi:10.1080/13215906.2017.1289856

Croce, F. (2017). Contextualized indigenous entrepreneurial models: A systematic review of indigenous entrepreneurship literature. Journal of Management & Organization, 23(6), 886-906. doi:10.1017/jmo.2017.69

Dana, L. P., & Anderson, R. B. (2011). Indigenous entrepreneurship as a function of cultural perceptions of opportunity. In L. P. Dana (Ed.), World Encyclopedia of Entrepreneurship (pp. 249-258). Cheltenham: Edward Elgar Publishing Ltd.

Global food security : challenges for the food and agricultural system. (2013). [Paris]: OECD.

Gretzinger, S., Fietze, S., Brem, A., & Ogbonna, T. U. (2018). Small scale entrepreneurship understanding - behaviors of aspiring entrepreneurs in a rural area. Competitiveness Review, 28(1), 22-42. doi:10.1108/cr-05-2017-0034

Harpa, E. (2017). Macroeconomic Analysis of the Competitive Factors which Influence Innovation in Rural Entrepreneurship. 10th International Conference Interdisciplinarity in Engineering, Inter-Eng 2016, 181, 965-968. doi:10.1016/j.proeng.2017.02.494

Harpe, S. E. (2015). How to analyze Likert and other rating scale data Currents in Pharmacy Teaching & Learning. Currents in Pharmacy Teaching and Learning, 7(6), 836-850. doi:10.1016/j.cptl.2015.08.001

Haynes-Maslow, L., & Salvador, R. (2015). The food system should unite us, not divide us. Journal of Agriculture Food Systems and Community Development, 5(4), 105-108. doi:10.5304/jafscd.2015.054.019

Lawrence, G., Lyons, K., & Wallington, T. (2010). Food security, nutrition and sustainability. London: Earthscan.

Maguirre, M. V., Portales, L., & Bellido, I. V. (2018). Indigenous Social Enterprises as Drivers of Sustainable Development: Insights From Mexico and Peru. Critical Sociology, 44(2), 323-340. doi:10.1177/0896920516688757

Marsden, T. Sustainable food systems : building a new paradigm.

Morrison, P. S., Murray, W. E., & Ngidang, D. (2006). Promoting indigenous entrepreneurship through small-scale contract farming: The poultry sector in Sarawak, Malaysia. Singapore Journal of Tropical Geography, 27(2), 191-206. doi:10.1111/j.1467-9493.2006.00253.x

Muller, S., & Korsgaard, S. (2018). Resources and bridging: the role of spatial context in rural entrepreneurship. Entrepreneurship and Regional Development, 30(1-2), 224-255. doi:10.1080/08985626.2017.1402092

Newbery, R., Siwale, J., & Henley, A. (2017). Rural entrepreneurship theory in the developing and developed world. International Journal of Entrepreneurship and Innovation, 18(1), 3-4. doi:10.1177/1465750316686232

Pato, L., & Teixeira, A. A. C. (2018). Rural entrepreneurship: the tale of a rare event. Journal of Place Management and Development, 11(1), 46-59. doi:10.1108/jpmd-08-2017-0085

Peredo, A. M., & Anderson, R. B. (2006). INDIGENOUS ENTREPRENEURSHIP RESEARCH: THEMES AND VARIATIONS. In C. S. Galbraith & C. H. Stiles (Eds.), Developmental Entrepreneurship: Adversity, Risk, and Isolation (Vol. 5, pp. 253-273). Bingley: Emerald Group Publishing Limited.

Polbitsyn, G. T. (1928). Desiat' let khoziaĭstvennogo i kul'-turno-sotsial'nogo stroitel'stva Penzenskoĭ gubernii. Penza,: Izd. Penzenskogo gubispolkoma.

Ritzer, G. (1996). The McDonaldization thesis: Is expansion inevitable? International Sociology, 11(3), 291-308. doi:10.1177/026858096011003002

Science, policy and politics of modern agricultural system. (2014). New York: Springer.

Torri, M. C., & Herrmann, T. M. (2011). The Entrepreneurship and the Role of Indigenous Communities. In Bridges between Tradition and Innovation in Ethnomedicine: Fostering Local Development through Community-Based Enterprises in India (pp. 7-42). Berlin: Springer-Verlag Berlin.

Creating the First Entrepreneurial Law Course

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Abstract: It is well-known in the literature that most entrepreneurs fail to build a sustainable business, most of the time. Serial entrepreneurs are no more likely to succeed than new entrants to the field. This is the nature of the field, and a wide body of literature is focused on reducing the failure rate, ranging from Drucker to Christensen to Ries. Once past the initial causes of failure, however, the growing business faces challenges more exogenous than endogenous; in every country we have studied, legal standards and ethical norms become the foremost barrier to success. We discuss the research and practical challenges involved in creating what we observe to be the first course on entrepreneurial law in the United States and provide suggestions for programs seeking to include a formal course in the field.

Keywords: Entrepreneurship, Ethics, Law, Disruption, Entrepreneurial Law, Women and Entrepreneurship, Entrepreneurship Curriculum Development

1. Introduction

Entrepreneurship is the transformation of an innovation into a sustainable enterprise that generates value. An entrepreneur provides a new product or service or that develops and uses new methods to produce or deliver existing goods and services at a lower cost. Entrepreneurs take risks to develop a novel, sustainable enterprise—a new or improved organization that benefits the economy and society. Entrepreneurship can involve invention, creativity, and management, starting a small business, or becoming self-employed.

Entrepreneurship entails the commercialization of an innovation. New ideas, products, or organizational schemes matter little until they achieve market acceptance and traction. The market validates utility and need along with excellence. This ultimately means that the market also invalidates new ideas and the judgement that the idea is not good. The entrepreneur's risk, therefore, is as much a gamble as it is an informed calculation about the viability of the new enterprise in the market and about its capacity to meet a demand or need of others, though entrepreneurs are calculating not the odds of known risks, but reasoning under uncertainty.

Entrepreneurship is prevalent in many fields but is studied most thoroughly in commerce; intimately tied to science, entrepreneurship is another search through an uncertain space to uncover true knowledge about the state of reality, reflected in entrepreneurial profit. Business and commerce are deeply rooted in constitutional societies. Cultural and social values and economic policies and behaviors shape and validate one another. For entrepreneurship to be a mainstream and routine business practice, it must reflect its society's view of how the world should work and how human beings should behave. Social attitudes, political practices, economic policies, and the legal system must support creativity, risk-taking, and the implementation of new enterprises.

Innovators, scientists and entrepreneurs must feel safe to share their commercial ideas in exchange for protective rights such as Intellectual Property. Entrepreneurship cannot thrive if the society's values undermine it.

Entrepreneurship is a process of fundamental transformation: from innovative idea to enterprise and from enterprise to value. In America, our founders valued the innovation process by embedding notions and precursors to patent, trademark and copyright law in our constitution. It was these notions that propelled innovators and entrepreneurs to share their ideas and partake in the industrial revolution in America. In exchange for sharing one's ideas, America bestowed its entrepreneurial citizens with federal protection for original and improved intellectual property that benefited technology, culture, and commerce.

Entrepreneurship requires knowledge, imagination, perception, practicality, persistence, and attention to others. Entrepreneurship is a self-transcending activity that—through responsiveness to the market—integrates the entrepreneur with society. Entrepreneurship is an exercise in social responsibility. Impressing or pushing forward innovation, improvement, and its implementation addresses a society's needs and wants, and

propels that society forward. Entrepreneurship is the unique process that, by fusing innovation and implementation, allows individuals to bring new ideas into being for the benefit of themselves, others and society at large. It is the essence of freedom of expression and of a society.

2. Why Entrepreneurship Belongs in a Learning Curriculum

Entrepreneurship is critical to understanding and succeeding in the contemporary global economy. Entrepreneurship is already an expanding area of American interdisciplinary learning. Entrepreneurship has become a basic part of what universities and schools teach. Finally, entrepreneurship meets many of the goals of a quality undergraduate and graduate education. To neglect entrepreneurship or relegate it to the educational sidelines makes learning orthogonal to the world it is supposed to help students learn to understand.

Entrepreneurship has long been overlooked as a topic of economic study, but is now recognized as a major generator of wealth and job creation in the economy. The continual creation of new enterprises is a fundamental reason for the economic growth and technological innovation of economies, particularly the American economy. Entrepreneurship is the core of growth for a free society, from an economic and cultural perspective. Showing students how American politics, law, culture, and economics actually interact in the innovation process is a stimulating way for students to achieve a realistically comprehensive picture of the concrete machinery of their own economy and society, and to extend those insights to others.

Entrepreneurship has been a standard component of the curricula of business schools but it is now emerging as its own discrete area of study which has interest, overlap, and applicability to many core curriculum subjects. The science, technology, engineering, arts and mathematics is a prime example of where the concepts of entrepreneurship have profound overlap and open the minds of students to possibilities not originally thought of. Entrepreneurship is one of the fastest-growing subjects in today's undergraduate curriculums. In the past three decades, formal programs (majors, minors and certificates) in entrepreneurship have more than quadrupled, from 104 in 1975 to more than 500 in 2006. Entrepreneurship is ideal for general education because it is a practice that applies to many fields and because it provides a revealing lens for studying how cultural values, social institutions and ethics, economic policies, and legal practices correlate to shape human behavior.

This trend is self-evident, given universities themselves are agents of entrepreneurship. Through offices of "technology transfer," schools encourage and enable their faculty to create ventures that transform their research into products for the market. Now a university's students can begin to participate in this activity.

Research universities are an important source of innovation and the creation of new products and processes that become the foundation of new forms and enterprises. For universities to advocate entrepreneurship as a core activity for faculty and then fail to teach or involve their students disconnects the school's entrepreneurial mission from its innovation practice.

To further support the desire to create an entrepreneurial course or program it should be noted that entrepreneurship fulfills many of the established goals of a high-quality education. Entrepreneurship is not an isolated activity; it is the epitome of teamwork and cooperation. It is rooted in a society's regulatory and ethical constructs. Businesses do not exist in vacuums. In fact, they are integrated and interlock with law, economics, politics, finance, and cultural and societal values and behaviors. Entrepreneurialism focuses on the practical and pragmatic and can hone the ambition and talent of people into concrete and tangible projects.

Because of its practical focus, entrepreneurship's greatest teachers are its innovators and practitioners. Studying theory but also examining how the creators of new enterprises, firms, products, and services is a critical component of the curriculum. Entrepreneurship naturally and authentically draws together subjects usually taught and studied separately. It is by definition inter- and cross-disciplinary. For example, much of entrepreneurship depends on the legal concept of "intellectual property," the notion that ideas, once physically embodied, can be "owned" such that the owner can control the use and practice of that idea. This concept of ownership of property is directly related to the privacy and autonomy of an individual, and that our ideas come from within us and therefore belong to us as our property. The entrepreneurial lens illustrates how theory, philosophy, and sometimes theology constructs become real, practical, and affect everyday life—

in short, how values matter. In doing so, a course in entrepreneurship can fulfill business practice theory but also touch on the proprietary rights of individuals of their self's and their ideas. Such conversations spark ethical, moral and regulatory debates in light of emerging technologies.

3. Basics of entrepreneurship:

A major factor for entrepreneurial success is interest. This can stem from personal interest, solving other's recognized problems, or addressing a society's problem. It's this interest that fuels an entrepreneur's energy and passion in devoting time to the initiative at hand. It's this energy and passion that allows an entrepreneur to maintain a high level of work ethic. This interest must also translate into a vision for the resulting company's growth and expansion or at the very least achieving market traction, market acceptance, and if applicable, making a social impact. An entrepreneur must be able to wear many hats and do so effectively. For instance, if he wants to start a business that creates mobile games, he should have specialized knowledge in mobile technology, the gaming industry, game design, mobile app marketing or programming or create a team that does. In today's educational environment, a student's interest in a particular subject often dictates his or her success.

Similar to students investing in their own educational journey, an entrepreneur must invest in her interest and resulting company, from a financial aspect to hours worked which is sometimes referred to as sweat equity. This investment may be something less tangible, such as the time she spends or the skills or reputation she brings with her, but it also tends to involve a significant investment of assets with a clear value, whether they be cash, real estate, or intellectual property. An entrepreneur who will not or cannot invest in her company cannot expect others to do so and cannot expect it to succeed.

While many new businesses start as a one-man show, successful entrepreneurship is characterized by quick and stable growth. This means hiring other people to do specialized jobs. For this reason, entrepreneurship requires extensive organization and delegation of tasks, also similar traits to a typical student in an educational environment: juggling classes, workloads, friends and personal life and responsibilities is a mirror to the organized nature of an entrepreneur and student. It is important for entrepreneurs to pay close attention to everything that goes on in their companies, but if they want their companies to succeed, they must learn to hire the right people for the right jobs and let them do their jobs with minimal interference from management.

Entrepreneurship also requires risk, i.e. the operating under uncertainty and the need for courage to stand up to any risks. The measurement of this risk equates to the amount of time and money one invests into one's business. However, this risk also tends to relate directly to the rewards involved. Students who can appreciate and practice innovation, delegation, organization, team building, and risk assessment and appreciation, can only benefit from simulating the entrepreneurial journey in a classroom setting.

4. Emerging Technology, Responsible Innovation and Design Thinking and Entrepreneurship

Emerging technologies typically fall into the educational and regulatory institutional void. There are few regulatory structures or rules that govern them. There are few academic environments that are teaching about them. Emerging technologies straddle the ethical/moral line in a society's practice and use of the technology and the need for regulatory structure is often addressed too late once the emerging technology has taken hold of a society. Many of the emerging technologies in the world today are entrepreneurial-derived, generated and focused. According to this year's World Economic Forum top ten emerging technologies are:

- Brain-computer interfaces
- Mining metals from desalination brine
- Nanostructured carbon composites
- Grid-scale electricity storage
- Body-adapted wearable electronics
- Nanowire lithium-ion batteries
- Screen-less display
- Human microbiome therapeutics
- RNA-based therapeutics
- Quantified Self (Predictive analytics)

Many of these emerging technologies fall into the unregulated institutional void and thus it is incumbent on students, teachers, and entrepreneurs to be responsible researchers and innovators, i.e. wherein societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products. This would lead to a proper embedding of scientific and technological advances in our society. The student entrepreneur can work to further address the ethical and regulatory issues surrounding these and other emerging technologies by innovating in these fields from a responsible innovator approach.

Such questions to ask include:

Product questions	Process questions	Purpose questions
How will the risks and benefits be distributed?	How should standards be drawn up and applied?	Why are researchers doing it?
What other impacts can we anticipate?	How should risks and benefits be defined and measured?	Are these motivations transparent and in the public interest?
How might these change in the future?	Who is in control?	Who will benefit?
What don't we know about?	Who is taking part?	What are they going to gain?
What might we never know about?	Who will take responsibility if things go wrong?	What are the alternatives?
	How do we know we are right?	

Figure 1: Lines of questioning on responsible innovation.

To achieve a responsible innovation to an emerging technology, the entrepreneur can implement the five phases of Design Thinking:

- Empathize – with users
- Define –a users' needs, their problem, and their insights
- Ideate – by challenging assumptions and creating ideas for innovative solutions
- Prototype – to start creating solutions
- Test – solutions

Similarly, the 17 Sustainable Development goals of the United Nations were created specifically to address the need for responsible innovators to solve societal problems as a vehicle for entrepreneurship. Inspiring, creating or inspiring an entrepreneurial student to responsibly innovate a solution to a United Nations goal requires a plan of action for people, planet and prosperity ripe for academic curriculum. Eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. The ability of a student entrepreneur to innovate an entrepreneurial product or service to address or possibly solve, for example, poverty is a mission a student entrepreneur can get behind. The involvement of corporations in providing financial incentives to entrepreneurial solutions and products to address these goals also provides an additional incentivize to the student entrepreneur. The 17 Sustainable Development Goals are an excellent basis for creating the reason, the purpose, and the goals for a first entrepreneurial course. The goals and targets are in areas of critical importance for humanity and the planet and who better than entrepreneurs to solve these problems. The interdisciplinary nature of responsibly innovating and design thinking an entrepreneurial solution to an emerging technology that can solve one of the United Nation's 17 Sustainable Development Goals should be a crucial part of the work of a first entrepreneurial course.

5. Implementing the First Entrepreneurial Law Course

A first entrepreneurial law course must teach entrepreneurial culture and mindset. The academic institution must foster an entrepreneurial community and ecosystem. The academic institution should seek to work with community partners who can aid and assist in making porotypes and develop programs so that student's ideas go from paper to reality, perhaps the purchase of a 3d printer if one doesn't already exist. Curriculum should touch on present shocks to the commercial world that spark ethical and moral debates due to the lack of regulation such as 3-d printing, gig economy, sharing economy, cryptocurrency, and nanotechnology. The academic institution should promote the education of intellectual property of a student entrepreneur's ideas. Discussion of other regulatory schemes such as founder agreements between students who work together as

well as the need for a corporate entity should be discussed. Market Research and financial considerations during the entrepreneurial journey should be discussed as should the need for investment in student entrepreneurial projects whether they are based in a real life venture or a fantasy setting. The entrepreneurial course must address some of the legal pitfalls that haunt a venture. Some include the understanding of the regulatory tax implications facing small businesses, understanding the business structure that is best suited for one's business, the need for legally binding contracts and the definitions and implications between full time, part time, and casual employees, freelancers, and consultants, and intellectual property issues.

Finally, an academic institution should prepare itself for the desire of a student entrepreneur to have their solutions incubated and accelerated to a full fledge self-sustaining business or a candidate for the academic institutions technology transfer office. Creating a community that can hold follow on activities such as pitch and public speaking competitions where interested community and service partners at the state, local and federal level. Creating a first entrepreneurial course is a labor love, a term often used by entrepreneurs to describe their own ventures. From an educational standpoint, the course can enhance an existing curriculum and influence a student's current course of study in many interdisciplinary ways. Student entrepreneurs who can work to solve world problems is an added benefit that is still unmeasured.

The course would provide students a basic understanding of the legal and ethical issues facing startup and emerging businesses. The course is geared toward the non-legal student who have no background in law. The course will examine the legal and ethical issues and problems faced by entrepreneurs in their journey, specifically from conception of an idea, to the creation and operations of a company, to the launch of a product or service and finally to the sale of the company or investment by venture capitalists and everything in between. Topics include the legal, ethical and regulatory frameworks of the four main elements of Intellectual Property (Trade Secrets, Patents, Trademarks, and Copyright), business and corporate issues, operations and personnel, employee, interns and consultant work force, digital marketing, branding, social media and domain names, and raising capital through traditional and alternative methods.

The course would involve lectures, guest lectures, group projects, individual projects, case studies and problem sets. The course support entrepreneurship goals such as: demonstrating an understanding of the entrepreneurial process, understanding the basic elements of Intellectual Property and protecting your Idea/Concept, understanding the Regulatory and Legal Structure of the United States and International Jurisdictions; understanding the basic requirements of Corporate Structure, understanding the basic elements of Agreements between Founders, Investors, Key Employees and Contractors, learning when to get a lawyer involved and understanding the ethical decisions one must face when launching a new venture. The course will explore lean startup concepts for the creation of a new venture, conducting a customer discovery campaign, understanding and analyzing the options for new venture financing, using financial statements to analyze the financial performance of a new or existing venture, developing a marketing campaign for a new venture, and pitching a venture idea to potential funding sources.

Reference

Baumol, William J., Litan, Robert E. and Schramm, Carl J. (2007) Good Capitalism, Bad Capitalism, and the Economics of Growth and Prosperity, Yale University Press

Beyer, Catherine Hoffman, Gilmore, Gerald M. Fisher, and Andrew T. (2007) Inside the Undergraduate Experience. Anker Publishing Company, 2007, Bolton MA

Schramm, Carl J. Entrepreneurship in American Higher Education, Missouri, Kauffman Foundation

Stilgoe, Jack, Owen, Richard and Macnaghten, Phil, (2013) Developing a framework for responsible innovation Science Direct, Elsevier

World Economic Forum, Emerging Technologies, 2017

United Nations Sustainable Development Goals, 2015

Appendix: Sample Syllabus: Content And Scope Of The Course:

1. Introduction to Regulations and Ethics (1 class session)

U.S. and International System of Regulations

What is Intellectual Property?

2. Trade Secret or Patent (2 class sessions)

Types of Patents

Patent Searching

Global Perspectives

3. Trademarks (2 class session)

What Makes a Great Brand?
Trademark Searching
Global Perspectives

4. Copyrights (1 class session)

Inspiration or Infringement?
Global perspective

5. Corporate Structure (1 class session)

Types of Entities?
Founder Agreements, Operating Agreements, By Laws, International Perspectives

6. Building your Team (1 class session)

Employees, Independent Contractors, Consultants, Interns

7. Key Agreements (1 class session)

Non-Disclosure and Non-Compete Agreements, Licenses

8. Raising Capital and Valuation (1 class session)

Crowdfunding
Investors- Angels, VC's

9. Internet or Brick or Mortar (1 class sessions)

Terms and Conditions, Privacy Policy
Insurance
Is a Domain Name a Trademark?

10. Raising Capital (1 class session)

Crowdfunding
Investors- Angels, VC's

11. Go to Market (1 class session)

Social Media, Privacy
Other U.S. and International Perspectives, Regulatory Frameworks- FDA, Consumer Product Safety Commission

12. Ethics v. Legal (2 class session)

3d Printing, Uber, Airbnb, VW, Bitcoin, and other Present Shock Hot Topics

Complex Models Supporting Innovation Processes

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Abstract: The effective development of innovations requires efficient management at all stages of the innovation process, including generation, development and implementation of innovations. Among the methodologies that effectively support these processes, it is necessary to indicate the following tools: future research, with particular emphasis on foresight, as well as technology assessment and executive capacity assessment. State-of-the-art analyses and the author's practical experience resulting from execution of innovative projects have demonstrated usefulness of individual applications of the indicated tools for the purposes of supporting innovation processes. They also allowed for identification of areas of potential mutual complementarity of tools in question. Recognising legitimacy of a fully integrated use of selected tools to support innovation processes, the author has conducted in-depth literature studies aimed at identifying theoretical models and practical examples of the combined application of the indicated tools. The analysis showed that the joint use of tools, i.e. foresight, technology assessment, and executive capacity assessment in R&D organisations aimed at support for the processes of generation, development, and implementation of innovations is the subject of few scientific analyses and only a limited number of practical applications. Their majority comprise joint use of two out of three analysed tools, which is usually future research and technology assessment. The article presents examples in this area, including attempts to develop specialised models and propose approaches to the joint application of selected tools and practical examples of the joint use of selected tools. The author indicates possible areas of the integrated use of the indicated triad of tools, both at the macro level concerning the economy and at the micro level, in relation to entities participating in the innovation processes, including mainly R&D organisations. Against this background, the author proposes development of an original methodology of supporting processes of generation and realisation of technological innovations. The methodology is based on the application of a triad of tools in an integrated and comprehensive manner.

Keywords: triad of tools: foresight, technology assessment and executive capacity assessment, complex models supporting innovation processes, methodology of supporting processes of generation and realisation of technological innovations.

1. Introduction

Effective development of innovation requires efficient management at the stages of generating, realising and implementing of innovation, including identification and overcoming of barriers and challenges as part of innovation processes (Mazurkiewicz, Poteralska, 2015; Mazurkiewicz, 2017). The author's area of research interest encompasses support for management of processes of generation, realisation and implementation of technological innovations in R&D organisations. Tools effectively supporting these processes include future research, mainly foresight, technology assessment, and executive capacity assessment.

Development of models of preparing and implementing innovation from linear to interactive (Rothwell 1994; Kotesmir, Meissner 2013) enforces a new systemic approach to application of these tools (Könnölä et al., 1994). Changes in foresight studies and development of research methods in this field are also consequences of global changes in recent decades involving economic, social, cultural, and other aspects (Krawczyk, Slaughter, 2010). Some authors (Hines, 2002) point out that, despite the unquestioned need for raising standards of innovation, tools employed as part of foresight undertakings remain largely traditional and require changes. The methods in place are insufficiently effective. New methods and new approaches need to be sought (Rohrbeck, 2012). The same applies to the approach to technology assessment developed since as early as 1960s, where new methods and models of technology assessment continue to be developed and their applicability to a variety of contexts is analysed (Ely et al, 2011; Bütschi 2014). With regard to executive capacity assessment of organisations, in turn, the most extensive set of methods applies to enterprises while procedures for executive capacity assessment of research organisations are available as well (Jakuszewicz, 2015). The need must be emphasised, however, for developing methods of R&D organisations' executive capacity assessment applicable in reference to innovation process support. Moreover, it is necessary to develop these methods in conjunction with methods of foresight and technology assessment.

Although realisation of foresight projects helps to generate forward-looking directions of technological, economic or social development, decision-makers usually need information about existing executive capacity that lays foundations for developing new opportunities and realisation of the forward-looking directions (Salo, Cuhls, 2003). Mobilisation of executive capacity is necessary for the purposes of foresight and implementation

of its results as technological innovations (Keenan et al, 2002; McDowall, Eames, 2006; Georghiou 2008). Selection of forward-looking technological solutions is carried out in consideration of the available executive capacity and based on results of assessments of innovative solutions that have already been developed and become a source of research problems addressed. Next, innovations being developed are assessed at successive stages of work, also in combination with analysis of required and available capacity, followed by analysis of practical applicability of solutions developed using results of technology assessment and executive capacity assessment. In view of the mutual complementarity and potential for complex application of indicated tools, it is reasonable to use them as a triad including: foresight, technology assessment and executive capacity assessment at the time of generating, realising and implementing innovative solutions. The author's literature reviews, case studies, and direct experience (Mazurkiewicz et al., 2013; Poteralska, Sacio-Szymańska, 2014; Sacio-Szymańska et al., 2015; Mazurkiewicz et al, 2015; Poteralska, 2017) in connection with realisation and particularly management of research projects confirm such an approach as reasonable.

2. Analysis of state of the art in complex models supporting generation, realisation, and implementation of technological innovations

Experience shows foresight, technology assessment and executive capacity assessment activities undertaken by scientific communities in a range of countries are commonly independent one from another (Loveridge, 1996), although these areas of innovative activities are interrelated. On the other hand, industrial organisations have the practical ability of combining individual tools in order to select technological solutions of a potentially high significance, both commercial and social (Kuhlmann, 2002). In enterprises, actions for idea generation, assessment of solutions developed, and utilisation of the potential in place are frequently integrated (Loveridge, 1996) and the need for their interlinking is understood.

Combining the tools in the triad: foresight, technology assessment, and executive capacity assessment by R&D organisations to support the processes of generating and realising innovation is the subject of few scientific analyses, with scarce instances of combining such tools in practice.

There are theoretical analyses concerning potential and reasons for combining the tools in question, attempts are also made to develop specialist models. Loveridge's model (1996) or proposed solutions combining foresight and another tool, i.e. technology assessment or executive capacity assessment to support generation and realisation of innovation, e.g. by Kameoka et al. (2004), Porter (1995), Rip (2002) and Kuhlmann et al. (2002a), are some of the instances.

Loveridge's model (1996) assumes presence of links between two out of three tools constituting the triad, namely, foresight and technology assessment. Foresight is the tool helping to project possible visions of the future. The models of future generated are then subject to assessments of technological capacity. The need to address two streams of technology assessment is stressed as part of the model: in the public domain, oriented towards extensive and general issues of technological policy, and in the industry, aimed at practical technology applications.

Kameoka et al. (2004), following analyses of projects undertaken in Japan, have suggested linking the methods of foresight and technology assessment. In Japan, foresight and technology assessment projects have traditionally been carried out on a separate basis. The so-called DSW: Delphi-scenario writing has been employed as part of foresight projects since 1977 to develop innovation development strategy, an integrated approach to scenario building. The method of technology assessment has in turn been used since early 1970s in a number of areas related to both advanced technologies and social phenomena. As social and economic issues increasingly need to be addressed as part of foresight undertakings, Kameoka et al. (2004) have proposed, based on analysis of case studies concerning foresight and technology assessment projects, it would be reasonable to prepare a new methodology to integrate the approaches utilised in the case studies they had analysed. They pointed out forward-looking technology analyses involved, inter alia, forecasting, foresight, technology roadmapping, and technology assessment, while these approaches should be integrated to more fully understand emerging technologies and address their significance for society.

The possibility of combining foresight and technology assessment is also emphasised by Porter (1995). He states a systemic approach to technology management is ultimately applied to technology assessment as it addresses not only technological and industrial but also social and environmental aspects. Technology

assessment relates to evaluating effects, consequences and risks inherent in technology applications while also playing foresight functions of projecting opportunities and potential for developing technological solutions as parts of strategic planning. Close integration of technology assessment, technology monitoring and forecasting is indicated. Porter also points to shifts in the idea of technology assessment that bring it closer to foresight actions suited to the nature and requirements of individual users.

The need to integrate foresight and technology assessment actions is underlined by Kuhlmann (2002a) as well. The integration is of particular use where utilisation of results of these undertakings is expected to support strategic actions including analysis of market expectations and user requirements. Kuhlmann (2002) proposes a novel approach he refers to as 'distributed intelligence', which envisages development of tools that can be employed, in a variety of combinations, to support the decision-making process. He cites foresight and technology assessment among the best known and most commonly used tools. They need to be employed more effectively and new approaches need to be explored, including some that could serve to aid the decision-making process. He goes on to stress there is no single best approach to combining tools. They should be selected on an individual basis depending on objectives and scope of the decision-making process.

Rip (2002) refers to earlier studies by Kuhlmann at al. (1999), among others, which imply the potential has been recognised for linking e.g. foresight and technology assessment which can be taken advantage of owing to the distributed intelligence. Rip (2002) points out, however, foresight (particularly with reference to application of the Delphi method) falls short of requirements as far as a broader inclusion of economic and social aspects is concerned. He believes technology assessment can be utilised to this end. In case of technology assessments covering new technologies like nanotechnology or genomics, additional application of foresight is reasonable. In the circumstances, assessments of technologies at early stages of development, including new products or services, must address scenarios of socio-technical development for results to be of real value to technology developers, for example.

These literature reviews concerning integration of foresight, technology assessment and executive capacity assessment detect examples of projects where the importance of executive capacity is highlighted. The need to address the capacity in foresight undertakings is due to the fact that, although foresight helps to indicate forward-looking directions of technological, economic or social development, decision-makers also need information on existing executive capacity that provides the foundation for developing new potential and realisation of specific futuristic directions (Salo, Cuhls, 2003). Foresight publications suggest mobilisation of organisation resources is a pre-requisite of foresight projects and implementation of their results (Keenan, 2002; McDowall, Eames, 2006; Georghiou et al., 2008). Aside from designation of forward-looking technological solutions, the possibility of their practical and effective development and use in an organisation are of importance as well. To this end, it is necessary to assess executive capacity of an organisation. SWOT analysis is the method of executive capacity assessment most commonly employed as part of foresight undertakings at national, regional, sectoral (Popper, 2008), as well as corporate levels (Sripaipan, 2006). It is a universally used method of strategic planning in business practice (Humphrey, 2005). Its limitations arise from its weak theoretical foundations – it is a simplified, static and subjective method unable to satisfactorily represent complex, dynamic and systemic phenomena that characterise each business organisation (Valentin, 2005). Application of the classic version of the method fails to provide information that would allow for an all-round support of strategic decision-making processes (Yüksel, Dağdeviren, 2005). Although SWOT is utilised in foresight projects (Fleisher, Bensoussan, 2015; Nazarko et al., 2017), due to its imperfections some specialists (Popper, 2008) point to the need to replace it with other methods for the purpose of effective support of foresight undertakings.

A limited number of instances of linking technology assessment and executive capacity assessment of an organisation have been identified in the available literature. Analysis of existing projects finds scant examples of technology assessments addressing capacity of an organisation intending to utilise a given technology in its operations. The approach to the process of technology assessment proposed by T. Daim et al. (2011) comprises the following stages: identification of an existing gap related to technology, identification of potentially applicable technologies, assessment and selection of technologies best suited to needs of a given entity. Technology assessments are conducted according to a set of criteria. The authors submit a matrix of criteria using the example of manufacturing technologies. The matrix represents three perspectives concerning technological aspects, institutions, and the market. With regard to each of the perspectives, technological, economic, social, and political issues are taken into consideration. In addition, two decision-making time

horizons are determined for each type of the issues: strategic, with a longer action time frame, and tactical-operational. Detailed criteria are provided in respect of each perspective and the time horizons indicated. The criteria relating to technological issues encompass those concerning assessment of executive capacity in place, including infrastructure, available space, flexibility of equipment use. The final stage of the matrix application consists in choice of technologies best suited to needs and capabilities of user institutions with regard to a broad range of criteria including those concerning executive capacity assessment.

Apart from the theoretical analyses concerning the potential for and rationality of combining selected tools from the proposed triad: foresight, technology assessment, and executive capacity assessment, some isolated practical instances of such combinations occurring in projects realised can be indicated.

These include a German foresight undertaking 'Technologies at the Beginning of the 21st Century' (Grupp, 1993, after: Kuhlman et al, 2002), as part of which reasons have been identified for supplementing foresight methods with aspects of technology assessment. Informal technology assessment competences were expected of the participating experts. At the first stage, the Fraunhofer Institute for Systems and Innovation Research ISI reviewed a list of key technologies developed in the US and other international foresight undertakings. Following from that, a list of technologies of potential economic or social use in the coming 10–15 years was compiled. The technologies were then assessed in accordance with the following criteria: time of application, economic significance, and non-economic benefits. The final stages consisted in indication of key forward-looking technologies for Germany.

As part of a project in the United Kingdom (Improving, 1999) designed to prepare development scenarios and determine prospects for manufacturing of building materials in view of the proven adverse effect of asbestos on human health, foresight and technology assessment tools were integrated by combining quantitative and qualitative methods with application of modelling. Technological development was planned in consideration of identified opportunities and issues in order to respond to requirements of anticipated sale markets, reflect regulations concerning application of building materials, and to ensure future competitiveness of such materials. These aspects were evaluated by means of a calculation model that was developed. The actions served to construct quantitative-qualitative scenarios which helped to indicate directions of economic development.

Regional foresight projects in Poland are examples of practical application of foresight and technology assessment methods in order to support decision-making processes. The project carried out in Podkarpackie province (Ziółkowski, 2013) was aimed at identification and evaluation of future development needs of the region, selection of technologies most appropriate for the area, and development of future scenarios in the field of research and development. As part of the foresight project, key sectors were designated. Next, technology assessment was employed to identify priority ecoinnovative technologies, defined as a group of solutions with maximum attractiveness, feasibility and effect on sustainable development which deserve especial support in the framework of the regional innovation policy. A foresight project pursued in Podlaskie province (Nazarko, 2013; Nazarko, Magruk, 2013) was in turn designed to determine strategic directions of the province's development based on the postulated quantum leap of productivity as a result of application of innovative production and processing processes using state of the art in nanotechnology. Selected aspects of executive capacity were addressed and technology assessment was utilised as part of this foresight undertaking. These projects were among the first foresight undertakings in Poland employing technology assessment and addressing selected aspects of executive capacity.

Instances of executive capacity considered as part of foresight undertakings include evaluation of the so-called 'industrialisation potential', proposed by Lucheng et at. (2010). It envisages linking foresight with technology selection and assessment in order to become capable of evaluating the industrialisation potential of emerging technologies. A hybrid approach was suggested, based on foresight and a matrix serving to choose and assess technologies. This evaluation of the industrialisation potential of emerging technologies is designed to identify promising, as yet not fully developed technologies whose implementation can pave the way for development of local industry, with the necessary infrastructural, human and financial resources available for the purposes of developing such technologies. The method was utilised in practice by China in its preparations for the 2008 Olympic Games in Beijing in order to select appropriate technologies in construction of the Olympic stadium and extension of the transport network in the city, inter alia.

The analysis of the state of the art covering theoretical approaches, models and practical examples of combining foresight, technology assessment and executive capacity assessment tools supporting processes of generating, realising and implementing innovation has helped to identify, both in literature and in practice, only a limited number of instances of such integrations. In practice all the instances concerned combinations of two out of the three tools analysed, most commonly future research and technology assessment. Attention must be drawn to the need for an integrated application of these tools in order to boost effectiveness of innovation processes, arising from growing expectations of management structures, among other things. No single way to integrate foresight, technology assessment, and executive capacity assessment tools to optimum effect can be indicated, though. Each combination is dependent on objectives and scope of a decision-making process in place. No comprehensive systems of this type are currently available for application in R&D organisations, they need to be created and their component tools must be improved. Improvement of foresight tools involves searching for new, innovative approaches and methods. In respect of technology assessment, a strong need for continuing development and application of more effective methods and systems can be observed as well. The development potential of these methods is palpable, demonstrated with the extent of the changes they have undergone in the last three decades in view of the growing complexity of innovation systems and the need to support processes of action strategy creation, inter alia. In the case of foresight, forecasting has been substituted by creation of development visions and scenarios and support for active future creation. With regard to technology assessment, a shift has in turn taken place from identifying possible consequences of applying a technology to an instrument enabling not only to determine possible positive and negative effects of a technology application but also to aid innovative process realisers with development and realisation of innovative products and services. As far as executive capacity assessment is concerned, certain established methods are applied to enterprise analysis. Methods suited to unique requirements of R&D organisations need to be developed, however, aimed at effective support of processes of generating, realising and implementation of technological innovations and at their integration with the remaining tools in the triad: foresight and technology assessment.

3. Directions of development for complex models

Loveridge (1996) writing in mid-1990s claimed synergies between foresight and technology assessment in formal or institutional systems appeared unlikely since technology assessment was seen as reactive, not proactive, interactive or future-creating like foresight was. That opinion arose from the then understanding of technology assessment as contrary to foresight. In spite of these doubts, Loveridge (1996) admitted the possibility of synergies between the tools and proposed a relevant model. Rip (2002) and Kuhlmann (2002a) stressed the need to combine these tools in their studies conducted in the late 1990s and early 21st century. Linking of technology assessment and future research is also reflected in the classification of approaches to technology assessment advanced by Van Den Ende et al. (1998) it addresses futuristic aspects in two out of four types of technology assessment distinguished. Firstly, it indicates forecasting of technological development as part of technology assessment aimed at knowledge acquisition and increasing awareness. Secondly, it indicates the development of desirable future scenarios in the group related to backasting. The classification represents close links between technology assessment and foresight.

The reviews of state of the art, practical examples, and the author's own experience with management and realisation of research projects point to the need to apply the triad integrating foresight, technology assessment, and executive capacity assessment for the purposes of effective support of the decision-making process related to generation, realisation, and implementation of technological innovations.

Possible fields of integrated application of the triad of tools at the macro level primarily comprise aiding processes of strategic choices concerning allocation of limited resources to financing of research and technology development. Application of the triad helps to select areas of R&D financing, that is, identification of research and development priorities in conditions of limited public funding and heavy competition for these resources.

At the micro level of organisations involved in realisation of innovative processes, chiefly R&D organisations, complex models can be employed to:

- Indicate areas of R&D financing – determine current research and development priorities in line with an organisation's action strategy using foresight methodologies and considering results of technology assessment and an organisation's executive capacity available;
- Generate forward-looking fields of research both in the short term (considering possible utilisation of the executive capacity in place) and in the long term (designating areas for possible development of the executive capacity) for the purposes of organisations involved in R&D, also using foresight methodologies considering results of technology assessment and the organisation's executive capacity available;
- Support the process of technology development at the level of an organisation by means of an ongoing technology assessment and analysis of the necessary and available executive capacity;
- Support development of research infrastructure including indication of R&D organisations' priorities in this respect considering the existing capacity by application of foresight, technology assessment, and executive capacity assessment methods;
- Support processes of technology propagation by identifying current or future demand for research results and technological solutions using methods of foresight and technology assessment, analysis of capabilities and scale of their propagation considering the available executive capacity.

In view of the number of possible fields of potential practical application of complex models employing tools of foresight, technology assessment and executive capacity assessment, and bearing in mind the persistent economic importance of innovations with changing models of their development and implementation, the integration processes concerning combinations of the tools under analysis can be assumed to proceed. Certain forms of this integration can already be observed, e.g. addressing aspects of executive capacity as criteria for technology assessments in progress. Continuing development of individual methods employed as part of foresight, technology assessment or executive capacity assessment, enhanced integration of the particular tools in the framework of complex models, and introduction of new forms of the integration can be anticipated, among other developments.

The proposed triad of tools including foresight, technology assessment, and executive capacity assessment corresponds to the progressive tendencies to integration of tools serving to support innovation processes and highlights new aspects of this integration.

4. Conclusions

The author's practical experience with management of research undertakings oriented towards generation, realisation and implementation of innovations points to the potential for and benefits from applying foresight, technology assessment and executive capacity assessment to support realisation of innovation processes. The literature review has affirmed rationality of employing the said tools and has helped to identify very few attempts at combining them as part of theoretical models and practical instances of application, overwhelmingly in dual systems comprising futures studies and technology assessment.

Recognising the rationality of applying these tools as a fully integrated triad, the author has set about developing a methodology of supporting processes of generation and realisation of technological innovations, comprising the triad of tools (Fig 1).

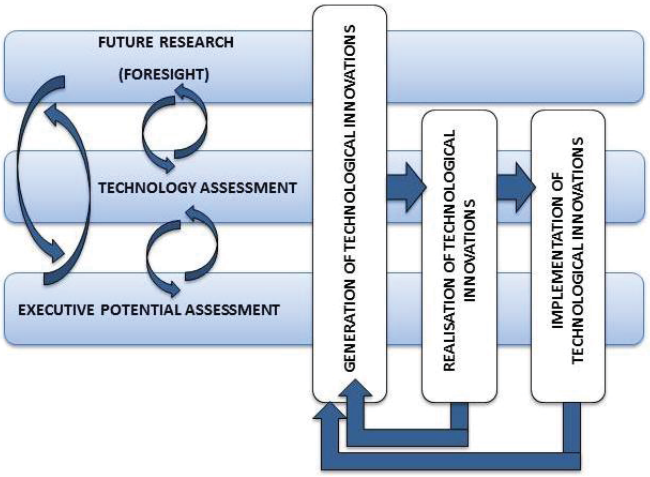

Figure 1: Application of the triad of tools: foresight, technology assessment and executive capacity assessment, at the successive stages of the innovation process

Source: Poteralska 2018.

The methodology employs foresight, technology assessment, and executive capacity assessment, to aid innovation process realisation by means of regular assessments of technological innovations developed and of the available and used executive capacity: material, human, organisational and financial, as well as prepare processes of implementing the results in economic practice using results of technology assessment and executive capacity assessment, and then employing these results for the purposes of initiating another process of innovation generation using foresight.

References

Bütschi D. (ed.), Strengthening Technology Assessment for Policy-Making, Report of the Second Parliamentary TA Debate on 7–8 April 2014, Lisbon, TA-SWISS, Centre for Technology Assessment, Switzerland, 2014.

Daim T., Gerdsri N., Basoglu N., Technology Assessment. Forecasting Future Adoption of Emerging Technologies. Erich Schmidt Verlag GmbH & Co. KG, Berlin 2011.

Ely A., Van Zwanenberg P., Stirling A., New Models of Technology Assessment for Development, STEPS Working Paper 45, Brighton: STEPS Centre, 2011.

Fleisher C. S, Bensoussan B. E. Business and Competitive Analysis: Effective Application of New and Classic Methods, Pearson Education, New Jersey, USA, 2015.

Georghiou L., Harper J.C., Keenan M. , Miles I., Popper R., The Handbook of Technology Foresight: Concepts and Practice. PRIME Series on Research and Innovation Policy, Edward Elgar Publishing Ltd., 2008.

Grupp H. (ed.), Technologie am Beginn des 21. Jahrhunderts, Heidelberg (Physica/Springer), 1993. After: Kuhlman S. , Foresight and Technology Assessment as Complementing Evaluation Tools, in: Fahrenkrog G., Polt W., Rojo J., Tübke A., Zinöcker K.J. (ed.), RTD Evaluation Toolbox – Assessing the Socio-Economic Impact of RTD-Policies – Strata Project HPV 1 CT 1999 – 00005, EC, Joint Research Centre, IPTS, 2002.

Hines A., A practitioner's view of the future of futures studies, Futures 34 (3–4), 2002.

Humphrey A.S., SWOT Analysis for Management Consulting, SRI Alumni Association Newsletter, December, 7–8, 2005.

Improving distributed intelligence in complex innovation systems. Final report of the Advanced Science and Technology Policy Planning Network (ASTPP) Karlsruhe, 1999

Jakuszewicz J., Analiza i ocena produktywności jednostek naukowych, PhD thesis, Politechnika Poznańska, Poznań 2015.

Kameoka A., Yokoo Y., Kuwahara T., A challenge of integrating technology foresight and assessment in industrial strategy development and policymaking. Technological Forecasting & Social Change 71, 2004.

Keenan M., Marvin S., Winters C., Mobilising the Regional Foresight Potential for an Enlarged European Union, STRATA-ETAN Expert Group Action, EC, Brussels 2002.

Kotesmir M., Meissner D., Conceptualizing the innovation process – trends and outlook, NRU HSE Working Paper Series Science, Technology, Innovation. No. 10/STI/2013, 2013.

Krawczyk E., Slaughter R.A., New generations of futures methods. Futures 42, 2010.

Kuhlmann S., Boekholt P., Georghiou L., Guy K., Héraud J.-A., Laredo P., Lemola T., Loveridge D., Luukkonen T. , Polt W., Rip A., Sanz-Menendes L., Smits R., Improving Distributed Intelligence in Complex Innovation Systems, Karlsruhe: Fraunhofer Institut für System- und Innovationsforschung, final report to the EU of the TSER Network on Advanced Science and Technology Policy Planning, 1999.

Kuhlmann S., Distributed Techno-Economic Intelligence for Policymaking, in: G. Fahrenkrog, W. Polt, J. Rojo, A. Tübke, K. Zinöcker (ed.), RTD Evaluation Toolbox – Assessing the Socio-Economic Impact of RTD-Policies – Strata Project HPV 1 CT 1999 – 00005, EC, JRC, IPTS, 2002.

Kuhlmann S., Foresight and Technology Assessment as Complementing Evaluation Tools, w: G. Fahrenkrog, W. Polt, J. Rojo, A. Tübke, K. Zinöcker (ed.), RTD Evaluation Toolbox – Assessing the Socio-Economic Impact of RTD-Policies – Strata Project HPV 1 CT 1999 – 00005, EC, JRC, IPTS, 2002.

Loveridge D., Foresight, Technology Assessment and Evaluation – Synergy or disjunction? Ideas in Progress. Paper Number 5. ASTPP meeting, Amsterdam 1996.

Lucheng H., Xin L., Wenguang L., Research on emerging technology selection and assessment by technology foresight and fuzzy consistent matrix, Foresight 12, 2, 2010.

McDowall W., Eames M. , Forecasts, Scenarios, Visions, Backcasts and Roadmaps to the Hydrogen Economy: A Review of the Hydrogen Futures Literature Energy Policy 34(11), 2006;

Mazurkiewicz A., Technology Transfer Barriers Encountered by R&D Organisations, In: Loué Ch., Slimane S. B.: Proceedings of the 12th European Conference on Innovation and Entrepreneurship, UK, 2017.

Mazurkiewicz A., Poteralska B., Barriers to technology transfer at R&D organisations, In: Dameri R. P., Beltrametti L. (ed.) Proceedings of the 10th European Conference on Innovation and Entrepreneurship, UK, 2015.

Mazurkiewicz A., Belina B., Poteralska B., Giesko T., Karsznia W., Universal methodology for the innovative technologies assessment, in: Dameri R. P., Beltrametti L. (ed.) Proceedings of the 10th European Conference on Innovation and Entrepreneurship, UK, 2015.

Mazurkiewicz A., Poteralska B., Model for the hierarchic application of foresight project results. Problemy Eksploatacji 4/2013, ITeE-PIB.

Nazarko J. (ed.), Podlaska strategia rozwoju nanotechnologii do 2020 roku. Przełomowa wizja regionu, Politechnika Białostocka, Białystok 2013.

Nazarko J., Ejdys J., Halicka K., Magruk A., Nazarko Ł., Skorek A., Application of Enhanced SWOT Analysis in the Future-oriented Public Management of Technology, Procedia Engineering 182, Elsevier Ltd., 2017.

Nazarko J., Magruk A. (ed.), Kluczowe nanotechnologie w gospodarce Podlasia, Politechnika Białostocka, Białystok 2013.

Popper R., How are Foresight Methods Selected? Foresight 10(6), 2008.

Porter A.L., Technology assessment. Impact Assessment, 13, 1995.

Poteralska B. Methodology of Supporting the Development of Technological Innovations in an R&D Organisation (in Polish), ITeE-PIB, Radom 2018.

Poteralska B. Decision support system in the area of generating innovative research projects of the future. Procedia Engineering, vol. 182, 2017.

Poteralska B. , Sacio-Szymańska A., Evaluation of technology foresight projects. European Journal of Futures Research, Vol. 2, nr 1, 2014.

Rip A., Challenges for technology foresight / assessment and governance. Final Report of the STRATA consolidating workshop. European Commission. DG Research. Unit RTD-K.2 – "Science and Technology foresight; links with the IPTS". 2002.

Rohrbeck R., Exploring value creation from corporate-foresight activities, Futures 44 (5), 2012.

Rothwell R., Towards the fifth-generation innovation process. International Marketing Review 11 (1), 1994.

Sacio-Szymańska A., Mazurkiewicz A., Poteralska B., Corporate foresight at the strategic research institutes, Business: Theory and Practice / Verslas: Teorija ir Praktika, Vol 16, No 3 (2015).

Salo A., Cuhls K., Technology foresight – past and future, Journal of Forecasting 22 (2–3), 2003.

Slaughter R.A., Professional standards in futures work. Discussion document. Futures 31, 1999.

Sripaipan C., Foresight in a Non-Profit Organisation: A Case of the Technology Promotion Association (Thailand-Japan), Second International Seminar on Future-Oriented Technology Analysis: Impact of FTA Approaches on Policy and Decision-Making, 2006.

T. Könnölä, T. Ahlqvist, A. Eerola, S. Kivisaari, R. Koivisto, Management of foresight portfolio: analysis of modular foresight projects at contract research organisation. Technology Analysis & Strategic Management 21 (3), 2009.

Valentin E.K. Away with SWOT Analysis: Use Defensive/Offensive Evaluation Instead. The Journal of Applied Business Research 21(2), 2005.

Van Den Ende J., Mulder K., Knot M., Moors E., Vergragt P., Traditional and Modern Technology Assessment: Toward a Toolkit, Technological Forecasting and Social Change, vol. 58, 1998.

Yüksel I., Dağdeviren M., Using the analytic network process (ANP) in a SWOT analysis – A case study for a textile firm, Information Sciences, 177, 2007.

Ziółkowski B., Technology Assessment in Foresight for Podkarpacie Province Towards Regional Innovation Policy. Maintenance Problems, nr 4/2014.

Technological Innovation In The Agriculture Sector - Who Are We Reaching?

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Abstract: This paper evaluates the success of an innovative web platform created in 2011 by the Institute for Financing Agriculture and Fisheries (IFAP) named "IFAP Private Account" in which the farmer was registered and accessed their data, their history of correspondence with the Institute, checking the forms they had already submitted as well inspections carried out in the field or administratively. In 2011 the ordinance 86/2011 was published that dictated new procedures by the Institute of Financing of Agriculture and Fisheries, I.P. (IFAP) as the institution allocated the managing of the EAGF (European Agricultural Guarantee Fund) and the EAFRD (European Agricultural Fund for Rural Development). Gradually, the functionalities included in this platform increased the possibility for farmers to submit application forms in their own private accounts. Later, in 2014, IFAP released an APP for Android and iOS smartphones where the beneficiary has access to his or her private account in a faster and more convenient way. For the enabling framework of the target audience of the study it was imperative to do a literature review to carry out an economic and social analysis of the sector and the population living in rural areas and manual labour and agricultural entrepreneurs. Therefore, to understand and characterize IFAP's target public (farmers / beneficiaries) as well as the wherewithal and knowledge they have to access their own private account in an autonomous way, quantifying and characterizing the type of access was a priority. Headquartered in low-density areas, agricultural entrepreneurs present unique opportunities for innovation and differentiation and, at the same time, experience several barriers to growth. Some of these barriers are mentioned in the article in order to raise awareness of the difficulties presented by farmers and inhabitants of rural and peripheral areas. Thus, surveys were directed to farmers and technicians in grassroots entities (associations and cooperatives) in order to understand whether users carry out access to the reserved area autonomously or if they need assistance from others in doing so.

Keywords: rural population, IFAP, agriculture, rural entrepreneur, private account, technological innovation

1. 1. The rural population and the agricultural sector's dynamic

Talking about inland Portugal (Pereira et al., 2018) is talking inevitably about agriculture and forestry, or the rural population. According to the National Statistics Institute (INE), in the last Agricultural Census conducted in 2009 (RA 2009), the rural population consisted of 793,000 individuals, corresponding to 7% of the national population and the 2011 Census revealed that 61% of the population resided in places with 2,000 or more inhabitants, although these represented only 18% of the national territory. According to the Territorial Portrait of Portugal, 15% of the population lived in medium-urban areas (corresponding to 20% of the national territory) in 2011 and only 13% lived in predominantly rural areas, whose territorial extension corresponds to 62% of the total area of the country. More recently, in 2016, the Territorial Portrait of Portugal indicates that the predominantly urban areas present a population density 19 times higher than in rural areas, being that the greater population densities are verified in coastline municipalities in contrast with the densities verified in the inland municipalities that had values in the order of 50 inhabitants per km2. These numbers are quite illuminating about the low population density in rural areas where the socioeconomic importance of the agricultural and forestry sectors is preponderant.

In 2012, the Planning and Policy Office of the Ministry of Agriculture, Forestry and Rural Development published a study entitled "Agriculture in the Portuguese Economy - environment, importance and recent evolution", which is quite illustrative of the national economic reality, in particular the internal consumption (which suffered a reduction) and exports of the agroforestry complex (which increased). Although the pace of world economic activity slowed down in 2011, the same document states that the primary sector and industry contributed positively to GDP, with the primary sector showing some stability between 2007 and 2011 through a period of recession, despite some abandonment faced by the sector in relation to previous years. Gaspar et al. (2014) points out, at a time of transition from the Community Aid Framework, that the promotion of the agricultural sector can play an important role in promoting post-crisis economic recovery. Not only as a measure of entrepreneurship and employability but recovery, maintenance and even accelerated pre-crisis economic growth rates, fostering Portugal's success in a globalized economic environment from a long-term

perspective and thereby helping the country achieve sustainable economic growth. In fact, the final report of the Rural Development Program for the period 2007-2013 (PRODER) shows that investment in agricultural activity increased between 2000 and 2014 (0.6% on average per year, at current prices), in contrast to the rest of the economy (-2.4% on average per year, at current prices) revealing the dynamism of the sector in the last CSF as a result of all the incentives of local, national, and Community decision-makers to attract rural entrepreneurs and to set the population in rural areas with a special emphasis on the implementation rate of the measure to support the "young farmers' establishment", which registered a growth of 111%, corresponding to a total of 8,314 farmers between 2007 and 2015. Despite the positive results of the current and previous CAFs, on the one hand the incentives to support investment in less favoured regions in the Mainland Rural Development Program and the Autonomous Regions and in the different Operational Programs that integrate Portugal 2020, the rural population is still quite aged and occupy territory with low density as shown by INE data.

2. Entrepreneurship and Innovation in the Rural Environment and its relationship with Information and Communication Technologies (ICT)

It is essential to state that the agricultural sector and the rural world have contributed positively to the trade balance, through production increases, the result of a more competitive and technologically developed sector, and the innovation and diversification of activities related to the sector, including processing, handicrafts, tourism and others. The Common Agricultural Policy (CAP) has tended to support sustainable modes of production that respect the environment and promote the economic and social development of local (rural) enterprises. The success of entrepreneurship in these regions is sometimes related to the complementarity between the various activities carried out by the companies. The valuation of endogenous products through the Certification of Quality Policy (EU) or cases such as the Demarcated Region of the Douro "where, in the case of winegrowing, there are several examples that show great vitality (greater scale and greater mechanization, for example) (Gaspar et al., 2014) have been very important.

The location of companies in rural areas may be a limiting factor, depending on the activities carried out. Access to communication routes, ensuring a good telecommunications network, may affect the performance of the activity. However, North & Smallbone (2000) argue that factors such as the high cost of innovation coupled with a lack of funding were the major constraints on the innovative capacity of rural SMEs in the UK between 1991 and 1996 (although the authors note that this restriction may reflect SME's views on indebtedness). Among other limiting factors, we emphasize the weaknesses in the supply of external resources and the difficulty of demand (the accessibility of the clients) and the lack of time for the SMEs to be involved in the development of products and services, due to the excess of concern of their managers with the day-to-day operations of their business which leaves them little time for new ideas, to innovate. On the other hand, Dinis (2006) affirms that the result of several studies of local production systems in more peripheral regions shows that companies are scarce and, because they are scarce, there is neither an entrepreneurial spirit nor a supportive environment. Social capital is a source of innovation and social innovation. In this way, the emergence and success of new companies is a very rare phenomenon. "Thus, innovation and marketing perspectives can be useful tools for the formulation and implementation of a sustainable strategy for these companies and territories" (Dinis, 2006), combating the effect of interiority and exploiting glocalization, especially through the communication of information, contributing to the construction of increasingly differentiated and distinct consumers or even new consumer traditions, which is intrinsically related to the global marketing strategies that defend that "diversity sells" (Salazar, 2005). Still, regarding development and economic growth, Gaspar et al. (2014) states that agriculture can play a key role in enabling the expansion of other sectors traditionally seen as driving economic growth through the transfer of resources and providing a market for the growth of non-agricultural goods and services. On the other hand, the agricultural sector can also benefit from technological improvements in industry and services that, by influence, could promote the growth of the sector.

Along with the technological improvements previously mentioned as leverages of growth of the sector, with regard to ICT, it is important, right now, to mention Riddlesden et al. (2014) that demonstrates, through a study of download speed in the United Kingdom in 2013, that average download speeds in a given region showed that higher speeds are generally grouped around large population clusters while in rural areas mean speeds are significantly slower. Warren (2007), in turn, presents several factors that may be conditioning communication such as ICT infrastructure which may be considerably weaker in rural areas than in urban

areas; that the benefits of online communication in rural areas may be relatively greater than in urban areas, since it brings all stakeholders together; that solutions for digital exclusion may depend on investments in specific locations and may face additional difficulties in rural areas. In fact, it is imperative to assume that ICT plays a key role in the success of rural enterprises. Whether it is in the technology adopted in production, such as precision agriculture, or in ensuring the connection to any point on the globe, anywhere where the entrepreneur can be found, so that he or she can easily maintain the existing relations at speed as demanded by the current market forces.

3. Technological innovation: communication and learning barriers

In general, the current publications on the information and communication network in agriculture (AKIS) link this process to the transfer of information to and from the farmer (dynamic process) to promote rural development. Figure 1 shows a modification of the model proposed by Rivera et al. (2005) and seeks to illustrate this network of relationships in which the farmer occupies the central place and is surely the greatest beneficiary of its functioning.

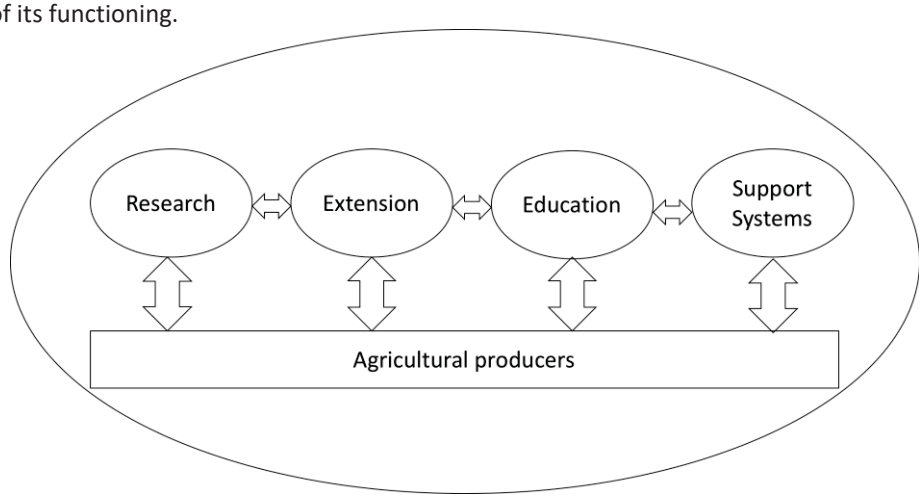

Figure 1: An idealized AKIS/Rural Development model, Source Adapted from Rivera et al. (2005)

Rivera (2000) states that agricultural information is undergoing a change in terms of content, the means by which it is transmitted, and the fact that this information is tradable (paid). Likewise, Rivera (2000) considers that the means of transfer advanced and evolved as a consequence of the modernization of telecommunications and the widespread use of computers, providing immediate access – for example, information on agricultural commodity prices worldwide and weather conditions. Despite all these changes, it is important to understand that there is sometimes a gap between the need for change and the willingness of farmers to adapt, and the inadequate capacities of innovation agencies and advisory / support services to effectively support change (Knickel et al., 2009).

Since the subject of this study focuses on the farmers' autonomy in the use of an online platform, and they often request help from the technicians of the grassroots entities (extension technicians), it will be important to draw attention to the fact that one of the gaps in the understanding of concepts in innovation processes (by farmers), presented by Knickel et al. (2009), addresses the outdated orientation of many institutions, administrations and extension services in support of rural innovation. Therefore, the author concludes that institutions, administrations and extension services, whose missions support and promote change, can become a limiting factor (Knickek et al., 2009). Thus, adapting this technological innovation introduced by IFAP to the previously discussed AKIS model, it is important to mention Rivera et al. (2005), which places particular emphasis on training as a process that minimizes the gap between AKIS actors. Farmers in many countries would profit from increased training in new technologies, and young farmers and farmers with higher education would benefit from training in problem analysis and participatory approaches (Rivera, 2005). In this sense, Sumane et al. (2018) states that farmers must also have a bureaucratic, administrative and legal knowledge to carry out the commercial side of agriculture (contract drafting, compliance with regulations, etc.) which supports farmers. Additionally, just as important is support for the establishment of farmers' organizations and farmers have important roles to play in these – not only as producers, but also as contributors to AKIS development processes (Rivera, 2005).

4. Methodology

After 7 years since the "IFAP private account" launch and observing how farmers use the platform on a daily basis, it is opportune to analyze their degree of autonomy in accessing and using the functionality. An anonymous online survey was conducted using Google Forms and involving farmers and technicians from grassroots entities who were asked to respond briefly to questions related to the use of the reserved area of the farmers. The collaboration of technicians was requested to validate the responses of farmers (as proficient users) and to understand the frequency that farmers ask technicians to access the platform on their behalf.

The survey was shared on social networks in public groups that had “agriculture” as the main topic and via a link sent by email to technicians and farmers. The questionnaire initially sought information on gender, the district and the type of respondent, and the latter question guided the respondent to different types of questions appropriate to their characterization. Multiple-choice and Likert-scale methods were used with 5 items ranging from 1 - Very Easy to 5 - Very Hard to evaluate the respondents' opinions about their experience of using the various operations in the private account.

5. Results

The survey administered had 117 valid responses, of which 61 were from male participants (52.1%) and 56 from female participants (47.9%). Survey respondents come from almost all the districts in the country, as illustrated in Figure 2. The highest number of responses were from the districts of Bragança (11%), Viseu (17%), Vila Real (11%), and Porto (12%); and the districts of Évora, Leiria and the Autonomous Regions of Madeira and the Azores did not obtain any answers. Although it is a non-probabilistic sample, the results obtained favour the study since the most responsive district was the district of Viseu, in which rural areas prevail. Among the respondents, the farmers stood out representing 52.1% of the responses against the 47.9% corresponding to the technicians of grassroots entities.

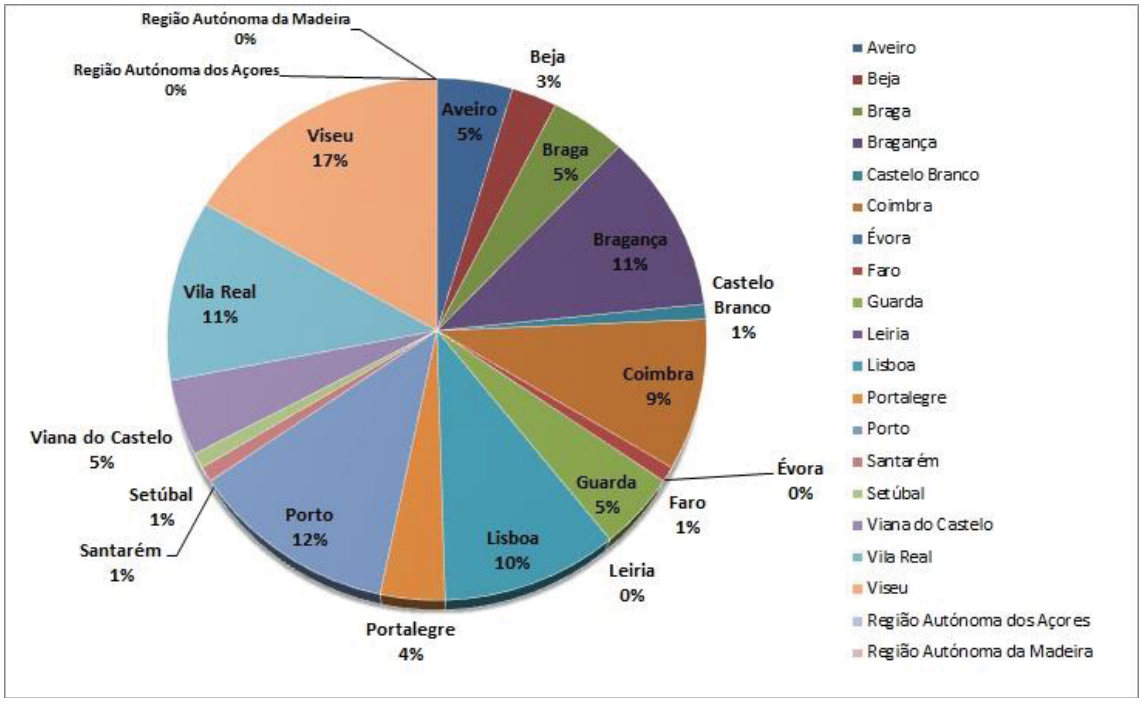

Figure 2: Percentage of answers by Portugal districts.

5.1 Farmer

Of the 61 respondents of the "Farmer" type respondents, half (46%) of the sample corresponds to "farmer" as shown in Figure 3. In addition to this legal entity there also exists the figure of "Agricultural entrepreneur" in which all the farmers were framed with Individual Corporations by Quotas, "Administrators" in which all the managers of Companies by Quotas are placed and the figure of "Legal Representative" where prosecutors, representatives of undivided inheritances, and the case of the chairmen of boards of directors of corporations are included. Regarding the age group, it was from the group of individuals aged between 45 and 65 years that

we obtained the largest number of responses (33) corresponding to 54% of the total, as can be seen in Figure 3; this was followed by the age group of individuals aged between the 35 and 45 years that represents 26% of the respondents, with 16 answers. Regarding the educational levels of the farmers, the majority selected higher education, corresponding to a percentage of 56%, which is the result of the sum of the respondents with a first degree (25) and a master or higher degree (postgraduate education) (9) as is shown in Figure 3.

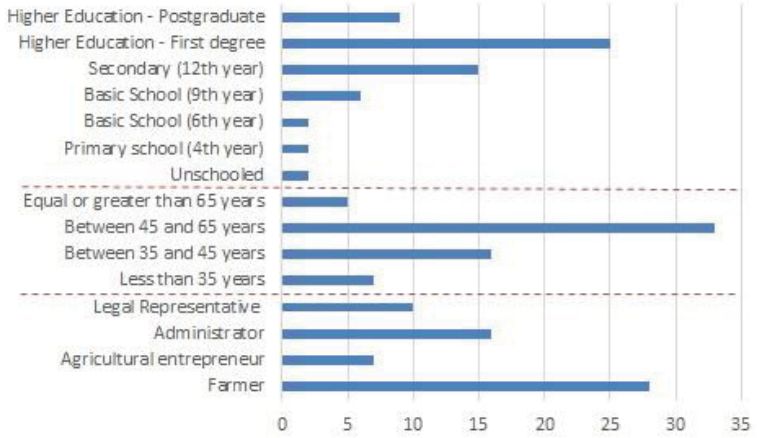

Figure 3: Diagram combining the three variables: legal nature, age group and educational levels of farmers.

Analysing figure 3, the farmers who answered the survey and who have a first degree are aged between 45 and 65 years and are individual farmers. According to RA2009 (a document which characterized the individual agricultural producer according to age classes and educational level) the profile of the "farmer" who registered the major number of answers corresponds to the group of individuals that represents 5% of the sample of the last agricultural census, and at the time of the census the greater percentage of individuals were over 65 years of age and, as far as level of education was concerned, the highest percentage fell to those who attended only primary education.

When questioned about the autonomy of access to the reserved area, 63.9% of the respondents (39) answered that they accessed autonomously while 36.1% (22) answered that they requested help from relatives or technicians of associations (grassroots entities) in order to access the platform. The way this access is performed was also questioned through the possibility of a multiple response between Web Access, App for Android and App for iPhone options. Access through the website had 60 responses, while APPs for Android and iPhone just recorded 4 replies each. In addition, to understand how farmers access their reserved area and the tools used, it is still important to understand what operations they routinely perform on the platform. In Table 1 we can see the parallel analysis between Farmers' answers and Technicians. In addition, they were asked to indicate their degree of difficulty on a Likert scale from 1 to 5 where 1 is very easy and 5 is very difficult as can be seen in Figure 4. These questions were of an optional nature since they depended directly on the individual experience of each user depending on the characteristics of his holding.

Table 1: Parallel analysis of the answers given by farmers and technicians about the operations most performed on the web platform

Operations most performed	Farmers	%	Tech.	%
Consultation of farm information (updated Land Parcelling and Beneficiary Identification Data)	**44**	**72**	**35**	**63**
Consultation of payment extracts	**48**	**79**	**45**	**80**
Payment clearance consultation	**26**	**43**	17	30
View of submitted forms	24	39	22	39
View of control report	21	34	26	46
Submission of forms (BI, "Single Application", among others)	25	41	**33**	**59**
Issue of cattle transaction forms	13	21	19	34
Operations related to Investments PRODER / PDR2020	24	39	18	32
Others	0	0	2	4

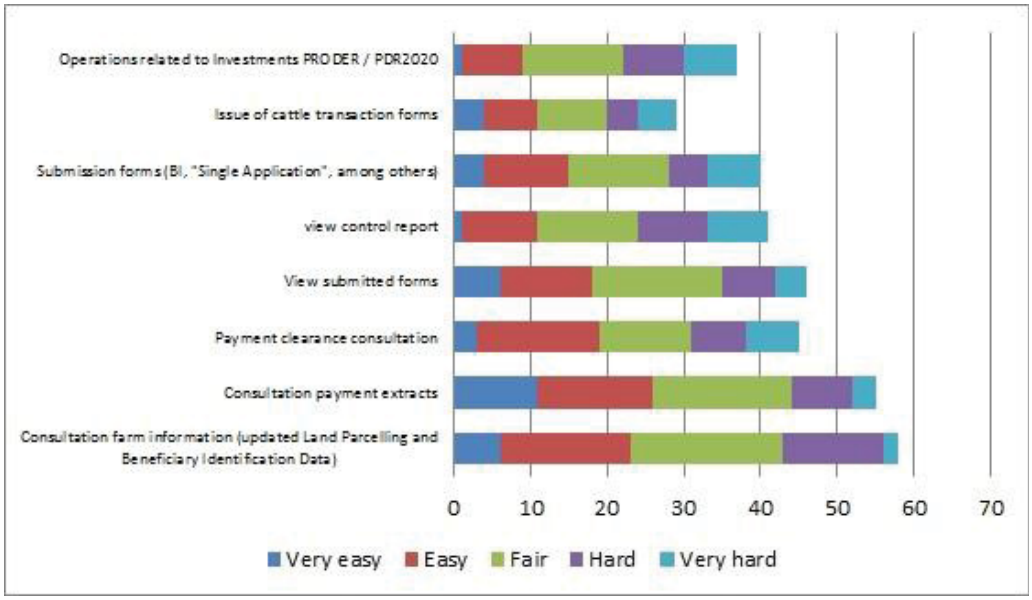

Figure 4: Difficulty verified with the several operations performed by farmers.

5.2 Technician

This group registered 56 valid responses to the survey. As mentioned before, the purpose of directing questions to the technicians was to understand how often they access the web platform on the farmers' behalf. Per week, 45% answered that "supported less than 10", 21% "supported 10 to 20", 13% "supported 20 to 30", 4% "supported 30 to 40" and 18% "supported more than 40" farmers accessing their private account.

Regarding the age group and educational level, as seen in Figure 5, technicians with higher education (first degree) and aged between 45 and 65 years old were more responsive.

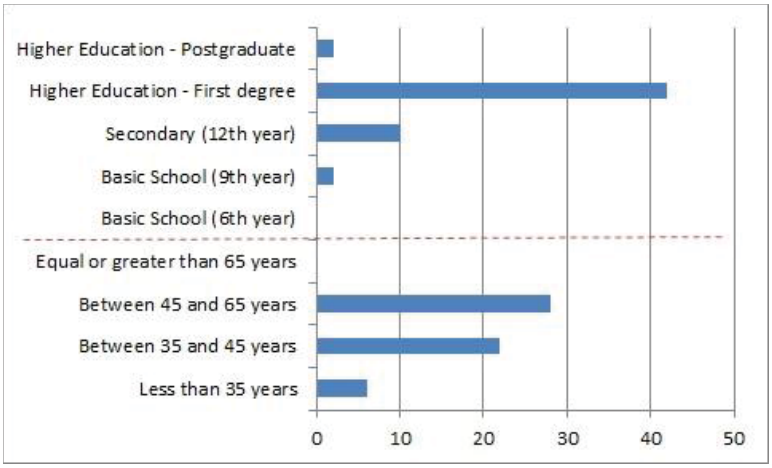

Figure 5: Diagram combining age group and educational levels of technicians.

As well as the farmers, they were asked to indicate their degree of difficulty on a Likert scale from 1 to 5 where 1 is very easy and 5 is very difficult, as can be seen in Figure 6. These questions were of an optional nature since they depended directly on the individual experience of each user and on the characteristics of the requests made by the farmers.

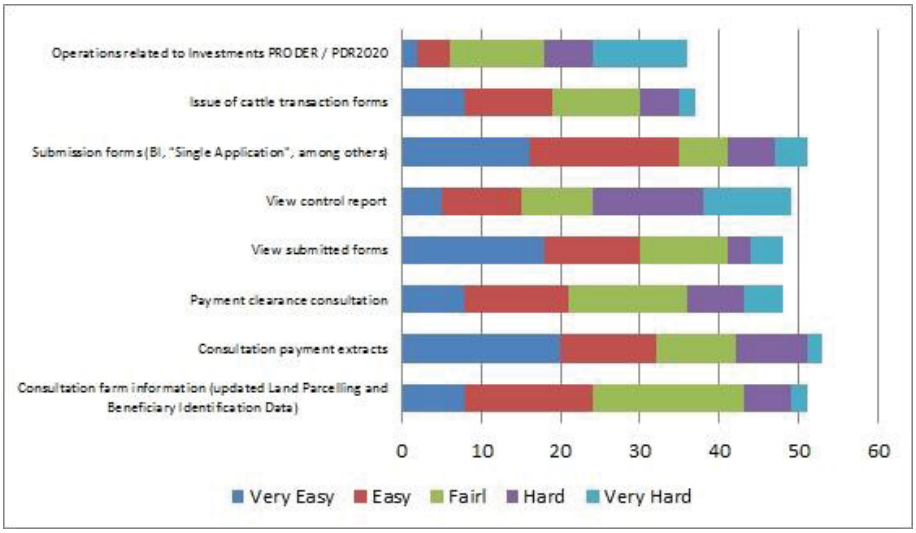

Figure 6: Difficulty verified with the several operations performed by technicians.

5.3 Analysing their opinions

A section of the survey had as an objective to supply a qualitative analysis where respondents answered questions related to their experience with the platform. As we can see in Table 2, they were asked to give their opinion about the existing barriers and both categories of respondents indicated the same top 3 barriers: "Computer-illiterate", "Age group of beneficiaries" and "Unawareness of form submission rules". However, we can say that the other options were generally chosen by most of the respondents and the other barriers indicated by the farmers were related to the interactions between application forms and browsers and some technical incompatibilities verified on the platform. Despite all the barriers mentioned, both categories consider that the Private Account results as a facilitator in the contact between IFAP and Farmers.

Table 2: Farmers' and Technicians' opinions about IFAP's Private Account

In your opinion, which factors do you consider conditioning the beneficiaries' autonomy in accessing the IFAP's Private Account?	**Farmers**	**%**	**Tech.**	**%**
Unawareness of form submission rules	**31**	**51**	**35**	**63**
Unawareness of document and procedural obligations of operations	28	46	29	52
Lack of computer facilities and access to the internet	21	34	34	51
Computer-illiterate	**34**	**56**	**41**	**73**
Age group of beneficiaries	**30**	**49**	**40**	**71**
Complexity of the rules of operations and its relation to legal issues	21	34	30	54
Insecurity	15	25	20	36
Difficulty in interpreting information withdrawn through available operations	27	44	27	48
Others	4	7	0	0
Do you think that the Private Account facilitates contact between IFAP and Farmers?	**Farmers**	**%**	**Tech.**	**%**
Yes	46	75	36	64
No	10	16	14	25
No opinion	5	8	6	11
Total	61	100	56	100

6. Conclusion

"Digital rural development means opening doors to the nearly unlimited possibilities to exchange information on a scale never before imagined" (Malecki, 2003). As already mentioned the digital world can represent an opportunity for the entrepreneur in terms of competitiveness. Whether in communication, marketing or transactions, web platforms can be facilitative as information travels at the speed that broadband allows.

However, we know that most of the rural areas are not prepared for this digital revolution because most of the farm population is aged and has low educational levels. The high percentage of respondents of the survey with higher education degrees shows us that the efficient users of the platform studied in this paper correspond to a very low percentage of the farm population, answering the main question of the paper: Who are we reaching?

Cruz-Jesus et al. (2016) studied related variables such as the use of mobile devices or access to home banking or e-Learning in EU countries. Through this study, they were able to state that despite the many efforts, there are still huge gaps between education and the proficient use of the Internet in EU countries and Portugal is one of the countries where this gap is more evident. On the other hand, Preston et al. (2007) studied the access to broadband in rural areas in the EU and mention that some socio-economic groups are resistant to broadband until they have compelling reasons to adopt it. "The primary drivers in this respect will be the availability of applications, services and content that are relevant and add qualitative benefits to their lives" (Preston et al., 2007). In fact, the ordinance that dictated the launch of the IFAP's web platform contained the following purpose: "with the aim of simplifying the process of communication with the beneficiary and, consequently, making the process of granting and payment of aid more efficient". This platform corresponded, theoretically, to the suggestion made my Preston et al. (2007) but after seven years of using the "private account" we can affirm that farmers are not yet autonomous users as mentioned in the results.

Although we cannot easily overcome the lack of technological means (computers, access to the internet, mobile devices), we reinforce the importance of training and support previously mentioned in topic number 3 and the link with rural extension. Grassroots organizations can play a very important role in transferring information and knowledge to farmers as they form the link between policy issues and the reality of rural areas.

7. Suggestions for future research

We suggest that future research focus also on millennials, as other research has done (Au-Yong-Oliveira et al., 2018), in this case however related to agriculture and how millennials perceive the technological future. Specific platform accessibility and usability may also be tested more in-depth (see for example Gonçalves et al., 2013, 2017).

References

Au-Yong-Oliveira, M., Gonçalves, R., Martins, J., Branco, F. (2018) The social impact of technology on millennials and consequences for higher education and leadership. Telematics and Informatics, Vol 35, Nº4, July, pp 954-963. DOI: https://doi.org/10.1016/j.tele.2017.10.007

Cruz-Jesus, F., Vicente M. R., Bacao, F., Oliveira, T. (2016) The education-related digital divide: An analysis for the EU-28, Computers in Human Behavior, Vol 56, pp 72-82.

Dinis, A. (2006) Marketing and innovation: Useful tools for competitiveness in rural and peripheral areas, European Planning Studies, Vol 14, Nº1, pp 9-22.

Gaspar, J., Pina, G., Simões, M. (2014) Agriculture in Portugal: linkages with industry and services. Review of Agricultural and Environmental Studies, Vol 95, Nº4, pp 437 – 471.

Gonçalves, R., Martins, J., Pereira, J., Oliveira, M.A., Ferreira, J.J.P. (2013) Enterprise web accessibility levels amongst the Forbes 250: Where art thou o virtuous leader? Journal of Business Ethics, March, Vol 113, Nº2, pp 363-375. Doi: 10.1007/s10551-012-1309-3

Gonçalves, R., Rocha, T., Martins, J., Branco, F., Au-Yong Oliveira, M. (2017) Evaluation of e-commerce websites accessibility and usability: an e-commerce platform analysis with the inclusion of blind users. Universal Access in the Information Society. Online 5 July. DOI 10.1007/s10209-017-0557-5

Knickel, K., Brunori, G., Rand, S., Proost, J. (2009) Towards a Better Conceptual Framework for Innovation Processes in Agriculture and Rural Development: From Linear Models to Systemic Approaches. Journal of Agricultural Education and Extension, Vol 15, Nº2, pp 131-146.

Malecki, E. J. (2003) Digital development in rural areas: potentials and pitfalls. Journal of Rural Studies, Vol 19, pp 201–214.

Ministry of Agriculture, Rural Development and Fisheries (2011), Ordinance 86/2011, Republic Diary nr.40/2011, Serie I of 2011-02-25, [online], DIÁRIO DA REPÚBLICA ELECTRÓNICO, http://data.dre.pt/eli/port/86/2011/02/25/p/dre/pt/html

Ministry of Agriculture and Rural Development, Rural Development Program 2007-2015 – Closure Report, [online], PRODER, http://www.proder.pt/Handlers/Relat%C3%B3rio%20de%20Encerramento5e49.pdf?id=4138&menuid=1535

National Statistical Institute (2011) Agricultural Census 2009, [online], INSTITUTO NACIONAL DE ESTATÍSTICA – Statistics Portugal, http://ra09.ine.pt/xportal/xmain?xpid=RA2009&xpgid=ine_ra2009_publicacao_det&contexto=pu&PUBLICACOESpub_boui=119564579&PUBLICACOESmodo=2&selTab=tab1&pra2009=70305248

North, D., Smallbone, D. (2000) Innovative Activity in SMEs and Rural Economic Development: Some Evidence from England, European Planning Studies, Vol 8, Nº1, pp 87-106.

Pereira, A.C., Martins, J., Branco, F., Gonçalves, R., Teixeira, M.S., Moreira, F., Au-Yong-Oliveira (2018) Determinantes da adoção de realidade aumentada por parte dos operadores turísticos em regiões economicamente desfavorecidas. The proceedings of the 13th Iberian Conference on Information Systems and technologies (CISTI 2018), Cáceres, Spain, June, pp.1-7.

Planning and Policy Office of the Ministry of Agriculture, Forestry and Rural Development (2012) Agriculture in the Portuguese Economy - involving, importance and recent evolution - 2011, [online], GABINETE DE PLANEAMENTO E POLÍTICAS, http://www.gpp.pt/images/GPP/O_que_disponibilizamos/Publicacoes/Periodicos/Agricultura_Economia_Portuguesa_2011.pdf

Preston, P., Cawley, A., Metykova, M. (2007) Broadband and rural areas in the EU: From technology to applications and use. Telecommunications Policy, Vol 31, pp 389-400.

Rivera, W. M. (2000) The changing nature of agricultural information and the conflictive global developments shaping extension. The Journal of Agricultural Education and Extension, Vol 7, Nº1, pp 31-42.

Rivera, W. M., Qamar, M. K., Mwandemere, H. K. (2005), Enhancing coordination among AKIS/RD actors: an analytical and comparative review of country studies on agricultural knowledge and information systems for rural development (AKIS/RD), [online], FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, http://www.fao.org/docrep/008/y9087e/y9087e00.htm

Salazar, N. B. (2005) Tourism and Glocalization - ‘‘Local’’ Tour Guiding. Annals of Tourism Research, Vol 32, Nº3, pp 628–646.

Sumane, S. et al. (2018) Local and farmers' knowledge matters! How integrating informal and formal knowledge enhances sustainable and resilient agriculture. Journal of Rural Studies, Vol 59, pp 232-241.

Warren, M. (2007) The digital vicious cycle: Links between social disadvantage and digital exclusion in rural areas. Telecommunications Policy, Vol 31, pp 374–388.

Supporting New Firm's Through Entrepreneurship Education: A Case of a Successful Course

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Abstract: Nowadays entrepreneurship is a theme on the agenda of governments. Entrepreneurship is a dynamic process of vision, change and creation. Entrepreneurship is a process of fundamental transformation, from an innovative idea, to the value proposal to the creation a new venture. It requires an application of energy and passion towards the creation and implementation of new ideas and creative solutions. The essential ingredients include: the willingness to assume risks, the ability to join a venture team, the creative skill to get necessary resources, ability to develop a solid business plan and the vision to recognize an opportunity. As entrepreneurship is about devising and implementing new ideas and practices, a strong educational foundation helps ensure that new ideas will be effective and substantive. This paper starting from the theoretical framework of entrepreneurship based on different lines of thought and with different approaches, will try to describe the dimensions of the Entrepreneurial education process and how this process promotes students' attitudes and intentions favorable to create business start-ups. In a practical way, will be presented the successful case of an course of entrepreneurship of technological base, that has been going on for some years in a partnership between several universities. Examples of successful startups, resulting from the course will be mentioned.

Keywords: Entrepreneurship, Universities, Entrepreneurship Education, New Technologic Based Firm's

"Entrepreneurs are the heroes— they make the world livable for everyone else"

(Kuratko and Morris, 2018:20)

1. Introduction

Entrepreneurship is one of the most important activities of modern economic life. The creation and growth of new companies, as well as the closure and retraction of existing companies, are at the heart of "economic dynamism." Entrepreneurship is a dynamic process of vision, change and creation. It requires an application of energy and passion towards the creation and implementation of new ideas and creative solutions. The essential ingredients include: the willingness to assume risks, the ability to join a venture team, the creative skill to get necessary resources, ability to develop a solid business plan and the vision to recognize an opportunity. In this light entrepreneurship is more than the mere creation of a business.

It is in general, recognized that entrepreneurial activity is the driving force behind the development of countries' GEM (2008), economic growth (Verheul et al, 2001; Carree and Thurik, 2005), employment (Birch, 1979, 1987); Lundström and Stevenson, 2005), and innovation (Schumpeter, 1934; Acs and Audretsch, 2005).

For this reason entrepreneurship has become a preferred theme on the agenda of most governments.

Entrepreneurship as an important force in the actual economy, generates ongoing innovation and improvement of our goods, services, and institutions. It makes them more efficient, affordable, and, thus, effective. Entrepreneurship enhances the quality of our collective and individual lives. It changes the way we work, the way we communicate, the way we live. Innovation and improvement depend on intelligibility. If intelligibility is a fundamental goal of learning, than the higher education institutions should be dynamic, generate new knowledge, adaptable and have capacity to address the urgent questions of our society.

To Kuratko (2005) an entrepreneurial perspective can be developed in individuals. Peter Drucker, recognized as one of the leading management thinkers, has said, "The entrepreneurial mystique? It is not magic, it's not mysterious, and it has nothing to do with the genes, it's a discipline. And like a discipline, it can be learned" Drucker (1985:18). An additional support to this view, comes from Gorman, Hanlon, and King, (1997:63) "most

empirical studies surveyed indicated that entrepreneurship can be taught, or at least encouraged by entrepreneurship education".

Universities and other higher education institutions started to get aware of the relevance of teaching and learning entrepreneurship as it became evident that the Entrepreneurship Education (EE) could influence the predisposition to create start-ups, or at least could influence individuals to become more proactive and entrepreneurial in their lives and their jobs. Entrepreneurship and university education are closely linked one with another. So is possible to say higher education institutions have a relevant role in promote technological entrepreneurship through Entrepreneurial education and learning.

This paper starting from the theoretical framework of entrepreneurship based on different lines of thought and with different approaches, will try to describe the dimensions of the Entrepreneurial Education (EE) process and how this process promotes students attitudes and intentions in the face of entrepreneurship and business start-ups. In a practical way, will be presented the curricular contents and the way of functioning, of a course of entrepreneurship of technological base, that has been going on for some years in a partnership between several universities. Examples of successful start ups, resulting from the course will be mentioned.

2. Entrepreneurship as a field of study

Entrepreneurship is recognized as being fundamentally important for societies and economies (Gans and Stern, 2003). Some classical authors as, Cantillon (1755), one of the pioneers of the theories of entrepreneurship, presents entrepreneurs as economic agents, who produces new products and connect producers and customers. Say (1840) proposes that one of entrepreneurs' major roles is to create teams in order to achieve productivity. However Veciana (2007), consider that entrepreneurship as a scientific research programme, has its explosion and consolidation in the last three decades.

Introducing the Risk Bearing Theory, Knight (1921) claims that risk taking is a key aspect of any entrepreneurial activity. His perspective views risk takings as a factor of production in that the key role of an entrepreneur was to act in expectation of particular future occurrences. Thus taking risks would result in entrepreneurial performance and success. The theory supports that for entrepreneurship occur, an individual must have the capacity to take risks, or an individual would not be able to engage in business activities that would risk his investment.

Schumpeter (1934, 1947) views the entrepreneurship through the lens of his Innovation Theory. He believes that certain characteristics are essential for an individual to be considered an entrepreneur: being innovative, having foresight and being creative. McDaniel (2005), argues that according this theory, entrepreneurship happens when an individual introduces a new product, finds an alternative raw material and discovers a new market or a new way of doing things.

In the vision of McClelland's (1961), the entrepreneur is an individual with the ability to perform certain tasks and make good decisions when face with uncertainties. Thus an individual´s vision of success becomes much more important than any monetary or other external risks that are involved (Kuratko and Audrestch, 2009).

Davidsson (1995) highlights the scene experienced in 1970's, where large companies could not employ much more people, turning the focus to small businesses as mean to achieve economic growth and job creation. It is in this way that entrepreneurship diffuses, reaching academic legitimacy and interest in the psychological characteristics of business creators, developing explanatory models that consider the characteristics of entrepreneurs, but also personal antecedents and situational variables. (Davidsson,1995; Kuratko and Morris, 2018).

A large number of studies focus on the theoretical models and personality factors of the individuals and how they can influence the EI (Entrepreneurial Intention), where we highlight Boyd and Vozikis (1994) and Krueger and Brazeal (1994), as well as Behavior Theory Planned (TPB) of Azjen (1991), designed to predict and explain the human behavior in particular contexts. Frese (2009) added, related that the psychological approach is required to understand the entrepreneurship, and recently Fayolle and Líñan (2014) argue that EI literature evolve positively with theories of the field of social psychology and cognitive.

In his theory, Ajzen (1991) shows that all behaviors requires a certain planning, being a rational and planned action, making use of available information. The intentions are indicators of the level of effort that the individuals are willing to put into practice in order to carry out a particular behavior. This theory also presupposes that both internal and external factors can influence human action.

These and other works try to explain the concept of entrepreneurship. However, many other external factors could play a significant role in stimulate the entrepreneurial activity as well. Factors as technology, market, environment, type of customers, industry structure, strategy, support institutions and entrepreneurship education, all play important roles in the start event of new firm creation, survival and success. Considering those various factors our paper just focus on the role played by entrepreneurship education.

3. Entrepreneurship Education

Education seems important for stimulating entrepreneurship because several reasons (Reynolds, Hay, & Camp,1999; Sánchez, 2011). First, education provides individuals with a sense of autonomy independence and self-confidence. Second, education makes people aware of alternative career choices. Third, education broader the horizons of individuals, thereby making people better equipped to perceive opportunities, and finally, education provides knowledge that can be used by individuals to develop new entrepreneurial opportunities.

However, the idea that the entrepreneur is a result of hereditarily or that entrepreneurship is an innate characteristic of some individuals, no longer seems to have many followers in the scientific literature. Li (2006) argues that the theory of planned behavior is very useful and it provides a sound theoretical framework toward understanding the antecedents of entrepreneurial intentions. Instead, it seems to win strength, the stream that defends that it is possible to learn to be an entrepreneur, through the use of differentiated policies in education.

The innovation and creativity is critical to create a sustainable future. So we need people who know how to implement ideas and make them accessible to society. The creation of new innovative firms is fundamental to translate that knowledge. So it is needed to understand why entrepreneurship matters, how it works and how to sustain it. That understand is the result of education. So entrepreneurship is about devising and implementing new ideas and practices or improving old ones. In a Progressively technological, scientific, and interconnected world, the quality of innovation in large measure increasingly relies on superior advanced learning. A strong educational foundation helps ensure that new ideas will be effective and substantive.

Because entrepreneurship promotes, implements, and rewards innovation, it necessarily correlates with education (Kauffman Foundation, 2008).

One of the ways in which it has been intended to reinforce the interest for the development of new companies, was trough the higher education system, and some scientific literature has been studying the relationship between the levels of training and the creation of companies. Based in the Small Business Economic Report (2006), a review of the research measuring the impact of general education on entrepreneurship and entrepreneurial performance suggests three key generalizations. First, the evidence suggesting a positive link between education and entrepreneurial performance is robust. Second, although the link between education and selection into entrepreneurship is somewhat ambiguous, evidence suggests that when “necessity entrepreneurship” and “opportunity entrepreneurship” are considered separately and when country difference is considerate, the link is less ambiguous. Finally, the relationship between education and selection into entrepreneurship is not linear in nature. The highest levels of entrepreneurship are linked to individuals with at least some college education. Also according the report the main conclusion of great majority of entrepreneurship research, reveals a positive relationship between education and business activity.

To Hindle (2007), entrepreneurship needs no justification to study on the grounds of its importance to humanity. It is a wellspring of economic growth, social renewal and personal development. Such an important subject is worthy of deep research, significant reflection and sustainable dialogue. When a subject has the depth importance which entrepreneurship possesses, it is capable of being the foundation for great education.

Also Birch in Aronsson, (2004: 289), says that to encourage entrepreneurship, it should be trough some kind of apprenticeship that would be a wonderful experience.

Additionally, the education and training should center itself much more in changing personal attitudes than in knowledge, because the effects could be more significant to the process of business creation and to overcome the perceived barriers to entrepreneurship. The educational systems need to be oriented to emphasize and value entrepreneurship in order to promote an enterprise culture.

The research carried out on the influence of entrepreneurial education on entrepreneurship emphasizes that education facilitates the student a better knowledge of his possibilities to create a company, Raposo and Paço (2011). For Mogollon (2017), this demonstrates the need to understand the role played by universities in society, especially in the university environment, in training for entrepreneurship, and in motivating students to start processes to business creation.

In study of Dutta, Li and Merenda (2011) it was found that education specialized in entrepreneurship is positively related to the predisposition to create companies in the future. The education encourages entrepreneurship for several reasons, providing a sense of independence, autonomy and self-confidence. On the other way, it makes people aware of alternative careers, expand the horizons, perceives opportunities and offers knowledge to develop and explore new business opportunities (Dutta, Li and Merenda, 2011; Sánchez, 2011). A correct EE program enables individuals to acquire skills and necessary knowledge to found and develop new business (Sánchez, 2011)

A study developed by Raposo et al (2008), involving university students, had shown the important effect of *education* on the *propensity to start-up a firm*. The results point out the importance of the entrepreneurship education and the promotion of the entrepreneurial intention. That is, the entrepreneurial intention was predicted significantly by entrepreneurship education, other researches had similar conclusions (Brice 2004; Florin, Karri and Rossiter, 2007; Kennedy et al. 2003; Li, 2006).

A large number of universities offer certifications and master degrees in Entrepreneurship; others offer doctoral programs as a way to prepare a new generation of scholars. Other universities, organize their own training courses and methodologies to stimulate entrepreneurial skills and enable the transfer knowledge to the market. The rhythm of changes is accelerating, with more and more universities interested in developing their EE programs. The growth of the recognition of EE programs is another example of the evolution that is seen in entrepreneurial education (Liñán, 2004; Kuratko and Morris, 2018).

Krueger and Brazeal (1994) argue that entrepreneurship education is conducive to the initiation of new business, being the highest EI in students who attend these courses. Souitaris, Zerbinati and Al-Laham (2007) mention that EE programs lead to the development of entrepreneurial postures and intentions, demonstrating in their study that attending in entrepreneurship course increases the EI.

Also for Kuratko and Morris (2018) entrepreneurship courses prepare students for entrepreneurial life, setting up a business mindset with more emphasis on skills. It can empower them to create their own job, to design their future, to achieve wealth, to create jobs for others, to make their contribution to the world. For Fayolle and Liñán (2014) the empirical results reveal significant differences in attitudes and levels of EI among students who participate in EE courses and those who do not participate.

We can question where should positioned the entrepreneurship education inside the University. It is interesting to note that Withehead (1929:93), about the role of Universities wrote:

> *"The justification for a university is that it preserves the connection between knowledge and the zest for life, by uniting the young and the old in the imaginative consideration of learning. The University imparts information, but it imparts it imaginatively. At least this is the function which it should perform for society. A University which fails in this respect has no reason for existence. Their atmosphere of excitement arising from imaginative consideration to transform the knowledge".*

Having this in mind, probably there is no single and universal correct location for entrepreneurship education in University. Entrepreneurship belongs wherever we want to put it, so long is the key condition of imaginative transcendence of the immediately vocational is meet. So it can be teach wherever the right mindset prevails (Hindle, 2007).

4. The case of *CEBT Ibérico* - Entrepreneurship Technology Based Course

The *CEBT Ibérico* - Technological based entrepreneurship skills, presents itself as an advanced training program in Entrepreneurship area, inserting itself in the category typical programs of EE (Entrepreneurship Education) oriented to projects of companies of technological base.

The program was developed as part of the INESPO project – "Rede de Transferência de Conhecimento Universidade-Empresa Região Centro de Portugal" and "Castilla y León of Spain", funded by the Cooperation Program INTERREG A Spain-Portugal (POCTEP) 2011-2020. The project is a network of nine entities coordinated by University of Beira Interior (UBI), and involves the portuguese universities of Coimbra and Aveiro, the spanish universities of Salamanca, Leon, Valladolid, Pontífica of Salamanca and finally the business confederations of CEC/CCIC-Portugal and CECALE- Castilla y León.

In addition to the training contents, the program seeks to identify emerging ideas, new technologies, new products or patents, in those universities, which will be worked on in a team, during the training sessions. The idea is to develop a value proposition and a business plan, that supports the creation of technology-based companies capable of accelerating and overcome the nascent phase and assume an important role in the economic development and social growth of the cross-border region. This new ventures are also known for its ability to generate qualified employment, for its adaptability to the market, often leading to innovations through the development of products/services ahead of its time and contributes to affirm the regions in the RIS3 strategy.

In the genesis of the CEBT there is an innovative methodology, through advice and specialized consultancy composed of three lines of action: 1) Sessions of advanced consulting in the areas of Market Research, Business Model, Strategy & Marketing and, Communication & Negotiation; 2) Coaching and Mentoring for entrepreneurs, in order to ensure a correct follow-up of projects by specialists and at last; 3) Session of dissemination and promotion of business projects, as a way of disseminating of technology and knowledge among the various invited agents (companies, investors, business angels, etc.), enhancing networking between them. The same methodology is applied in the seven universities of both countries, through the same structure, trainers, consultants and mentors.

The Table 1 present the Sessions of advanced consulting promoted in a logic of advice and specialized consultancy, aiming the monitoring and development of the projects taking into account the needs of the market and the economic and financial viability.

Table 1: Sessions of advanced consulting

Session	Partner responsible for the session
1. Creativity and Business Idea	University of Coimbra
2. Proposal of value	University of Valladolid
3. Business Plan	University of Beira Interior
4. Research Market	University of Léon
5. Intellectual Property and Technology Transfer	University of Aveiro
6. Communication and Negotiation	University of Pontífica of Salamanca
7. Strategy and Marketing	University of Salamanca

Source: Own Elaboration.

It is a free action, open to all academic community that integrates the INESPO network, consisting essentially of teams of multidisciplinary areas, with a higher prevalence of participants from the areas of Health Sciences, as well as Engineering and Business science. On innovative approach of the CEBT course, result from the fact that the teams involved in the training sessions works with a new idea, patent, new technology or product resulting of the research carried out at each university.

The program is in its 8th edition, in global counted with about 800 participants, that submitted 130 project ideas and a few dozens of business ideas that resulted in the creation of TBF's where there appeared some new companies like Follow Inspiration and Inklusion, currently based in the interior region of Center of Portugal. As a success example, we are going to present synthetically these two startups that had their genesis in CEBT.

The training course was the starting point for two graduate students develop new ventures ideas, respectively under the name wiiGO and InKaos. After the course, these two final projects won several awards about entrepreneurship and innovation, which allows to demonstrate the technological viability of both projects, and how to convert the research done by UBI students in value propositions, allowed access at monetary prizes and the recognition of the merits of the projects at national and international level.

4.1 1st Case: Follow Inspiration – Improving Business like never before

wiiGO project was idealized by Luís de Matos (Msc in Computer Science in UBI), focused on the valorization of autonomous device developed to follow individual with disability or reduced mobility, wherever it moves, allowing the transport of objects autonomously, dynamically and safely, avoiding obstacles and dangers. With this robotic system, based computer vision and Artificial Intelligence, it is now possible for the individuals to carry out objects easily, comfortably and safely, through concept proof in shopping carts of Supermarkets.

This innovative technology has been winning numerous awards like “O Concurso de Ideias”, “Planos de Negócio Arrisca C” and it was second “MIT Venture Contest 2011”. Follow Inspiration it’s exactly the next step, said the young entrepreneur “that is the only way that you can continue to develop wiiGO and do with this get to the market”. Nowadays, Follow Inspiration is a TBC focused in the development of technology products in robotic field and they have got the first one business angel in 2012, “TIC Risco”, and in 2015 they entered in capital company of “Portugal Ventures”.

Currently, 6 years after the trigger event, the investment has been complemented with some monetary funds from “Portugal 2020” and the company is now a anonymous society, with 20 employees.

4.2 2nd Case: Inklusion – You dream it, we build it

Inkaos project aims to create a startup with a strong technological component, guided by innovation and focusing on the development of products with great quality and technological differentiation. This project aims to fill a gap in national market, such as the development of video games, or applications with interaction with three-dimensional environments and gave rise to the creation of Inklusion Entertainment.

According to the CEO of Inklusion, João Dias, the creation of the company had as initial goal to transfer to the market products that aim at a change of paradigm in the area of education, in conformity with the current highly computerized generations and accustomed from an early age to live in an era in which everything is digital.

The team intends to take advantage to introduce more interactive and appealing ways of educating young people through digital formats, either through video games or through applications that allow greater interaction with the subjects the intend to teach (eg. The possibility of interacting with three-dimensional objects, in order to have a greater perception of its real aspect). This business idea is geared towards a market segment that has not been explored at a national level (ie development of video games and 3D applications) and with great profitability at an international level. The company intends to make available all its products adapted to the generations of the digital era, can be filled by interactive and appealing digital formats. So, for those who want to teach and have fun learning, inKlusion provides interactive experiences with the human body and sensitizes to environmental issues. Unlike on the market, it ensures entertainment, teaching and 3D technology in a format similar to commercial games.

5. Conclusion

Entrepreneurial activity is determinant to achieve good levels of economic performance in any region or country. The evidences in scientific literature of entrepreneurship maintain that an entrepreneur, has certain personal characteristics such as capacity for innovation, vision, creativity, locus of control, willingness to take risks, which can be enhanced and improved through entrepreneurial education, particularly with training courses with innovative methodology, that encourage the creation of new companies resulting from ideas, or research results that can be valued and brought to the market.

Particularly, the *CEBT Ibérico*, considered an entrepreneurship training program with innovative methodologies, is a reference in a network of seven universities belonging to the two borders regions of Portugal and Spain. The course throughout its various editions, stimulate new ideas and business models, with special focus in creation of technology ventures, some of them already successfully recognized. In this line of ideas and based in the evidences presented, it is possible to concluded that entrepreneurship, as stated by many authors, can be effectively taught, and effectively contributes to foster the emergence of new technology ventures, essential to reinforce the competitiveness and specialization of countries and regions, act as innovative leading agents in field of technology, as well as in the generation of qualified employment.

References

Acs, Z. J. and Audretsch, D. B. (2005) *Entrepreneurship, innovation and technological change,* Foundations and Trends® in Entrepreneurship, 1(4), 149-195.

Ajzen, I. (1991) *The Theory of Planned Behavior*, Organizational Behavior and Human Decision Processes, v, 50 (JANUARY 1991), pp. 179–211.

Aronsson, M. (2004) *Education Matters – but does entrepreneurship education? An interview to David Birch*, Academy of Management Learning and Education. Guest editors; Patricia G. Green, Jerome A. Katz and Bengt Johannisson. Special issue: Entrepreneurship Education, pag. 289.292.

Birch, D. (1979) *The job generation process.* Cambridge, MA.

Birch, D. (1987) *Job creation in America*. New York. The Free Press.

Boyd, N. G. and Vozikis, G. S. (1994) *The Influence of Self-Efficacy on the Development of Entrepreneurial Intentions and Action*, Entrepreneurship Theory and Practice, 18, pp. 63–77.

Brice, J. (2004) *The role of personality dimensions on the formation of entrepreneurial intentions*, USASBE Small Business Advancement National Center. USA: University of Central Arkansas.

Cantillon, Richard (1755) *Essai sur la nature du commerce en general,* Londres and Paris.

Carree, Martin A., and Thurik, Roy (2005). The Impact of Entrepreneurship in Economic Growth. in Z.J. Acs, D.B. Audretsch (eds.), Handbook of Entrepreneurship Research, International Handbook Series on Entrepreneurship 5. Spring Science+Business Media.

Davidsson, P. (1995) *Determinants of entrepreneurial intentions*, Education + Training, 57(8/9), pp. 891–907.

Drucker, P.F. (1985) *Innovation and entrepreneurship*, New York: Harper & Row Publishers

Dutta, D. K., Li, J. and Merenda, M. (2011) *Fostering entrepreneurship: Impact of specialization and diversity in education*, International Entrepreneurship and Management Journal, 7(2), pp. 163–179.

GEM (2008) *Global Entrepreneurship Monitor* - Executive Report 2008.GEM

Gorman, G., Hanlon, D., and King, W (1997) *Some research perspectives on entrepreneurship education, enterprise education, and education for small business management*, A ten-year literature review, International Small Business Journal, 15, 56-77.

Fayolle, A. and Liñán, F. (2014) *The future of research on entrepreneurial intentions*, Journal of Business Research. Elsevier Inc., 67(5), pp. 663–666.

Florin, J., Karri, R., and Rossiter, N. (2007) *Fostering entrepreneurial drive in business education: an attitudinal approach*, *Journal of Management Education*, *31*(1), 17–42.

Frese, M. (2009) *Towards a Psychology of Entrepreneurship — An Action Theory Perspective*, Foundations and Trends® in Entrepreneurship: Vol. 5: No. 6, pp 437-496

Gans, J. S and Stern, S. (2003) *The product market and the market for "ideas": commercialization strategies for technology entrepreneurs*. Research Policy, 32 (2), pag. 333-350.

Hindle, K. (2007) *Teaching entrepreneurship at University: From the wrong building to the right Philosophy*, Entrepreneurship Education, Edited by Patricia G. Green and Mark P. Race, Edward Elgar, Pag. 135-158.

Kauffman, The Foudation of Entrepreneurship (2008) *A Report from Kauffman Panel on Entrepreneurship Curriculum in Higher Education,* Kansas City.

Kennedy, J., Drennan, J., Renfrow, P., and Watson, B. (2003) *Situational factors and entrepreneurial intentions*, Proceedings of the 16th Annual Conference of the Small Enterprise Association of Australia and New Zealand: Ballarat.

Knight, F. H. (1921) *Risk uncertainty and profit*, New York: Hart, Schaffer and Marx.

Krueger, N. F. and Brazeal, J. V (1994) *Entrepreneurial Potential and Potential Entrepreneurs*, Entrepreneurship Theory and Practice, pp. 91–104.

Kuratko, D.F., (2005). *The emergence of entrepreneurship education: Development, trends and challenges*, Entrepreneurship Theory and Practice, 577-597.

Kuratko, D.F. and Audretsch, D. (2009) *Strategic Entrepreneurship: exploring different perspectives of an emerging concept*, Entrepreneurship Theory and Practice, 33 (1), pag. 1-17.

Kuratko, D. F. and Morris, M. H. (2018) *Examining the Future Trajectory of Entrepreneurship*, Journal of Small Business Management, 56(1), pp. 11–23.

Li, W. (2006) *Entrepreneurial intention among international students: testing a model of entrepreneurial intention,* USASBE Small Business Advancent National Center, Arkansas: University of Central Arkansas.

Liñán, F. (2004) *Intention-based models of entrepreneurship education*, Piccolla Impresa/Small Business, 3(January 2004), pp. 1–30.

McClelland, D. (1961) *The achieving society*, Princeton, Nj, 1961.

McDaniel, B. A (2005) *A contemporary view of Joseph Schumpeter's theory of the entrepreneur*, Journal of Economic Issues, 39 (2), pag. 485-489.

Mogollon, R. (2017) *El gran Desafio de la Educación Emprendedora. Propuesta de un Modelo parra la Educación Superior*, Real Academia de Ciencias Económicas y Financieras, Barcelona.

Raposo, M., Ferreira, J., Paço, A., and Rodrigues, R. (2008) *Propensity to firm creation: empirical research using structural equations*, International Entrepreneurship and Management Journal December 2008, Volume 4, Issue 4, pp 485–504.

Raposo, M. and Paço, A. (2011) *Entrepreneurship education: Relationship between education and entrepreneurial activity,* Psicothema 2011. Vol. 23, (3), pp. 453-457.

Reynolds, P.D., Hay, M., and Camp, S.M. (1999) *Global Entrepreneurship Monitor: 1999 - Executive Report*, Babson College, London Business Seholl and the Kauffman Center for Entrepreneurial Leadership.

Sánchez, J.C. (2011) *University training for entrepreneurial competencies: Its impact on intention of venture creation*, International Entrepreneurship and Management Journal, April, 1-16.

Say, J.B. (1840) *Cours complete déconomie politique pratique* in "Textes choisis par Reynauud" P.L. Libraire Dalloz, 1953.

Schumpeter, J. (1934) *Theory economic development,* Harvard University Press.

Schumpeter, J. (1947) *The creative response in economic history*, The Journal of economic history, 7 (2), pag. 149-159.

Souitaris, V., Zerbinati, S. and Al-Laham, A. (2007) *Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources*, Journal of Business Venturing, 22(4), pp. 566–591.

The Small Business Economy (2006) *A report to the President*, Washington: United States Government Printing Office.

Veciana, Josep Maria. (2007): Entrepreneurship as Scientific Research Programme, in Entrepreneurship: Concepts, Theory and Perspectives, Ed, Alvaro Cuervo, Domingo Ribeiro and Salvador Roig, Springer Editor, pp.23-71.

Verheul, I., Wennekers, S., Audretsch, D., and Thurik, R. (2001) *An eclectic theory of entrepreneurship*, Tinbergen Institute Discussion Papers.

Whitehead, A. N. (1929) *The Aims of Education and Other Essays, New York: The Free Press.* Reprinted 1967.

The Linkage between Input and Output in the Global Innovation Index

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Abstract: An innovation ecosystem is characterised by numerous interactions between its various components. Jackson (2010) argues that it is critical to manage and expand the benefits of this ecosystem, which requires mapping and creating metrics to identify gaps in its performance, and possibly correcting bottlenecks. The proper functioning of an innovation ecosystem is a necessary condition to increase the chances of successful innovative activities, thereby improving the likelihood of creating jobs and providing better conditions for the prosperity of a society. The Global Innovation Index (GII), created jointly by Cornell University and the World Intellectual Property Organization (WIPO), measures various dimensions of the innovation ecosystem in different countries. The index tracks innovation input, which is related to a favourable innovation environment (such as Institutions, Human Resources, Research, Infrastructure, Market Sophistication and Business Sophistication) and innovation output, which in turn is associated with proper innovation outcomes (Products of Knowledge and Technology; Creative Products). Based on the GII metrics, our research aims to investigate the possible relationship between input and output in the innovation ecosystem. Using annual country data, we estimate a quantile regression model to identify the (hypothesised) structural relationship between innovation input and output. The model includes control variables such as GDP (PPP) per capita. Our findings show that innovation input has a significant and positive effect on innovation output. This result confirms the main hypothesis and is similar to the findings of Dutta and Benavente (2011), Dutta, Benavente and Wunsch-Vincent (2012), Dutta, Benavente and Wunsch-Vincent (2013), Dutta et al (2014), Dutta et al (2015), Dutta et al (2016) and Dutta et al (2017). In addition, the more we move to the left tail of the innovation output distribution, the higher is the effect of innovation input. These findings are useful for national innovation policies, since they emphasise the need to promote better innovation incentives.

Keywords: The Global Innovation Index (GII), Innovation Input, Innovation Output, Innovation Ecosystem, Innovation Policies

1. Introduction

The result of new arrangements between the factors of production that lead to new goods, new production processes or new forms of industrial organisation is associated with the notion of innovation introduced by Schumpeter (1982).

Innovation is the key to a dynamic economy. Helpmann (2004) argue that it is not so much the accumulation of more capital that determines the long-term economic growth, but how capital is used, i.e., the innovation process (Easterly and Levine, 2001; Helpmann, 2004).

Innovation increases employment, income, competitiveness and consequently leads to economic development. Countries need creating incentives for innovation in order to raise their quality of living (Moretti, 2004; Helpmann, 2004; OCDE, 2010; Atkinson, 2013). However, the decision making of policy makers should be preceded by studies that qualify and quantify the specificities of innovation, in order to identify the state of the art and prepare adequate strategies to promote it.

The Global Innovation Index (GII), created in 2007, resulted from a collaboration between Cornell University, INSEAD (European Institute of Business Administration) and the World Intellectual Property Organization (WIPO). The goal with is to create procedures and metrics to measure the different dimensions of innovation in a number of countries (SaiSana, 2011). The GII tracks innovation input, which are related to a favourable innovation environment (Institutions; Human Resources and Research; Infrastructure; Market Sophistication and Business Sophistication), and output, which is defined as the results of innovation (Knowledge and Technology-based Products; Creative Products). The innovation input and output are sub-indices that generate the GII (Dutta and Benavente, 2011).

However, the methodology of GII does not empirically assess the possible linkage between innovation input and outputs over a particular time. The GII only synthesises the final annual result for the status quo of innovation in several countries based on the mapped categories.

Our investigation found no scientific studies that conducted a more specific analysis about the possible links between the GII sub-indices. Therefore, we aim to investigate the relationship between input and output in the innovation ecosystem. We test the hypothesis that innovation input affect output in the GII results between 2010 and 2016.

We estimate a quantile regression model to identify the (hypothetical) structural relationship between innovation input and output. Our study proposes a different view for analysing the innovation ecosystem that may be useful for global innovation policies.

2. Innovation ecosystem

Following Schumpeter (1982), other authors and organisations have proposed new concepts of innovation (OECD, 1997; Edquist, 1997; Sundbo and Gallouj, 1998; OECD, 2005). To summarize, innovation is now understood as the implementation of something new or significantly improved (Product or Service, Process, Marketing Method; Business Organisation Method, Commercial Models, Practices, Workplace Organisation or Foreign Relations). In addition, the innovation phenomenon has been systematically investigated and measured (Dosi, 1988; Lundvall, 1992; Nelson, 1993; Freeman, 1995; Moore, 1996).

Leydesdorff and Etzkowitz (1996) and Etzkowitz and Leydesdorff (2000) proposed the Triple Helix innovation model to identify the role of companies, governments and universities. In this model, the university encourages the relationship with companies and government in generating, accumulating and applying new knowledge (technological innovations) in favour of economic development. Campbell, Carayannis and Rehman (2015) broaden the notion of Triple helix by introducing civil society as a fourth helix, emphasising democracy and the importance of political and civil rights in the innovation system. Carayannis, Barth and Campbell (2012) and Carayannis and Rakhmatullin (2014) include sustainable development as another dimension in the helix models, resulting in a five-helix model.

The innovation ecosystem has become an organisational paradigm and has served as the primary reference in formulating strategies for innovation (Teece, 2007). The functioning of an ecosystem is characterised by multiple interactions between its different components. In this respect, it is important to manage and expand the benefits of the ecosystem, which requires mapping and creating metrics to quantify and identify gaps in its performance, possibly correcting any bottlenecks (Jackson, 2010). The proper functioning of an ecosystem is needed to broaden the effectiveness of entrepreneurial and innovative activities, creating jobs and providing the conditions for economic prosperity.

2.1 Global Innovation Index (GII)

The GII was created with the reasoning that innovation is important for driving competitiveness and economic progress in developed and underdeveloped economies. According to Saisana, Domínguez-Torreiro and Vertesy (2017), in 2017 the index was calculated for 127 countries based on 79 indicators; in that year, the index measured innovation ecosystems that covered 92.5% of the world's population and 97.6% of GDP (in USD).

The GII adopts the concept of innovation originally devised by the Oslo Manual and expanded by the European Community and the Organisation for Economic Cooperation and Development (OECD). Figure 1 shows that the GII consists of seven large innovation areas divided into 21 sub-areas.

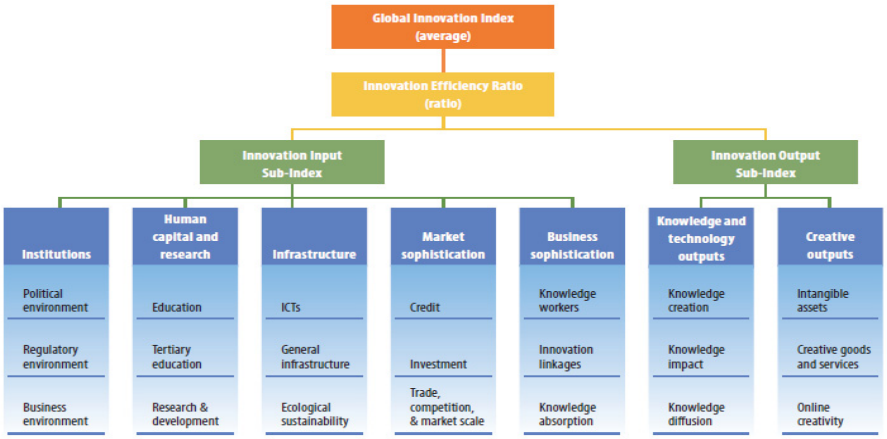

Figure 1: Composition of the Global Innovation Index (GII)

Source: Saisana, Domínguez-Torreiro and Vertesy (2017)

Five large areas monitor innovation input, which determine environmental aspects favourable to innovation, and two large areas monitor innovation output. The GII then aggregates the large areas into two sub-indices: Input and Output. Next, they calculate the Innovation Efficiency Ratio, which is the ratio between the sub-indices of Innovation Input and Output. Finally, the Global Innovation Index (GII) is calculated by arithmetic mean of the sub-indices.

The GII and its sub-indices are quantitative measures that range between 0 and 100; the higher the score, the more developed is the innovation ecosystem. At an elementary level, the methodology allows all sub-areas to be decomposed into 81 indicators. The complete GII methodology can be accessed in greater detail in the annual reports published jointly by Cornell University and WIPO.

SaiSana (2011), Saisana and Philippas (2012; 2013), Saisana and Saltelli (2014), Saisana and Domínguez-Torreiro (2015) and Saisana, Domínguez-Torreiro and Vertesy (2016; 2017) assessed the GII using the *Handbook on Constructing Composite Indicators: Methodology and User Guide*, produced by the Applied Statistics and Econometrics Unit of the Joint Research Centre (JRC) of the European Commission in Ispra (Italy) in partnership with the OECD. These authors tested the GII from two perspectives: conceptual and statistical coherence. They concluded that the multilevel structure of the GII is statistically coherent and has a stable structure, since it is not dominated by any of the sub-index. The ranking obtained by a country is reasonably robust given the methodological assumptions (estimate of lost data, weighting and aggregation formula).

2.2 Literature review

Al-Sudairi and Bakry (2014) explored the results of the GII for Saudi Arabia. Sohn, Kim and Jeon (2016) re-examined the GII using a structural equation model for 2013 data. These authors analyse innovation input (institution, human capital and research, infrastructure, market sophistication and business sophistication) and output (knowledge and technology, and creative solutions). However, they did not consider the possible structural relationship between the factors that affect a country's innovation performance.

Crespo and Crespo (2016) assume that countries can achieve high innovation performance in the GII using various combinations of input. The authors discuss the internal sub-pillars of innovation input and define two sub-samples (high and low-income countries). They find that several input combinations lead to high innovation performance in both groups, and that in the low-income group none of the individual conditions is sufficient to predict good innovation performance, while in the high-income group the infrastructure, human capital and research conditions are sufficient to obtain a better innovation performance. Carpita and Ciavolino (2017) found evidence of a positive relationship between Business Sophistication (explanatory variable) and Innovation Input (response variable), using the GII data for 27 European Union (EU) countries in 2012.

Vlasova, Kuznetsova and Roud (2017) investigated the results for Russia in the GII between 2013 and 2016. The authors analysed the strengths and weaknesses regarding progress in science, technology and innovation in the country. Jankowska, Matysek-Jedrych and Mroczek-Dabrowska (2017) used the GII to explain how national

innovation systems can transform innovation input into output in different countries. The authors assume that more innovation input generates more innovation output in a country. They used cluster analysis with 228 countries. Subsequent results obtained for Poland and Bulgaria contradicted the first results. The authors then try to explain how and why national innovation systems failed (or succeeded) in creating innovation.

There is also a series of studies available in the GII reports that discuss its theoretical-methodological concept and results (Dutta and Benavente, 2011; SaiSana, 2011; Dutta, Benavente and Wunsch-Vincent, 2012; Saisana and Philippas, 2012; Wunsch-Vincent, 2012; Slater and Wruuck, 2012; Saisana and Philippas, 2013; Hollanders, 2013; Xiangjiang, Peng and Kelly, 2013; Dutta et al, 2014; Saisana and Saltelli, 2014; Scott and Vincent-Lancrin, 2014; Dutta et al, 2015; Saisana and Domínguez-Torreiro, 2015; Reynoso et al, 2015; Goedhuys, Hollanders and Mohnen, 2015; Atkinson and Ezell, 2015; Chen, Zheng and Guo, 2015; Chaminade and Moskovko, 2015; Gopalakrishnan and Dasgupta, 2015; Ecuru and Kawooya, 2015; Dutta et al, 2016; Saisana, Domínguez-Torreiro and Vertesy, 2016; Poh, 2016; Gokhber and Roud, 2016; Dutta et al, 2017; Andrade and Domingos, 2017; and Lybbert et al, 2017).

Dutta and Benavente (2011), Dutta, Benavente and Wunsch-Vincent (2012), Dutta, Benavente and Wunsch-Vincent (2013), Dutta et al (2014), Dutta et al (2015), Dutta et al (2016) and Dutta et al (2017) report that, although the scores for Input and Output in the GII may differ substantially, leading to important changes in the countries classification, there is a positive relationship between them. To summarize, based on the data available for the respective years, these authors infer that the efforts made for better innovation input are rewarded with improved innovation results.

3. Methodology

3.1 Sample Design

The sample was based on the availability of the GII sub-indices (innovation input and output) and the data were obtained from the annual GII reports. The other control variable selected was Gross Domestic Product Per Capita based on Purchasing Power Parity (GDP PPP per capita) in 2011 United States dollars, obtained from the World Bank.

The sample includes all the available years of the GII (2011 to 2017). However, the current year GII is based on country data from the previous year. In order to estimate the empirical model, we consider that the results of the GII always refer to the year prior to publication.

Table 1: Number of countries mapped by the GII

Countries	2010	2011	2012	2013	2014	2015	2016
GII	125	141	142	143	141	128	127
GDP PPP per capita	146	146	146	146	145	145	141

Source: the authors

As we see, the non-homogeneous number of countries mapped each year by the GII requires some specific methodological treatment.

3.2 Empirical Model

The GII sub-indices use a variety of information on countries' innovation ecosystem (see Figure 1), which can support, at least in an initial investigation, the lack of other control variables included in the model. However, since the index covers several countries with varying economic performance, it is important to consider the possible high heterogeneity in the structural relationship between input and output in the GII environment. As such, we propose estimating a quantile regression model with fixed effects in a panel data setting in order to test the possible relationship between innovation input and output.

The quantile regression model with fixed effects is credited to different authors (Koenker, 2004; Bache, Dahl and Kristensen, 2013; Powell, 2017). In this study, we use the penalized quantile regression with fixed effects proposed by Koenker (2004),

$$Q_{y,it}(\tau|x_{it}) = x_{it}^{\top}\beta(\tau) + \alpha_i, \qquad (1)$$

where $Q_{y,it}$ is the conditional quantile of the response variable, i.e. innovation output for country *i* in year *t*. The individual unobserved characteristics are controlled by the various $\alpha's$, and the effect is restricted only to a location shift on the conditional quantiles. Moreover, the effect of α is, by assumption, identical across all quantiles of a same country. x_{it} is the covariate vector that contains the intercept, innovation input, GDP PPP per capita and dummy variables to identify the effect of different regions on innovation output. The regions' label is based on the United Nations criteria, as follows: EUR = Europe; NAC = North America; LCN = Latin America and the Caribbean; CSA = Central and Southern Asia; SEAO = Southeast Asia, East Asia, and Oceania; NAWA = Northern Africa and Western Asia; SSF = Sub-Saharan Africa. We selected CSA as the base region. The response variable and the covariates are in logs, except for the dummies.

The penalised estimator proposed by Koenker (2004) for model (1) consists on solving the linear programming problem

$$\min_{(\alpha,\beta)} \sum_{k=1}^{q} \sum_{i=1}^{n} \sum_{t=1}^{t_i} w_k \, \rho_{\tau_k} \left(y_{it} - \alpha_i - x_{it}^{\top} \beta(\tau_k) \right) + \lambda \sum_{i=1}^{n} |\alpha_i|. \quad (2)$$

The quantiles of interest are estimated simultaneously and w_k are the weights that control the relative influence of each quantile in estimating the $\alpha's$ individual effects. λ is a parameter that controls the penalty on the $\alpha's$: when $\lambda \to 0$ we have an estimator for a dummy-variable fixed effects regression, and when $\lambda \to \infty$ all the fixed effects are shrink toward zero, resulting in a cross-section regression estimator. In our model, we set $w_k = 0.2$ for each of the five usual quantiles and $\lambda = 1$. As shown in (2), the estimator allows unbalanced panels.

4. Results

Table 6 summarises the results. We find that innovation input has a significant positive effect on innovation output. This result confirms our hypothesis and partially corroborates that of Dutta and Benavente (2011), Dutta, Benavente and Wunsch-Vincent (2012), Dutta, Benavente and Wunsch-Vincent (2013), Dutta et al (2014), Dutta et al (2015), Dutta et al (2016) and Dutta et al (2017). As we move to the left tail of the innovation output distribution, the higher is the effect of innovation input.

Our analysis also includes GDP per capita as control variable. Interestingly, GDP per capita seems not to provide any substantial informational in explaining innovation output across the quantiles. The absence of statistical significance is a result that should be observed with caution, since a higher level of economic activity should promote more innovation output, as measured by the GII. However, the lack of significance may be attributed to three reasons: i) a decline in the economic growth rate in many countries during the period; ii) GDP per capita may be affecting innovation output differently in the short, medium and long run; and iii) the relevant information for explaining innovation output is already being captured by the innovation input sub-index.

Table 2: Results of quantile regressions for countries between 2011 and 2017

OUTPUT	10% Quantile	25% Quantile	50% Quantile	75% Quantile	90% Quantile
INPUT	1.10829***	1.00682***	0.96613***	0.78954***	0.71202***
	(0.17102)	(0.15049)	(0.12559)	(0.11283)	(0.12281)
GDP	0.05461	0.01711	0.0065	0.03677	0.02543
	(0.03989)	(0.03614)	(0.03285)	(0.02958)	(0.02975)
EUR	0.17686**	0.24461***	0.19918**	0.09121	0.14103
	(0.07361)	(0.0786)	(0.08615)	(0.08596)	(0.09823)
LCN	0.07354	0.10491	0.06195	-0.02663	-0.0362
	(0.06099)	(0.06972)	(0.07532)	(0.06919)	(0.06977)
NAC	0.18127**	0.26115***	0.1712*	0.02043	0.00163
	(0.08869)	(0.08914)	(0.09247)	(0.09508)	(0.10585)
NAWA	-0.04021	0.06616	0.05001	-0.03602	-0.01047
	(0.09639)	(0.09473)	(0.08737)	(0.08252)	(0.07706)
SEAO	0.05006	0.15452*	0.09406	0.00713	0.05751
	(0.12827)	(0.08034)	(0.08315)	(0.09509)	(0.10258)
SSF	-0.10516	-0.04096	0.02323	-0.03711	-0.04881
	(0.0891)	(0.08383)	(0.08666)	(0.06043)	(0.05622)

Source: the authors

The results for Europe and North America, which have the most dynamic and advanced economies in the world, are practically identical. This seems to strengthen the hypothesis that these two regions exhibit a sort of spatial effect that has a positive impact (relative to CSA) at the left tail of the innovation output conditional distribution (roughly, it means that these regions encourage more innovation output using input when output levels are lower). On the other hand, the non-significant effect of Europe, North America and Canada at higher quantiles may be associated with stagnant innovation results. LCN, NAWA and SSF showed no significance at all. There are some reasons why no significant effect was found for these regions, the most likely being related to the fact that these regions have underdeveloped economies with low innovation levels.

5. Conclusion

This study presents evidence that innovation input affect positively innovation output as measured by the GII. However, the results reveal that the effect of innovation input on innovation output is more intense at lower quantiles. The effect seems to decline the more we move to the right tail, which would contradict, to a certain extent, part of the literature that argues that more efforts directed to innovation input are always rewarded with better innovation results. This argument seems to be more plausible at lower quantiles, whereas encouraging more input when we are at the right tail might moderately affect innovation results.

The relationship between input and innovation output in the GII has already been recognised, but we attempt to broaden the discussion by monitoring all countries included in the GII. Furthermore, we observe a longer period than that of past studies. In addition, we include regional dummies in order to capture more information on the behaviour of innovation output. Only the regions of North America and Europe exhibited a significant positive effect across the quantiles. The non-significant effect found for the regions demonstrates the need for more efficient policies, in order to reverse the stagnation trend in the upper quantiles, and enhance the effectiveness of input in materialising innovation products in countries with developing economies.

The evidence presented is not definitive and should be compared with additional studies. We suggest future research using alternative methodologies, such as using finite distributed lag models or test the hypothesis of a dynamic effect on the response variable (innovation output).

References

Andrade, R.B. and Domingos, G.A. (2017) Policies and Institutions Fostering Innovation and Agriculture Technologies in Brazil. In: The Global Innovation Index 2017: Innovation Feeding the World, Cornell University, INSEAD, and the WIPO.

Atkinson, R.D. (2013) Innovation in cities and innovation by cities. In: Creating Competitiveness: Entrepreneurship and Innovation Policies for Growth, Ed. Audretsch, D.B and Walshok, M.L.

Atkinson, R.D. and Ezell, S. (2015) Principles for National Innovation Success. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Al-Sudairi, M. and Bakry, S.H. (2014) "Knowledge issues in the global innovation index: Assessment of the state of Saudi Arabia versus countries with distinct development", Innovation-Management Policy & Practice, Vol 16, Ed 2, pp 176-183.

Bache, SHM., Dahl, CM. And Kristensen, JT. (2013) "Headlights on tobacco road to low birthweight outcomes: Evidence from a battery of quantile regression estimators and a heterogeneous panel", Empirical Economics, Vol 44, Issue 3, pp 1593–1633.

Campbell, D.F.J., Carayannis, E.G. and Rehman, S.S. (2015) "Quadruple helix structures of quality of democracy in innovation systems: the USA, OECD countries, and EU member countries in global comparison", Journal of the Knowledge Economy, Vol 6.

Carayannis, E.G., Barth, T.D. and Campbell, D.F.J. (2012) "The quintuple helix innovation model: global warming as a challenge and driver for innovation", Journal of Innovation and Entrepreneurship, Vol 1.

Carayannis, E.G. and Rakhmatullin, R. (2014) "The quadruple/quintuple innovation helixes and smart specialisation strategies for sustainable and inclusive growth in Europe and beyond", Journal of Knowledge Economy, Vol 5.

Carpita, M. and Ciavolino, E. (2017) "A generalized maximum entropy estimator to simple linear measurement error model with a composite indicator", Advances in Data Analysis and Classification, Vol 11, Issue 1.

Chaminade, C. and Moskovko, M. (2015) Radical Institutional Change: Enabling the Transformation of Georgia's Innovation System. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Chen, D., Zheng, S. and Guo, L. (2015) The Impact of Science and Technology Policies on Rapid Economic Development in China. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Crespo, N.F. and Crespo, C.F. (2016) "Global innovation index: Moving beyond the absolute value of ranking with a fuzzy-set analysis", Journal Of Business Research, Vol 69, Ed 11, pp 5265-5271.

Dosi, G. (1988) The nature of the innovative process. In: DOSI, G. et al (Eds.). Technical change and economic theory. London: Pinter.

Dutta, S. and Benavente, D. (2011) Measuring Innovation Potential and Results: The Best Performing Economies. In: The Global Innovation Index 2011: Accelerating Growth and Development, Dutta, S. INSEAD.

Dutta, S., Benavente, D. And Wunsch-Vincent, S. (2012) The Global Innovation Index 2012: Stronger Innovation Linkages for Global Growth. In: The Global Innovation Index 2012: Stronger Innovation Linkages for Global Growth, INSEAD and WIPO.

Dutta, S., Benavente, D. And Wunsch-Vincent, S. (2013) The Global Innovation Index 2013: Local Dynamics Keep Innovation Strong in the Face of Crisis. In: The Global Innovation Index 2013: The Local Dynamics of Innovation, Cornell University, INSEAD, and the WIPO.

Dutta, S., Benavente, Reynoso, R.E., Bernard, A.L., Lanvin, B. and Wunsch-Vincent, S. (2014) The Global Innovation Index 2014: Nurturing New Sources of Growth by Developing the Human Factor in Innovation. In: The Global Innovation Index 2014: The Human Factor in Innovation, Cornell University, INSEAD, and the WIPO.

Dutta, S., Bernard, A.L., Reynoso, R.E., Lanvin, B. and Wunsch-Vincent, S. (2015) The Global Innovation Index 2015: Effective Innovation Policies for Development. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Dutta, S., Reynoso, R.E., Litner, J., Lanvin, B., Wunsch-Vincent, S. And Saxena, K. (2016) The Global Innovation Index 2016: Winning with Global Innovation. In: The Global Innovation Index 2016: Winning with Global Innovation, Cornell University, INSEAD, and the WIPO.

Dutta, S., Reynoso, R.E., Litner, J., Lanvin, B., Wunsch-Vincent, S. And Guadagno, F. (2017) The Global Innovation Index 2017: Innovation Feeding the World. In: The Global Innovation Index 2017: Innovation Feeding the World, Cornell University, INSEAD, and the WIPO.

Ecuru, J. and Kawooya, D. (2015) Effective Innovation Policies for Development: Uganda. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Easterly, W. and Levine R. (2001) "It's not factor accumulation: stylized facts and growth models", World Bank Economic Review, Vol 15, pp 177–219.

Edquist, C. (1997) Systems of Innovation: technologies, institutions and organizations. Londres: Printer Publisher.

Etzkowitz, H. and Leydesdorff, L. (2000) "The dynamics of innovation: from national systems and Mode 2 to Triple Helix of university-industry-government relations", Research Policy, Vol 29.

Freeman, C. (1995) "The national system of innovation in historical perspective", Cambridge Journal of Economics, Vol 19, No 1.

Goedhuys, M., Hollanders, H. and Mohnen, P. (2015) Innovation Policies For Development. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Gokhberg, L. and Roud, V. (2016) How to Design a National Innovation System in a Time of Global Innovation Networks: A Russian Perspective. In: The Global Innovation Index 2016: Winning with Global Innovation, Cornell University, INSEAD, and the WIPO.

Gopalakrishnan, S.K. and Dasgupta, J. (2015) Policies to Drive Innovation in India. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Helpmann, E. (2004) The Mystery of Economic Growth, Cambridge, MA: Belknap Press, pp 32.

Hollanders, H. (2013) Measuring Regional Innovation: A European Perspective. In: The Global Innovation Index 2013: The Local Dynamics of Innovation, Cornell University, INSEAD, and the WIPO.

Jackson, D.J. (2010) What is an Innovation Ecosystem? Arlington, VA: National Science Foundation.

Jankowska, B., Matysek-Jedrych, A. and Mroczek-Dabrowska, K. (2017) "Efficiency of National Innovation Systems - Poland and Bulgaria in The Context of the Global Innovation Index", Comparative Economic Research-Central And Eastern Europe, Vol 20, Ed 3, pp 77-94.

Koenker, R. (2004) "Quantile regression for longitudinal data", Journal of Multivariate Analysis, Vol 91, No 1.

Kon, A. (2016) "Ecossistemas de inovação: a natureza da inovação em serviços", Revista de Administração, Contabilidade e Economia da Fundace, Vol 7, No 1, pp 14-27.

Lundvall, B.A. (1992) National systems of innovation: towards a theory of innovation and interactive learning. Londres: Frances Pinter.

Leydesdorff, L. and Etzkowitz, H. (1996) "Emergence of a triple helix of university–industry–government relations", Science and Public Policy, Vol 23, Issue 5, pp 279–286.

Lybbert, T., Saxena, K., Ecuru, J., Kawooya, D. and Wunsch-Vincent, S. (2017) Enhancing Innovation in the Ugandan Agri-Food Sector: Progress, Constraints, and Possibilities. In: The Global Innovation Index 2017: Innovation Feeding the World, Cornell University, INSEAD, and the WIPO.

Moore, J.E. (1996) The death of competition: leadership and strategy in the age of business ecosystems. New York: Harper Business.

Moretti, E. (2004) Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data, Journal of Econometrics, 121, Los Angeles, CA: UCLA, pp 175–212.

Nelson, R. (1993) National innovation systems: a comparative analysis. Nova York: Oxford University Press. OECD. (1997) Manual de Oslo: Diretrizes para coleta e interpretação de dados sobre inovação. 3ª Ed, Organization for Economic Co-Operation and Development.

OECD. (2005) Promoting innovation in services. Paris: Organization for Economic Co-Operation and Development.

OECD. (2010) The OECD Innovation Strategy, Paris: Organization for Economic Co-Operation and Development.

Poh, L.C. (2016) From Research to Innovation to Enterprise: The Case of Singapore. In: The Global Innovation Index 2016: Winning with Global Innovation, Cornell University, INSEAD, and the WIPO.

Powell, D. (2017) "Quantile Treatment Effects in the Presence of Covariates", RAND Working Paper.

Reynoso, R.E., Bernard, A.L., Saisana, M. Schaaper, M. Wunsch-Vincent, S. And Guadagno, F. (2015) Benchmarking Innovation Outperformance at the Global and Country Levels. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

SaiSana, M. (2011) Statistical tests on the Global Innovation Index. In: The Global Innovation Index 2011: Accelerating Growth and Development, Dutta, S. INSEAD.

Saisana, M. and Philippas, D.T. (2012) Statistical tests on the Global Innovation Index. In: The Global Innovation Index 2012: Stronger Innovation Linkages for Global Growth, INSEAD and WIPO.

Saisana, M. and Philippas, D.T. (2013) Joint Research Centre Statistical Audit of the 2013 Global Innovation Index. In: The Global Innovation Index 2013: The Local Dynamics of Innovation, Cornell University, INSEAD, and the WIPO.

Saisana, M. and Saltelli, A. (2014) Joint Research Centre Statistical Audit of the 2014 Global Innovation Index. In: The Global Innovation Index 2014: The Human Factor in Innovation, Cornell University, INSEAD, and the WIPO.

Saisana, M. and Domínguez-Torreiro, M. (2015) Joint Research Centre Statistical Audit of the 2015 Global Innovation Index. In: The Global Innovation Index 2015: Effective Innovation Policies for Development, Cornell University, INSEAD, and the WIPO.

Saisana, M., Domínguez-Torreiro, M. and Vertesy, D. (2016) Joint Research Centre Statistical Audit of the 2016 Global Innovation Index. In: The Global Innovation Index 2016: Winning with Global Innovation, Cornell University, INSEAD, and the WIPO.

Saisana, M., Domínguez-Torreiro, M. and Vertesy, D. (2017) Joint Research Centre Statistical Audit of the 2016 Global Innovation Index. In: The Global Innovation Index 2017: Innovation Feeding the World, Cornell University, INSEAD, and the WIPO.

Schumpeter, J.A. (1982) Teoria do Desenvolvimento Econômico: Uma Investigação Sobre Lucros, Capital, Crédito, Juro e o Ciclo Econômico. São Paulo: Abril Cultural.

Scott, R. and Vincent-Lancrin, S. (2014) Educating Innovators and Entrepreneurs. In: The Global Innovation Index 2014: The Human Factor in Innovation, Cornell University, INSEAD, and the WIPO.

Slater, D. and Wruuck, P. (2012) We Are All Content Creators Now: Measuring Creativity and Innovation in the Digital Economy. In: The Global Innovation Index 2012: Stronger Innovation Linkages for Global Growth, INSEAD and WIPO.

Sohn, S.Y., Kim, D.H. and Jeon, S.Y. (2016) "Re-evaluation of global innovation index based on a structural equation model", Technology Analysis & Strategic Management, Vol 28, Ed 4, pp 492-505.

Sundbo, J. and Gallouj, F. (1998) Innovation in Service. Manchester, 1998. Policy Research in Engineering, Sciense & Technology - PREST. Project Report.

Vlasova, V., Kuznetsova, T. and Roud, V. (2017) "Drivers and limitations of Russia's development based on the evidence provided by the Global Innovation Index", Voprosy Ekonomiki, Ed 8, pp 24-41.

Wunsch-Vincent, S. (2012) Accounting for Science-Industry Collaboration in Innovation: Existing Metrics and Related Challenges. In: The Global Innovation Index 2012: Stronger Innovation Linkages for Global Growth, INSEAD and WIPO.

Teece, D.J. (2007) "Explicating dynamic capabilities: The nature and micro foundations of (sustainable) enterprise performance", Strategic Management Journal, Vol 18, No 13, pp 1319-1350.

Xiangjiang, Q., Peng, J. and Kelly J. (2013) Open Innovation: The View of an ICT Leader in Distributed Global Innovation. In: The Global Innovation Index 2013: The Local Dynamics of Innovation, Cornell University, INSEAD, and the WIPO.

Sustainable Internationalization of Hi-Tech Small Firms: Meta-Synthesis

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Abstract: The fragmented literature of internationalization has not yet been structured in a coherent framework or model. Especially this is true about Sustainable internationalization of Hi-tech small firms. To build a comprehensive framework in this regard this research study involved collecting academic and peer reviewed articles that addressed the issue of Sustainable internationalization of Hi-tech small firms. The application of the inclusion and exclusion criteria on the 51 articles yielded eleven articles that were appropriate for the meta-synthesis. The results suggest sustainability themes are in six categories: economic, social, environmental, company specific factors, location, industrial factors and human capital.

Keywords: Sustainability, internationalization, Hi-tech, Meta-Synthesis

1. Introduction

Among multiple objectives of firms, two objectives can be particularly important for firm growth: internationalization, and innovation/quality (Skrt and Antoncic, 2004). The importance of internationalization for small businesses growth has been in the international entrepreneurship literature (for example, see reviews by McDougall and Oviat; Antoncic and Hisrich; Zahra and George). Many studies in the field of internationalization have led to a variety of internationalization theories and models. In general, international theories and models can be categorized as follows: (1) Product Life Cycle Model (PLC): In this model, firms become international once their products have passed their maturity stages and can produce standard products on a scale (Gankema et al., 2000), (2) INV model: Based on this model, product nature, industry norms and trends of managers and entrepreneurs of that firm are the main determinant factors in the internationalization of a firm (Zahra, 2005); (3) global birth model: this model is quite the opposite Process models, and it is argued that some companies operate globally from the moment of birth. And do not necessarily take internationalization steps (Weerawardena et al, 2007), (4) Network Approach: In this approach, it is believed that the business network in which an enterprise operates plays a crucial and decisive role in the internationalization of firms (Senik et al., 2011), (5). Process models: These models consider internationalization a step-by-step process. In these models, it is believed that firms must go through different stages of internationalization (Anderson, 1993).

However, research shows that there are many open questions in this regard. For example, it should be noted that the issue of providing stable internationalization models and models, as well as on technology-driven businesses, has been considered very little in literature (Senik et al., 2011). But there are some studies pointing out some aspects of this phenomenon. For example, Kowalski (2014) points out that networking and clustering can contribute to the process of internationalization. On the other hand, it should be noted that most of the research in this area was about businesses other than technology-based businesses (for example, Chety et al., 2014; Lefgren, 2014). Lack of attention to this issue can not address the issue of sustainable internationalization of technology-oriented businesses and deprive them of the benefits of this issue. The presentation of such a model can simultaneously provide internationalization and sustainability benefits (Box, 2014). On the other hand, considering the different dimensions of this phenomenon discussed, the ground for this model seems to be presented. But there are still many challenges in this area-such as taking into account the particular conditions of advanced technology-based businesses (Sanic et al., 2011). Cedrola et al. (2015) cites a challenging issue in a study that presents sustainability internationalization patterns, drawing researchers' attention to the characteristics of their firms in particular. As a result in this research, we will focus on "providing a sustainable internationalization model for technology-driven businesses" to give an effective response to the concerns of sustainability in international arena. For this purpose, a system perspective will be used.

Sustainability means continuity in something like activity and the creation of a dynamic balance between many effective factors such as the natural, social, and economic factors required by humanity. Sustainability as a descriptive aspect of development is a situation in which the desirability and facilities are not reduced over time, and the meaning of keeping the hold of the word Sustenere (Sus means from the bottom and Tenere means keeping it alive) It refers to long-term support or long-term durability. Sustainability, in its broadest sense, refers to the ability of the community, ecosystem or any current system to operate indefinitely in the future, without necessarily leading to the degradation of the resources to which the system relies or due to imposing excessive burden on them. To be weakened (Gold, 1996).

On the other hand, the system's capability for endurance and reliability is inevitably dependent on the success that the system gains in communicating with the outside world; in other words, the stability of the system is entirely dependent on the system's ability to adapt, adapt, and It is evolving and responsive to the environment, and since the environment in turn is constantly changing, this adaptation and adaptation system should be a dynamic and sensitive process.

Therefore, the sustained system requires proper internal function and environment-friendly relationship, in other words stability to inside and external stability (in interaction with the environment), in general, to act as a sustainable system. In fact, sustainability is in practice a balance between environmental imperatives and development needs, and is achieved in two ways: reducing pressures and increasing existing capacities.
Therefore, the main conditions of sustainability are:

1. Systems must be compatible with local and environmental conditions.
2. Systems must be compatible with future needs and intended purposes.
3. Systems must be adaptable to changes, and should be repaired in the event of a system failure due to unplanned incidents.
4. The expansion of systems should not cause harm to systems that protect human life, such as climate, soil and biological systems.

2. Sustainable internationalization

The fragmented literature of internationalization has not yet been structured in a coherent framework or model (Krishna, 2012; Lane and Guan, 2015; Hajimarco et al., 2015). Therefore, a process model can produce a more specific image of this process. As Zhian et al. (2008) acknowledge, an integrated process model can encompass and interact with each other factors that contribute to the sustainable internationalization process of high technology companies. In his view, the process model offers a better explanation of this phenomenon.

Penn and Kelly Deberl (2002) also point out the importance of presenting a process model in this regard.

The acquisition of sustainable competitive advantage determines sustainability. Competitive advantage of any kind can be either sustained or temporary in terms of competitive performance. The temporary advantage refers to a short-term and transitional advantage. For example, American Airlines's Intelligent Automated Booking System introduced the company at the time of introduction in terms of exploiting capacity and quick access to customers and other operational aspects. It can be said that the more obvious the features and the simplicity of the competitive advantage are, the more potentially its capability.

However, if a company has an innovative enterprise-oriented culture and high market-leading innovation, it can, firstly, intelligently use its own feature and improve its position advantage, secondly, before competitors have a temporary advantage To create a new advantage and always have competitors behind them. In the face of a temporary competitive advantage, there is a lasting competitive advantage, which is, firstly, long-term and non-transitory, and secondly, easily accessible by competitors. A striking example of that is the strong brand and the Coca-Cola brand that has continued for over a century and enrays all competitors.

In general, it can be said that the sustainable competitive advantage of such features as durability, high throughput, good tolerance, tolerance, high bioavailability, high support and support, high acceptability, reasonable power and satisfactory reassurance And there is considerable negotiating power that, of course, will fit all or some of the above features according to the strength and strength of the competitive advantage.
For example, if an organization is compelled to protect its values against its competitors, then the term sustainability is more consistent with tolerance and capability, or if the competitive advantage of the

organization is to enable it to design and implement a strategy The aggressive nature of the market in various fields, the term sustainability of competitive advantage is more dependent on its aggressive capabilities.

Grant considers sustainability a competitive advantage with a long, vibrant, and reflective dimension. Prolonged in terms of the ability of competitors to mimic or obtain the source of the competitive advantage, it is argued that the sustainable competitive advantage is essentially related to a large number of subfields and of a dynamic nature. Each aspect of the sustainability of competitive advantage depends on the nature of the strategic task at different levels of the organization, and therefore sustainability is considered instead of a static concept as a dynamic process, and thus it can be said that the competitive advantage of a destination is not a specified interval. But an infinite journey that depends on the ability of the passenger and his goals. With this concept, the competitive advantage of tomorrow is close, but it never comes, because of the dynamic nature of the environment and the rapid changes in market demands and expectations, as well as the changing behavior of competitors, as well as its complex nature, is a competitive advantage. Another important point is that there is a relationship between a temporary competitive advantage and a sustainable competitive advantage, so that in some cases, a sustainable competitive advantage derives from a sum of a series of temporary competitive advantages. For example, in the computer industry, Intel's dominance of the cheap computer market has been achieved through the creation of a set of tangible benefits, which further creates a new advantage and, based on that, delivers a new product and, as a result, competitors who seek Imitation and copying have to start a new business in order to achieve the new advantage, and this is the secret to continuing the competitive advantage of Intel in the computer industry over the past two decades.

Therefore, it should be noted that the issue of providing stable internationalization models and models, as well as on technology-driven businesses, has been considered very little in literature (Sanik et al., 2011). But there are some studies pointing out some aspects of this phenomenon.

For example, Kowalski (2014) points out that networking and clustering can contribute to the process of internationalization. On the other hand, it should be noted that most of the research in this area was about businesses other than technology-based businesses (for example, Chety et al., 2014; Lefgren, 2014). On the other hand, considering the different dimensions of this phenomenon discussed, the ground for this model seems to be presented. But there are still many challenges in this area-such as taking into account the particular conditions of advanced technology-based businesses (Sanic et al., 2011). Cedrola et al. (2015) cites a challenging issue in a study that presents sustainability internationalization patterns, drawing researchers' attention to the characteristics of their firms in particular. In general, the problems faced by small and medium enterprises in this regard can be divided into two categories (Al Rawi, 2007):

Major internal barriers, including lack of information, lack of sufficient capital or credibility, (a) the difficulty of creating a position on the international market and maintaining international business relations, (b) the difficulty of using commercial finance services, dealing with growing costs, Prolonged credit and tolerable losses, (c) lack of timely access to loans and loans needed), and inadequate managerial skills (a) many small and medium enterprises are more productive and technology-oriented than market-oriented, and more affordable Energy, time and resources for international marketing and marketing; b) the lack of management with International experience and foreign language skills).

Major external barriers: technical commercial constraints (such as standardization, compliance with qualitative requirements, assessment of product compliance with market demand, packaging and labeling, compliance with environmental requirements), administrative procedures, marketing and distribution problems in the target market , Lack of risk insurance, high transportation costs and communication problems in distant countries.

3. Method

This research study involved collecting academic and peer reviewed articles that addressed the issue of Sustainable internationalization of Hi-tech small firms. Forward and backward tracking of citations was used to further complement the research efforts. The articles used for this study were retrieved from the following academic and research databases: MPDI and ScienceDirect. Google and Google Scholar search engines, were also used for search on relevant articles. The research team used subject headings, author names, and keywords to search for relevant sources. The keywords used for the academic peer reviewed articles included

Sustainable internationalization ‘‘+”Hi-tech small firms, Sustainability, internationalization, and Hi-tech. As there are several established authorities on the topic of internationalization, the search terms also included the names of authors.

The searches on Sustainable internationalization and related topics produced 51 articles. Following the guidelines of the conventional systematic review methodology, inclusion and exclusion criteria were applied to the 51 studies by two independent researchers. This was done to ensure that the sample of articles used for the analysis was appropriate for the meta-synthesis. The inclusion criteria for the qualitative component included the following: (1) publication was qualitative in research design; (2) publication was academic and peer reviewed in nature; (3) publication dealt with investigation of Sustainable internationalization; (4) the study used primary data; and (5) researchers had a defined sample.

The exclusion criteria were applied to: (1) papers with an entirely conceptual or theoretical background and no research design; and (2) studies with close-ended survey questions as the data collection instrument. The application of the inclusion and exclusion criteria on the 51 articles yielded eleven articles that were appropriate for the meta-synthesis. 40 articles were excluded from the analysis because they failed to meet the criteria stipulated given the design of the current research.

4. Sustainability themes

Sustainability themes are categorized in most articles in seven categories: economic, social, environmental, company specific factors, location, industrial factors and human capital. Accordingly, it is suggested that themes such as improving the level of national income, production conditions, living standards (nutrition, housing, health and education), working environment conditions, institutions and policies for measuring sustainable development are suggested (Steretin's comment on development, known as the vision of sustainable development, is a fundamental requirement). And in another article by Gunnar Myrdal, he has proposed other indicators for assessing sustainable development, including indicators (rationalism, knowledge development and effective implementation planning, productivity enhancement, living standards, social and economic equality, and improvement Institutions, behaviors and habits, national solidarity, national independence, broad-based democracy, social discipline).

From the series of articles, "themes of Sustainable Development have been categorized from the indicators in four areas: economic, social, environmental and institutional.

Construct	Theme, article (#)	Theme description
Social	Participation in the cultural and social (1) Durability of the product (2) Performance (2) Management of the products (2) The following participation of stakeholders (3) Security of operation (3) Encouraged staff (3) Participation and development of the organization (4) Supply chain, customers, consumer products / services (4) Business Ethics / fair operating practices (4) Observance and compliance with social rules and regulations (4) Workers and employees of the investor company (4)	Staff training The impact of employee diversity and sustainability in the production of various products business Of the active role of communication / Community participation in sustainability and business development Yield loss based on the landfill The quality and efficiency of manufactured products Employment of local community The creation of jobs processing your product Repeats its customers The amount of customer consent The number of complaints to its customer s Financial staff turnover Securing local resources Products with innovation and growth A Yi or through a savings in valuable resources, to the benefit of its community Recent securing percent of the total resources of the feet of the Watch behind the securing and development in the growth and sustainable impact? B-related damage and accidents are considered stable business? Percent of the staff of my education of the poor in the growth and sustainability of the business is how much? Are employees exposed to high-risk work environment? And its impact? According to health / risk for the society of my business how much is on sustainable?

Construct	Theme, article (#)	Theme description
		Provide staffing abilities and innovate products The role of management and social creativity in business growth and sustainability The effect of encouraging employees to motivate and reward. taking part Voluntary Company To Development Keep up Beyond requirements Legal Hint has it Health And Safety products, information and Sticker Pasture Recovery And Privacy Private customers Information about Risks Related With Bribery, corruption, influence Illegitimate On policy making General and Actions Exclusive case Opinion Are. Risks Related With Bribery, corruption, influence Illegitimate On policy making The public and the role of observance of the rules Impact of the employees of the supplier and investor company on the social dimension and sustainability trend. Social satisfaction: Customer satisfaction of products and services Careers (during construction and operation) Employment and income distribution Social capital Access (employment, recreation, services): access to resources Accountability: Accountability employees and manufacturers to provide better product Social Security Satisfaction with the quality of service: customer satisfaction and respond to the needs of society according to the product
Economic	International cooperation and its impact on the growth of the financial and economic (1) Activity and employment (1) New investments (2) Direct costs (2) Indirect costs (2) Advertisement costs (2) Project life cycle costs (2) Investments (2) Net profit (2) Local economy (2) Investment channels (2) Financial growth rates (3) Economic added value (3) GDP (6) Globalisation (6) Capital net growth (6) Quality Control (7) Contract type (8) Project Management and Strategic Management of Projects (8) The unemployment rate (8) Revenue and distribution of products (8) Middle of the income (8)	Facilities for job creation Convenient and practical equipment for activities and job creation Environment and social impacts, the cost is not out of the activity of the economic value of economic transactions No capital cost of new No capital cost of new Not the cost of the study and development Annual costs include the materials No energy cost It's not the cost of labour The Cost Water The Cost Shipped And Quotes The Cost Store The Cost By The other (Role Cost The At Process Work To earn And work) The Impact of Initial Investments on Emerging or Technology-driven Business Growth Net profit impact of revenue and business growth Materials and resources needed to achieve net profit and thus economic growth and sustainable development business The role of local economy and domestic economies in business efficiency Current assets of effective business financing Fixed assets affecting financing and sustainable business The Impact of Financial Growth on Business Growth and Sustainability Value-added products and their impact on productivity

Construct	Theme, article (#)	Theme description
		Impact of unrelated domestic production on business performance International relations and adaptation to global economies and parallel growth Net growth of new capital Quality control of domestic and manufactured products for economic growth The Impact of Foreign and International Contracts on Sustainability Project management and project management, and the role of providing strategic solutions The effect of creating jobs and preventing the unemployment of employees The variety of products and distribution between consumers and the level of income generation and its effective factors on growth Company's Annual Income and Financial Growth and its Impact on the Business Process
Environmental	External resources of the country's and environment effects (1) Annual costs including the use of the resources of the Homeland (2) The external pressure exerted on the environment due to the needs of the person (2) % Of shared resources or international sources (2) Management of the waste Release (2) Production of a new product (2) Close loop of resources (3) Maximum benefit from the materials and energy (3) Replacement with the renewable energy and natural processes (3)	
Institutional	Community-based institutions (9) Organizational Areas (9) Participation (10) Justice (10) Civil society organizations (10)	The impact of the political, legal, stakeholders, education, religion, culture, the environment, international companies. The impact of commodity markets and services to international companies (including several organizations, including customers, competitors and suppliers that have common rules and norms) State (including ministries and agencies co-operation and frames of reference that are specific to this area) Labor market, financial market This suggests that the influence of different multinational companies. Area By Organizational On Company How many Nationality the effect The transition And the extent of their influence on emerging and international businesses with respect to the proposed measures be examined. The Role of Employee and Investor Participation and Maintaining Social Justice and the Impact of Civil and Governmental Institutions and Organizations on Sustainability of Investments
Company specific factors	Size Company (11) Organizational structure (11) Human Capital (11) Technology (11) Market Share (11) Life cycle (11) Financial strength (11)	
Spatial and situational factors	Location (11) Scale of the economy (11) Market enrichment (11) Institutional legitimacy (11)	Location for new companies' survival is critical factor and also cultural necessity for keeping the company's growth rate.

Construct	Theme, article (#)	Theme description
Human Capital	Level of education (9,11) The Previous Experience (9,11) The Motivation To Success (9,11) Working years (11) Total number (11)	Human capital is usually raised by entrepreneurs (or institutions and company owners) in order to increase the survival rate and sustainability of new companies. There are various factors affecting business sustainability
Industry Specific factors	The the level Development of Market At The life cycle (9,11) The Technology And the level Industry life cycle (9,11) The Industry Special Capital market And Technological Regime (11)	

5. Conclusion

The meta-synthesis of 11 studies on Sustainable internationalization of Hi-tech small firms resulted in deeper insights into questions formulated for this research. To recap, the main antecedents of Sustainable internationalization of Hi-tech small firms are economic, social, environmental, company specific factors, location, industrial factors and human capital.

The results suggest that Internationalization is one of the ways in which companies can benefit from international market activity. The least benefit to internationalization for companies and countries is the transfer of technology across borders. Internationalization was first introduced in 1966 in the theory of the Vernon product life span. It is very difficult to discuss the theory of internationalization because the term itself is not yet fully defined. Nevertheless, extensive definitions have been internationalized, such as internationalization as a process to increase international engagement, and define international business as the business that has two or more countries to be included. Researchers consider internationalization as an outsider for international operations. Internationalization has also been defined as reflecting the interests of the country of origin and the enthusiasm of decision makers (entrepreneurs) for operating on the basis of opportunities in foreign markets (outside the boundary of the country of origin) (Prahadan & Das, 2016).

In 2001, there was no definition in which definitions and previous findings were included. And internationalization is considered as a process in which companies are aware of the direct and indirect effects of international exchanges on their future and therefore trade with other countries. In 1989, Bilas and Calif introduced the internationalization process to the implementation of the company's operations (strategy, structure, resources, etc.) with the international environment. Internationalization of a company is not a one-dimensional concept and cannot be considered only in the operational dimension, so the research approach should identify its full dimensions (ibid).

As mentioned earlier, in this study, we will use a process approach to provide a sustainable internationalization model in technology-driven businesses. In our view, the application of a system of process sets, together with identifying the relationships and interactions of these processes and their coherence to create optimal output, is referred to as a process approach. The ever-increasing need for speed and decisiveness in complex decisions regarding product development and production operations has encouraged firms to focus on different processes - contrary to the traditional approach that has focused on the entire firm. The main processes can be divided into two main groups (Gregory, 1995; Canon and Oguto, 2015):

1. Business Processes: The business process represents the flow of information and materials from the supplier to the customer (consumer). The benefits of these processes include: Describing and revealing the normal activities of a business; providing a framework for evaluating completed processes; providing a basis for analyzing the value of each activity within the process; and making it possible for employees who can engage in activities that involve them. Are identifying and evaluating.
2. Management processes: Management processes are activities that will implicitly determine how key decisions are made within the organization. Such decisions require the input of data and the perception and receipt of information from different parts of the organization, and not necessarily in terms of mathematical modeling. For example, management processes include formulating strategies and analyzing and designing policies and procedures. The audit of production strategies and the identification of capabilities (capabilities) are examples of such.

In general, a process approach offers opportunities and solutions to overcome existing problems. As a result of using this approach, it is possible to identify issues related to the internationalization of technology-based companies, to integrate them into operational and, consequently, with other current management activities.

In addition, technology management may be considered as a business flow and not as seen in the flow of operational information and flow of materials. It may also be possible to identify the technology management activities, their continuity and their evaluation of the business process approach. Business processes and management processes together provide tools for deploying a technology strategy. On the other hand, internationalization or, in other words, the internationalization of activities is being studied in various aspects, and in fact the concept is ambiguous, and has a different meaning in relation to any field of study. The word goes back to the various elements in the organization, such as strategy, organizational structure, products, and the like. Internationalization is also a process of engagement in international operations. A different view of Kalouf and Bezhish (1995) states that internationalization means the process of aligning the operations of companies (such as strategy, structure, resources, etc.) with international environments, that is, in fact, the international Activity is considered as a dynamic process (Rundh, 2007).

References

Acs, Z. J., Armington, C., & Zhang, T. (2007). The determinants of new-firm survival across regional economies: The role of human capital stock and knowledge spillover. Papers in Regional Science, 86(3), 367-391.

Alrawi, K. (2007). The internet and international marketing. Competitiveness Review: An International Business Journal, 17(4), 222-233.

Anderson, K. M., Murahashi, T. E. T. S. U. Y. A., Dostal, D. E., & Peach, M. J. (1993). Morphological and biochemical analysis of angiotensin II internalization in cultured rat aortic smooth muscle cells. American Journal of Physiology-Cell Physiology, 264(1), C179-C188.

Antoncic, B., & Hisrich, R. D. (2001). Intrapreneurship: Construct refinement and cross-cultural validation. Journal of business venturing, 16(5), 495-527.

Bradley, P., Parry, G., & O'Regan, N. (2016). A framework for understanding and designing business models for sustainable development (No. 20161606).

Cedrola, E., Battaglia, L., & Quaranta, A. G. (2015). The country of origin effect (COO) in the industrial sectors: The results of an empirical study. In Proceedings of the 14th International Congress Marketing Trends.

Gankema, H. G., Snuif, H. R., & Zwart, P. S. (2000). The internationalization process of small and medium-sized enterprises: an evaluation of stage theory. Journal of Small Business Management, 38(4), 15.

Gold, J. (1996). Interpretation: the IMF and international law (Vol. 4). Kluwer Law International.

GRI (1997). Global Reporting initiative. Report.

Huang, A., & Badurdeen, F. (2017). Sustainable Manufacturing Performance Evaluation: Integrating Product and Process Metrics for Systems Level Assessment. Procedia Manufacturing, 8, 563-570.

Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., & Lattanner, M. R. (2014). Bullying in the digital age: A critical review and meta-analysis of cyberbullying research among youth. Psychological bulletin, 140(4), 1073.

Krishna, A. (2012). An integrative review of sensory marketing: Engaging the senses to affect perception, judgment and behavior. Journal of Consumer Psychology, 22(3), 332-351.

Lefgren, L., Platt, B., & Price, J. (2014). Sticking with what (barely) worked: A test of outcome bias. Management Science, 61(5), 1121-1136.

McDougall, P. P., & Oviatt, B. M. (2000). International entrepreneurship: the intersection of two research paths. Academy of management Journal, 43(5), 902-906.

Pett, T. L., & Clay Dibrell, C. (2001). A process model of global strategic alliance formation. Business Process Management Journal, 7(4), 349-364.

Porter, M. E., & Kramer, M. R. (2006). Strategy and society: the link between corporate social responsibility and competitive advantage. Harvard business review, 84(12), 78-92.

REZVANI, M. (2009). FUZZY MARKETING MIX MODELING (A CASE STUDY OF AUTOMOBILE BATTERY INDUSTRY).

Senik, Z. C., Scott-Ladd, B., Entrekin, L., & Adham, K. A. (2011). Networking and internationalization of SMEs in emerging economies. Journal of International Entrepreneurship, 9(4), 259-281.

Skrt, B., & Antoncic, B. (2004). Strategic planning and small firm growth: An empirical examination. Managing Global Transitions, 2(2), 107.

Weerawardena, J., Mort, G. S., Liesch, P. W., & Knight, G. (2007). Conceptualizing accelerated internationalization in the born global firm: A dynamic capabilities perspective. Journal of world business, 42(3), 294-306.

Yang, X., Jiang, Y., Kang, R., & Ke, Y. (2009). A comparative analysis of the internationalization of Chinese and Japanese firms. Asia Pacific Journal of Management, 26(1), 141-162.

Zahra, S. A. (2005). Entrepreneurial risk taking in family firms. Family business review, 18(1), 23-40.

Zahra, S. A., & George, G. (2002). International entrepreneurship: The current status of the field and future research agenda. Strategic entrepreneurship: Creating a new mindset, 255-288.

Future Worlds, Post Anthropocene: New Approaches to Sustainability

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Abstract: This paper presents research emanating from a deep concern about the existential health of our planet; my personal pursuit of effective teaching in the area known as creative technologies; and the responsive engagement of the students facing the insurmountable problems we all confront. The Anthropocene is one of those problems that demands a response, but denies singular, simplistic solutions. Paradoxically, the Anthropocene is the result of the human impact on the earth, however, it is apparently beyond individual, and probably, even technological control. Just as there has been the emergence of a global environmental and social consciousness there has been a dawning suspicion that the wicked problems of the Anthropocene may elude our technological solutions resulting in planetary anxiety and neurosis. I have undertaken a number of novel approaches to teaching creative technologies in order to explore positive teaching methods with the ambition to liberate students, and ourselves from cognitive and physical paralysis and to open metaphysical boundaries for future innovative research and creativity. Over the course of the past 4 years I have experimented with numerous approaches to assist students in coming to grips with this and other intransigent problems that trouble humanity and nonhumanity alike. Despite the fact that many of these problems relating to the Anthropocene are over 60 years old, wave after wave of student graduates have failed to critically address design innovations and entrepreneurial opportunities that might ameliorate human impact or contribute to sustainable businesses. The military-industrial-academic legacy of creative technologies suggests a wider exposure of education to the pathologies of cyber weaponry. Known as the Great Acceleration of the Anthropocene, exponential technological growth may correlate with the worst excesses of human production, consumption and waste. Through the multidisciplinary Bachelor of Creative Technologies I seek to provide students with the cognitive skills to imagine alternative worlds and speculative futures that enable students to escape the 'transparent cage' and the weaponisation of education. The limitations and successes of student projects will be reviewed and critically assessed in order to provide insights into opportunities for novel pedagogical methods in addressing sustainability and wicked problems.

Keywords: Post Anthropocene; Speculative Realism; Object Orient Ontology; Sustainability; Future Worlds.

1. Introduction

This paper documents the philosophy and methods behind teaching creative technology undergraduates with respect to the theme of the Anthropocene. Over the course of the past 4 years I have experimented with numerous approaches to assist students in coming to grips with this and other wicked problems that trouble humanity and nonhumanity alike. At times this paper will take a personal, somewhat auto-ethnographic approach, intended to assist the reader with the context of my experiments. Due to the limitations of space I will provide a brief summary of student projects that will illustrate how speculative methods have helped students think and design projects considering current and future design challenges using speculative theoretical frameworks.

Despite the fact that many of these problems relating to the Anthropocene are over 60 years old, wave after wave of student graduates have failed to critically address design innovations and entrepreneurial opportunities that might ameliorate human impact or contribute to sustainable businesses. It would appear that design thinking with it emphasis on critical reflexivity has been inadequate to the task of addressing what appears to be the insurmountable problem of humanity's anthropogenic and pathological impact on the earth system. Indeed, philosophically we are now being challenged by thinkers who state that the human perspective must accept a place alongside the astronomically large collection of nonhuman objects that sense the universe in their own alien and mysterious way (Bogost, 2014; Harman, G. 2017; Shaviro, 2014).

While critical thinking can offer a method of evaluating some of the causes and symptoms of our anthropogenic impact a number of philosophers and theorists have begun to critique the legacy of Kantian correlationism and the Enlightenment's current hold on our imagination in the 21st century. Speculative realism, and more specifically Object Oriented Ontology, or OOO, have begun to gather support from those who point to the shortcomings of anthropocentric social theory and scientism. Speculative realists such as Harman, Meillassoux, Bryant, Morton, Bogost and Shaviro regard the likes of Kant, Hume and Descartes as the architects of our 'transparent cage' (Meillassoux, 2017). My concern has been to not only free students from a

suffocating sense of helplessness but to explore novel means of unlocking the cage. My pedagogical approach has been to explore creativity, humour, speculative design and philosophy in the hope of exposing the cognitive bars of our imprisonment. These playful 'experiments' align closely with practiced based research methods and have begun to reveal insights into a new symbiosis between our species and the alien majority of nonhumans that occupy the multiverse.

This transdisciplinary re-imagination of reality is not only essential for our sanity but must be assisted by future generations charged with what Donna Haraway calls 'response-ability'. The Anthropocene demands a response from those who could apply their creative abilities in a responsible way. As Haraway warned there are two fatal paths many have chosen in response to the Anthropocene: 1) childish technofixes, the terra-transformer geoengineering of Hollywood fantasies or 2) the self-defeating, if not suicidal, inaction of critical and cynical academic theorists or scientists who declares it is too late to do anything (2016). These two paths have been popularised through the media, including the Internet and are common popular responses. Haraway insists we should 'stay with the trouble' through 'sympoiesis', mutual making, as opposed to autopoiesis, self-making 'worldings', imagining new worlds for livable futures, 'becoming-with' our nonhuman kin. She uses creative speculative futures to reimagine the past, present and future by dispensing with the Anthropocene and replacing it with the Chthulucene, a subterranean and watery epoch bound to fictional monsters and primitive symbionts, such as "choanoflagellates, microscopic aquatic creatures whose body type and genes place them right next to the base of the animal family tree" (McGowan, K., 2016). Haraway offers us a third speculative path, what she describes as SF, an acronym that encompasses 'string figures, science fact, science fiction, speculative feminism, speculative fabulation' (Haraway, D., 2016). Haraway writes "The Anthropocene marks severe discontinuities; what comes after will not be like what came before. I think our job is to make the Anthropocene as short/thin as possible and to cultivate with each other in every way imaginable epochs to come that can replenish refuge." (Haraway, 2016). To her list I would add speculative realism, speculative fabrication, and speculative design, thinking by making, and making by thinking, a playful approach to 'staying with the trouble' that Haraway would approve, and theorist, such as game designer and philosopher, Ian Bogost (2012), encourages. We are charged with the responsibility of researching, imagining, and teaching about future worlds in the post Anthropocene.

The speculative realists go beyond just reintroducing us to the importance of botanical and biological storytelling by delving into the secret lives of objects, things, and units; a new materialism that includes every *thing*: fictional realities; quarks; and pogo sticks, to copy a typical absurdist list perfected by Bruno Latour. Bogost asks "Why do we give the dead Civil War soldier, the guilty Manhattan project physicist, the oval-headed alien anthropomorph, and the intelligent celestial race so much more credence than the scoria cone, the obsidian fragment, the gypsum crystal, the capsicum pepper, and the propane flame? When we welcome these things into scholarship, poetry, science, and business, it is only to ask how they relate to human productivity, culture, and politics." Bogost shouts, "We've been living in a *tiny prison of our own devising*, [emphasis added] one in which all that concerns us are the fleshy beings that are our kindred and the stuffs with which we stuff ourselves." (2012, Kindle Locations 107-110)

There appears to be an urgent necessity for significant numbers of educators, politicians, and entrepreneurs to begin creative and radically alternative ways of looking at how we live with the nonhumans of this planet.

Speculative realism and OOO are philosophical frameworks to consider how we might provide students and others the tools for our attempted escape from a prison guarded by Latour's 'epistemological police' (Harman, 2017).

2. The Reality of the Anthropocene

While there were earlier insights, prior to this new millennium, even before the Russian scientist Vedansky (1926) in the early 20th century, it was the concerted effort of the International Geosphere-Biosphere Programme scientists that revealed the astounding and dramatic impact of homosapiens on the earth. The geologists Paul Crutzen and Eugene Stoermer are credited with the modern coinage of the word in 2000. In a short peer reviewed article in Nature, The Geology of Man. Crutzen traced the beginnings of human impact back to the beginnings of the industrial revolution with a litany of anthropogenic disasters, and the dire warning that there has been a recent acceleration in the onset of the Anthropocene. He wrote "Unless there is a global catastrophe — a meteorite impact, a world war or a pandemic — mankind will remain a major

environmental force for many millennia. A daunting task lies ahead for scientists and engineers to guide society towards environmentally sustainable management during the era of the Anthropocene." (2002, p.23). I would add to his list designers, artists, and speculative futurists.

There has been a surprising and growing consensus between the Earth Systems' scientists who completed an extraordinary thirty year project before they concluded their anthropogenic theory. They have been followed by the traditionally slow moving geologic community who are close to a consensus that we are now in a new geological epoch, the Anthropocene, which is notably marked by the 'great acceleration' of 1945.

I will not present in detail the arguments for and against the title and theory, 'the Anthropocene', described by some as a new epoch (see Ian Angus, and Donna Haraway for a discussion of the name). The name is useful as it has been recognised by a wide range of scientists, artists, and social theorists. It follows the relatively stable climate of the past 10,000-12,000 years of the Holocene. Here I present a short list of impacts to give some weight to the gravity of the problems we have caused and to set the stage for my main focus of this paper, how I have set about coming to terms with the impending existential crisis and the tools I am trying to provide to my students who are learning creative technologies.

Here are just some of the features commonly related to the Anthropocene.

- A tenfold human population growth in three centuries.
- Maintaining 1.4 billion methane-producing cattle.
- Exploiting 20–50 percent of Earth's land surface.
- Destruction of tropical rainforests.
- Widespread dam building and river diversion.
- Exploitation of more than half of all accessible fresh water.
- A 25 percent decline of fish in upwelling ocean regions and 35 percent in the continental shelf.
- A 16-fold increase in energy use in the twentieth century, raising sulphur dioxide emissions to over twice natural levels.
- Use of more than twice as much nitrogen fertilizer in agriculture as is used naturally in all terrestrial ecosystems combined. Increasing atmospheric concentrations of greenhouse gases to their highest levels in over 400,000 years.
- The sixth mass extinction on earth. The first to be caused by a biological species.
- A thin layer of radionuclides from nuclear weapons testing is now spread all of the planet. (Angus, I., 2016, Kindle Locations 504-507)

3. Philosophical Traps

Why is it that for sixty years educators have been aware of a deep groaning pain coming from our planet buried deep in the chthonic strata, and still our graduates have ventured forward to create businesses and innovations that do not relieve the pain. The efforts of the few to salve the welts caused by vicious mineral extractions are overshadowed instead by the majority that have contributed to the growth of a global economy that have accelerated these savage attacks. As educators we must ask, were we unaware? Did we deny the harm? Did we not care? Or were our pedagogical means inadequate to the task?

One possible root causes may be that educators assumed a social responsibility to the neoliberal goal of economic growth based on a 19th century Malthusian belief in scarcity and the economic fallacy of 'survival of the fittest'. These ideologies or paradigms go back much further, even before the Enlightenment, and the birth of liberalism. The radical political and epistemological philosophy of the Enlightenment began to settle into a reified strata that has fossilised our thoughts in the past. While some social theorists and Earth Systems' scientists may argue that the Anthropocene began with the advent of industrialisation, as early as the invention of the steam engine in 1784; others have argued that the troubles began with the Mesopotamians, the fertile crescent, and the invention of agriculture at the beginning of the Holocene. Jared Diamond claims that agriculture was the 'worst mistake humanity ever made' and Timothy Morton (2018) claims we are still Mesopotamians, while Bruno Latour claims, "We Were Never Modern". Latour argued modernity attempted to split reality into two halves, human and nature. The human was conceived as multifaceted and complex, whereas nature and the material was only ever allowed to be singular and simple (Bogost, 2012). In his final expression of his philosophy, Alfred North Whitehead, in *Process and Reality* (1929) set out to overcome this

epistemological bifurcation of nature. Whitehead argued that there are two sides to reality, the world's phenomenal appearance, and the hidden physical reality beyond the human senses. He set out to rebut Immanuel Kant's eighteenth century claim that "phenomena depend upon the mind to exist" (Braver 2007, p.39). It is this assumption, above all, that speculative realism seeks to overturn." (Shaviro, S., 2014, Kindle Locations 132-134)

A growing body of Earth System scientists, geologists, and social theorists are not just petulantly blaming their parents for the mess we are in, but their parents, parents, parents etc., preceding us by 12 millennium. More recently a new community of philosophers, the speculative realists, have been pointing the finger at the patron saints of contemporary philosophy, Rene Descartes and Immanuel Kant. Of course, this is unfair as they tried to battle their way out of the paper bag that an oppressive politico-religion had fabricated for Western philosophy in the service of the powers that be. Eventually, the paper bag turned into what the speculative realist, Meillassoux described as 'the transparent cage' (Meillassoux, 2017).

In the early part of the 21st century the speculative realists, and the OOO, or object oriented ontology, have been supported by technologically savvy philosophers and software theorists such as Ian Bogost, Benjamin Bratton, Alex Galloway, and Ed Finn. Since the GFC of 2008 there has been a decisive shift of mood amongst critical theorists, some educators, and public opinion in general, from technological optimism towards a dark scepticism about the Internet and information technology (Bratton, 2016). The rise of Donald Trump and American escapism; the Russian state sponsored cyber attacks; and the improper use of Facebook data by Cambridge Analytica that exposed 83 million Facebook users, are just a few examples of recent events that have troubled our students.

Coinciding with the Great Acceleration, information technology developed during the first Cold War, and supported by what became known as the US industrial-military-academic complex, provided the infrastructure to support global consumer economics. This weaponisation of education and the global spread of US platforms such as Google, Facebook, Twitter, Apple, and Microsoft, to name a small handful of American multinationals, has infected the planet's education and our cognitive capacity to imagine alternative worlds and preferable futures (Rive, 2018, unpublished).

4. Speculative Futures

Creative technologies embrace speculative design and the positing of 'what if?' (Connor, A., & Sosa, R., 2018). This can be seen in contrast to what Dunne & Raby has described as 'affirmative design' that is typified by commercial design that contributes to the near future, 'faster, better, cheaper' (2013), or innovation as defined by the OECD Oslo Manual (2005). The shortcomings of mainstream design and the apparent failure to avert the onset of the Anthropocene, and the immanent effect of multiple environmental and existential crises, suggests that alternative, preferable, or even dystopian futures can frame questions that have been neglected by the technological 'closed worlds' of the past (Edwards, 1997). Creative technologies aspire to break out of the 'transparent cage' of neoliberal capitalism, and to provide cognitive tools that can reimagine a 'universe of things' within a flat and democratic ontology. Dunne & Raby in their book, Speculative Everything: design fictions and social dreaming (2013) point to Fredric Jameson's claim that "it is now easier to imagine the end of the world than an alternative to capitalism." (p.2). Design's affirmative objectives, that have sought solutions to problems, have appeared to make the big problems worse. "Design's inherent optimism leaves no alternative but it is becoming clear that many of the challenges we face today are unfixable and that the only way to overcome them is by changing our values, beliefs, attitudes, and behavior." (p.2) Creative technologies is sensitized to design's cheer leader approach, and assumes that "Design speculations can act as a catalyst for collectively redefining our relationship to reality." (p.2)

These are but a few suggestions to inoculate students against the viral attack of mainstream design, and the insidious threat of algorithmic cyber warfare that is spreading throughout the Internet, to the point that we face the weaponisation of education. In Finn's analysis of the pervasive influence of algorithms he argues that these now define and constrain our cognitive processes (2017). This is supported by Galloway (2004) who cites both Foucault and Deleuze in his claim that we now live in a 'protocological' world controlled by information and communication protocols. Galloway demands that we must decode these hidden protocols in order to free our minds from these controls, writing that, "You have not sufficiently understood power relationships in the control society unless you have understood "how it works" and "who it works for." (2004).

Speculative realism offers a radical philosophical challenge to allow us to dream beyond the Anthropocene and to envisage a world whereby nature and culture are no long divided by the dangerous mindset of consumer economics. The speculative realist, Graham Harman extends Latour's 'parliament of things' to encompass a 'democratic ontology' that equates the reality of all things both human and nonhuman while acknowledging that this in no way implies a symmetry of power, or existential equality of things (Harman, 2014).

5. Design Futures

One of the first learning outcomes that we pursue in the Bachelor of Creative Technologies is critical reflexivity. Over and above this course prescriptor is the New Zealand Education Act (1991) that states that our universities are charged with the responsibility to be the 'critic and conscience of society'. Yet, despite this clear legal demand on universities and scholars in New Zealand, and indeed, around the world, we have not managed to either persuade, or instruct society; its politicians; its business leaders; or our students about how to live harmoniously with each other, and the massive nonhuman population of the planet, or indeed the universe. The world has begun to wake up to the perpetual nightmare that our species may have caused irreparable damage to the planet and our nonhuman co-inhabitants. Our students may well have learned critical reflexivity but have these cognitive skills helped them to ameliorate the harm they have designed once they have graduated? For those of us in the so-called 'developed' world we all share the shame and the responsibility for the approaching existential crisis caused by anthropogenic global warming. According to the Earth scientist, Paul Cruzen, environmental problems such a acid rain, photochemical smog, and global warming have "have largely been caused by only 25% of the world population." (Angus, I., 2016, Kindle Locations 508-509). As Donna Haraway puts it "expressing an explicit "game over" attitude that can and does discourage others, including students, is facilitated by various kinds of futurisms." (2016, pp. 3-4). Haraway points out that there is a disturbing discourse amongst both experts and popular discussion that gravitates towards either technocratic geoengineering fixes or wallows in despair that 'coinfect any possible common imagination" (2016, p.56). Clearly, many of our past pedagogical methods have either: not been up to the task, simply ignored the problems, or worse, contributed to this crisis. Is Timothy Morton correct, because global warming is now happening, that we face 'the end of the world' as we know it (2013), or can we make a positive contribution through speculative design; playful experimentation; and building preferable future worlds.

In an effort to explore new possibilities I have been experimenting with various pedagogical techniques with the humble expectation that any possible success may never be known or attributable to those experiments. Graduates may never remember or credit their future designs, and businesses with their university education, I personally do not recall many of my own learning outcomes, although they were undoubtedly influential on my future decisions. My return to university research after thirty years in the screen industry, and my experience of start-ups has led me to investigate speculative design as a possible means of re-imagining the future. I have chosen some of my favourite speculative student projects to illustrate innovative approaches to wicked problems.

6. The Future of Design Management

In the late 90's I had realised that my advertising editing business was under attack by a fragmented media market, and the looming threat of the Internet. I pitched a global solution to Saatchi & Saatchi's Worldwide to enable virtual creative collaboration in a virtual world between all of their offices and their clients (Rive, 2008). The first facility was planned for their HQ in Manhattan. 9/11 brought an end to that, however, it inspired me to undertake twenty years of research into creativity, innovation, and world building, including a doctoral thesis on the subject (2012). At the time of my university research I had taught Design Futures and contributed designs and builds in virtual worlds. During these adventures I designed a number of worlds; some virtual, some conceptual, including virtual educational islands, sci-fi and fantasy screenplays, and executive produced a 3D animation feature in China.

Teaching Design Management was my first job at AUT. The students were business undergraduates studying with a design major. I was immediately struck by a general lack of imagination and creativity and concerned about their ability to eventually manage designers and the design process. Innovation is heavily dependent on creativity, and the successful design process requires the designer to imagine a future reality, something that does not yet exist.

Initially, I taught traditional design models of innovation, however, while these theoretical models seemed valid they did not address the creative praxis of modern design, i.e. 'plural, distributed, and collaborative' (Mau, 2004). The students who presented case studies of successful companies observed co-design and human centred design first hand, but they were in desperate need of a more playful practice based research.

To appreciate design practice and creative collaboration they needed to get their hands and brains dirty! They needed to build worlds and strange objects from scratch; they needed to speculate about futures worlds; they needed to ignore their teachers who had imprisoned their minds in a single unitary world, the global extractive consumer economy.

7. Pedagogical Review

In conclusion, I will review some of the successes and limitations of my teaching experiments. The course, Design Futures, was modified to be near future focused with some discussion about megatrends such as GRIN (Genetics, Robotics, Information Technology, and Nanotechnology). Simply by getting the students to envisage a hypothetical company 3 years into the future there was a significant improvement in the quality of ideas, creativity, and innovation. There were also some interesting examples of environmentally sustainable projects, such as 'GreenAir' designed to reduce 'negative environmental effects that building can have on a site's imminent surroundings'. One of the noted limitations of this near future approach was that students failed to fully comprehend the accelerating exponential rate of change (Kurzweil, 2005) and so many of the projects were relatively pedestrian based on linear assumptions.

This encouraged the evolution of new teaching approaches that explored design utopian and dystopian futures in the next ten to twenty years. Students were required to create infographics, and essays based on their research, and to research with brainstorming and collaborative online tools such as MindMup. The creative quality of the student work once again improved significantly with one example contemplating the future business opportunities of robotics for an ageing population while considering the unintended consequences of AI warfare, and the future fate of humanity. As they cited in their report, "Human beings of tomorrow may not be human at all. They may be artificial designer humans or some combination of humans and machines" (Waslekar, 2011). It appeared that the more speculative the design brief, the more the students were able to imagine alternative futures that considered social, environmental, and economic innovations. On reflection the student assignments and classes were limited to more theoretical than practice based research.

While it is still important to provide students with a theoretical framework for their design praxis, constructivist team coursework included a film assignment based on speculative and playful design concept, the 'SPIME', invented by eco-activist and science fiction writer, Bruce Sterling. In his design manifesto, Shaping Things, (2005) Sterling explains his neologism, "The SPIME is a set of relationships first and always, and an object now and then. The key to the SPIME is identity. A SPIME is, by definition, the protagonist of a documented process. It is an historical entity with an accessible precise trajectory through space and time. A SPIME must therefore be a thing with a name. No name, no SPIME." (2004, p. 77) Sterling's concept was based on the widely read ecological book by McDonough, W., & Braungart, M. (2009), *Cradle to cradle: remaking the way we make things*. Sterling created a conceptual design for designing things by incorporating RFID track and trace technology that would allow anyone to interrogate a 'thing', understand who made it, from what, when, how and even why? SPIMES are networked, connected to all knowable things; are capable of sensing multiple inputs; contain a record of all ownership; and are made from synthetic eco-matter capable of composting itself while communicating all of this known metadata (2004). A SPIME was designed to foster social, economic, and environmental responsibility. The students were asked to complete a short film based on the speculative design of a SPIME. This conceptually challenging assignment required that students creatively collaborate, research and physically create a design project that imagined a preferable world. The result was a successful collection of short films by business students (with little film experience), and first year creative technology students. The outstanding examples included films about a swarm of 'bioplastic' drones, known as Bumble, that replaced dead bees killed in a speculative environmental disaster; and a Augmented Reality device that allowed consumers to review the history, origin, material, and manufacturing ethics of clothing before they decide to buy. The limitation and strength of this project was that the design principles were so novel to most of the students that they struggled with radical speculation and tended to design commercial prototypes.

Virtual worlds provide an interesting platform to experiment with creative collaboration and allowed the business students to research co-design with creative technology students. An assignment on co-design provided a focus for students to use a mixed reality, physical and virtual environment to observe and test designs of studios on students who were studying creative technology. Interestingly, the creative technology students were not given an assignment to use the virtual world, Second Life, and despite a majority admitting enthusiastic use of Minecraft before university, they were sceptical of the Second Life platform. The business students showed more enthusiasm for the platform. This limitation supported earlier research that had shown that for students to explore speculative design they must either embrace the technological affordance or overcome their prejudice through incentives such as graded assessments using these technologies.

Due to the course description of the business degree with a design major there were notable limitations of time and content that could be taught. There was more success with greater freedom and experimental flexibility in the undergraduate degree in creative technologies due to the Studio format. In an open plan design studio students were introduced to the concept of the Anthropocene and were given freedom to design any project, with any technology based on the theme of Future Worlds. The studio was almost entirely practice based except for an introductory lecture on how to apply the cinematic arts to a design project, and the concept of speculative design. The students were introduced to the programme leaders for a project at USC, (University of Southern California), Spaceship Earth 2050. The students studying creative technologies at AUT in New Zealand used the USC project as the foundation for their self defined brief. This studio programme provided clear evidence that practical speculative design projects can provide a powerful teaching experience for students to imagine preferable futures and engage in playful 'what if?' research questions that can assist in revealing the 'transparent cage' and limitations of mainstream cognition and design praxis. Collaborative student projects included speculative film projects that included virtual and physical scenarios that considered brain uploads with unintended consequences, this was produced a year before the Netflix series, Altered Carbon; and a virtual identity hack where a boyfriend has his life ruined by a jealous girlfriend who controls his avatar. One team created an AR (augmented reality) model and animation of a future city in the Maldives that allows the citizens to remain in the islands in a floating city that rises and falls with the sun; and a solo student project that created a dystopian interactive audio installation based on factual research into a victim of abuse, set in the future when rising water levels has made the city a watery ghetto. One team created a game trailer that used a vintage 8 bit game design to depict the moral dilemmas faced by those affected by global warming. The limitation of this practice based studio was that the students did not do sufficient research into some of the theoretical underpinnings of the Anthropocene in their impatience to begin making. There have been discussions with colleagues about a more integrated approach to mixing theory and practice.

Finally, I will describe a personal speculative research project that has informed my teaching of creative technologies. I undertook research into e-waste (electronic waste) based based on reflection with regards my decommissioned editing business. It entailed a literature review, an IoT (Internet of Things) electronics project that connected a hacked printer/scanner to the Internet; and a DJ/VJ installation and performance using video performance software, VDMX. This informed my teaching and provided me with practical examples of my research to inform students of the huge social, economic, and environmental costs in a high impact emotional and humorous way (Rive, 2017). My research successfully informed student film and design projects based on the e-waste theme to communicate questions and propose possible future solutions.

This brief review of my experimental teaching methods over a 4 year period illustrates how an increasingly speculative approach resulted in more creative and engaged student projects. The design challenge of considering wicked problems that may not have a technological solution, such as the Anthropocene, requires educators to reflect on the educational deficiencies of the past with respect to equipping design innovators and entrepreneurial graduates with the cognitive skills and practical abilities to create preferable futures for a planet in an existential crisis. Speculative design, supported by the philosophical pragmatism of speculative realism and OOO have been useful approaches to consider the design challenges of the future.

References

Angus, I. (2016). Facing the Anthropocene: Fossil Capitalism and the Crisis of the Earth System (Kindle Locations 508-509). Monthly Review Press. Kindle Edition.

Bratton, B. H. (2016). The Stack - On Software and Sovereignty. Massachusetts: MIT Press.

Bogost, I. (20?) Alien Phenomenology, or What It's Like to Be a Thing (Posthumanities) (Kindle Locations 131-134). University Press of Minnesota. Kindle Edition.

Bongaarts, J. (2009). Human population growth and the demographic transition. Philosophical Transactions of the Royal Society of London B: Biological Sciences, 364(1532), 2985–2990. https://doi.org/10.1098/rstb.2009.0137

Dunne, A., & Raby, F. (2013). Speculative Everything: Design, Fiction, and Social Dreaming. The MIT Press.

Edwards, P. N. (1997). The closed world : computers and the politics of discourse in Cold War America. Cambridge, Mass. : MIT Press, 1997.

Estrada, A., Garber, P. A., Rylands, A. B., Roos, C., Fernandez-Duque, E., Fiore, A. D., … Li, B. (2017). Impending extinction crisis of the world's primates: Why primates matter. Science Advances, 3(1), e1600946. https://doi.org/10.1126/sciadv.1600946

Haraway, D. (2016). Staying with the Trouble: Making Kin in the Chthulucene (Experimental Futures) (pp. 3-4). Duke University Press. Kindle Edition.

Harman, G. (2017). OBJECT-ORIENTED ONTOLOGY: a new theory of everything. S.l.: Pelican.

Kurzweil, R. (2005). The singularity is near: when humans transcend biology. New York: Viking.

Latour, B. (2004). Politics of nature : how to bring the sciences into democracy. Cambridge, Mass. : Harvard University Press, 2004.

Mau, B., Leonard, J., & Institute without Boundaries. (2004). Massive change. London: Phaidon.

Marx,K. Capital, trans. Ben Fowkes (Harmondsworth: Penguin, 1990), 1:283–84 (chapter 7).

McGowan, K. (2016). "Did Bacteria Drive the Origins of Animals?". Retrieved March 24, 2018, from https://www.quantamagazine.org/did-bacteria-drive-the-origins-of-animals-20140729/

Meillassoux, Q., Brassier, R., Badiou, A., & Bloomsbury Publishing. (2017). After finitude: an essay on the necessity of contingency. London [etc.: Bloomsbury Academic an imprint of Bloomsbury Publishing Plc.

Morton, Timothy. (2018) Dark Ecology: For a Logic of Future Coexistence. Columbia University Press. Kindle Edition.

Morton, T. (2013). Hyperobjects: philosophy and ecology after the end of the world. Minneapolis : University of Minnesota Press

OECD. (2005). Oslo manual: Guidelines for collecting and interpreting innovation data (3rd ed.): OECD Publishing Eurostat.

Rive, P. B. (2008). Knowledge Transfer and Marketing in Second Life. In P. Zemliansky & K. St. Amant (Eds.), Handbook of research on virtual workplaces and the new nature of business practices (pp. 424–438). Hershey PA: Information Science Reference.

Rive, P. (2017). E Wastrels and Eco-disasters: Speculative Design, Innovation and Global E Waste. 12th ECIE Conference Proceedings.

Rive, P. (2018) Virtual Worlds & the Weaponization of Education. Unpublished.

Shaviro, Steven. (2014). The Universe of Things: On Speculative Realism (Posthumanities) (Kindle Locations 738-744). University of Minnesota Press. Kindle Edition.

Sterling, B. (2005). Shaping things. Cambridge, MA: MIT Press.

Waslekar, S. (2011). Big Questions of Time. Retrieved August 27 2015 from https://autonline.aut.ac.nz/bbcswebdav/pid-3492606-dt-content-rid- 6344542_4/institution/Papers/DESN704/Publish/67141BQOT.pdf

Whitehead, A. N. (2014). Process and reality. Free Press. Retrieved from http://www.myilibrary.com?id=893479

Social Networks and Internal Corporate Communication: Help or Hindrance?

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Abstract: An innovative, forward-looking organization has a different kind of internal structure, different Marketing and a different way of processing things. Innovative organizations have methods and processes that help them avoid stagnation. In the 21st century we have embraced a whole new technological world. Communicating through social networks is a new phenomenon and organizations must follow this trend, otherwise they will not endure. Companies need to be close to clients and the best way to achieve this is by exploring the new tools that online social media provide (social media includes e-mail and social networks and other such applications). The way people are exposed to information and publicity suffered a real change, as nowadays almost everything is also advertised online. Internet usage and social networking will be the focus of this article. The main research question of this paper is: what is the impact of using social networks on the performance and competitiveness of organizations? This question is relevant since almost every company has access to the Internet, as do their employees. Social networks may also be used for professional purposes as networks that connect everyone to expedite and facilitate communication. On the other hand, social networks may influence productivity negatively. To better discuss the main issue, we will use a Portuguese company as a case study. Thus, we interviewed an employee at BRABBU – the head of the BRABBU Press & Communications department – to establish patterns in the usage of social networks for internal communication during working hours. BRABBU is an award-winning company which won the Best Viral Instagram award, in January 2018, attributed by the Maison et Objet. Furthermore, a sample of the general population was surveyed (we received 352 answers to the survey) to deepen the study of this topic and so as to ascertain whether people think that online social networks help or hinder business performance. The result was clear: social networks may be a great help for internal communication, but this does not replace human contact. Finally, this usage of social networks in the work environment has to reach a consensus amongst the younger generations (e.g. millennials, in favour of this usage) and older ones (e.g. baby boomers, not so receptive to new technologies).

Keywords: Innovation; Strategy; Internet; Social Network; Competitiveness; Internal Communication.

1. Introduction

Technological innovation has changed direct communication. Online communication through social networks (such as Facebook, Instagram, WhatsApp, LinkedIn, Twitter and Google +) has replaced much of conventional face-to-face communication. We can communicate with a person that is on the other side of the world while we, at the same time, see their image; and we can now be connected to each other 24 hours a day and seven days a week to share information. The use of smartphones and the ease of accessibility to technology has nurtured this reality. Social networks play a very important role in society, and statistical data indicates that in 2018, 3,196 billion people (approximately 42% of the world population) use social networks (Chaffery, 2018).

Can communication through social networks have the same importance in companies (communication between employees) that it has in society at large? Should employees be allowed to use social networks during work hours? Does this interfere with a company's competitiveness? We will discuss these topics throughout this article.

At a time when the competitiveness of firms in a number of industries is at a peak many companies have chosen to block access to social networks during work hours. However, we shall discuss how this may hinder more than help competitiveness. People have a need to be online and to communicate and firms would do well to embrace this need by granting access to social media during work hours. Openness, rather than prohibition, is the answer that our research favours. It is up to senior leadership in corporations to make sure that social media is used wisely and appropriately, to the firm's advantage. This may well involve having employees use WhatsApp to communicate between themselves as well as using Facebook to post important firm messages.

Social media, as discussed herein, refers to the digital world and to "a number of applications […] to connect […] potential knowledgeable informants who could assist with providing information and data" (Remenyi and Greener, 2016, p.vi).

After the literature review, the paper has a series of topics about the research, the survey and the interview that have been performed. The article finishes with a section where the group discusses all the research findings and much of the information found in the literature. Communication through social networks, especially at work, is not a topic of global consensus, since the opinions are divided about its benefits and disadvantages.

2. Literature Review

Social networks in the business context are mainly present in two ways: external communication and internal communication (Leonardi, Huysman and Steinfield, 2013). In the first instance, companies use social networks to introduce themselves to their customers and tailor their products to their needs. In the second instance, the subject of this article, social networks are present as a way for internal communication between workers, and for social interaction within the company. According to (Leonardi, Huysman and Steinfield, 2013), the concept of social media in the business context is as follows:

> *"Web-based platforms that allow workers to (1) communicate messages with specific co-workers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular co-workers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing."*

Social networks may have several uses. However, when inserted in different environments, do they continue to have the same type of use and motive? Or depending on the context will, in this case, workers know how to distinguish these motives? The questions go beyond the functions and hierarchies of organizations. Are social networks an amplifier of knowledge, allowing it to be transmitted more quickly and intuitively? Or can it be an inhibitor of work, contributing to procrastination, and be a source of distraction for workers?

The evolution of Web 2.0 has allowed online applications to be used more transversally. The Internet is seen as a platform above the level of a single device (O'Reilly, 2018). According to O'Reilly (2006), cited by (Badea, 2014) "Web 2.0 is the business revolution in the computer industry caused by the move to the Internet as a platform, and an attempt to understand the rules for success on that new platform". Several social networks have emerged, and virtual communication has become more developed and attractive; not only for individuals but also for companies. On this account, applications have been created within social platforms that allow companies to sell their products and to be closer to their customers. Nowadays, people are usually users of more than one social network, with different purposes, and companies follow this trend, establishing a strong online presence. Social networks have changed the way society communicates. Sharing information and knowledge among different groups of people is one of the main reasons (Baruah, 2012). People feel closer to each other, as well as companies to their clients, establishing virtual relationships and interacting with each other; that is, a more active communication exists and, in this moment of evolution, all in real time.

We live in an era of instant messaging, of the posting of live videos to broadcast events; anyone around the world may know what we are doing at any given precise moment.

In this sense, it is revealed that, in 2017, according to (GlobalwebIndex, 2018), on average, 135 minutes (2 hours and 15 minutes) per day were used for the application of social networks worldwide, and this use has been growing steadily since 2012. The number of people active in social networks in January 2018 was 3,196 billion (42% penetration rate) in a universe of 4,021 billion (53% penetration rate) of Internet users (*2018 Digital Yearbook*, 2018).

Even in more remote countries and continents, such as Africa, the Internet has had an important impact. Though superior Internet access and connectivity is not the rule, even so social media, including YouTube.com, has revolutionized access to information and knowledge.

Since the scenario for this study will be a Portuguese company, it is important to understand how these numbers behave in this country. Portugal is still above the world average, when compared in the right proportions. The number of people using the Internet is around 7.73 million (penetration rate of 75%), while those active in social networks point to 6.60 million (penetration rate of 64%) (*2018 Digital Yearbook*, 2018).

Yet the number of active users in social networks through mobile devices points to 5.70 million (penetration rate of 55%) (*2018 Digital Yearbook*, 2018). Thus, it may be stated that the Portuguese business context may benefit from this scenario, if a company incorporates an internal communication policy that values social networks. In 2017, Portugal ranked in position Nº44, in a ranking of 176 countries around the world, in the index of information technology and communication (GlobalwebIndex, 2018), which is seen to be quite positive.

For the present study we assume two types of communication within companies: classical communication and modern communication. The former refers to communication tools which have been used by companies for a longer period, such as e-mail, which came into being in 1978 (Nightingale *et al.*, 2008). E-mail is a formal communication mode, considered to be distant and time consuming. The excessive number of e-mails received nowadays, in the corporate context, is cumbersome and hinders oftentimes more than it helps. Thus, we are seeing new legislation appear in an attempt to curb inappropriate e-mail usage. Firms may now incur very heavy fines (e.g. €20 million or 4% of annual revenue) for not respecting consumers' privacy. The latter type of communication (what we call modern communication) refers to a more dynamic, intuitive and fast communication process, associated to new technologies and new forms of communication – social networks.

Social networks may have considerable impact on workers' productivity. According to (*How Social Media Can Boost Your Productivity*, 2016), social networks can help the employee to be engaged with the company and enhance teamwork, unlock communication barriers, allowing everyone to be informed in this way to make employees feel valued. In addition, there are specific social networks for corporate internal communication (e.g. Asana and Trello), making the feeling of loss of focus at work not so present. Social networks in the corporate context can boost workers' performance, if they are willing to do so. In a Pew Research Centre study (Olmtead, Lampe and Ellison, 2016) that delves into the use of social media in the workplace, the motives are divided between strictly professional and job-related, and other more personal usage. Thus, some care and attention to this issue is required of senior management in organisations.

A good boost to workers' performance (and an increase in productivity of the company) is present due to the use of social networks in the corporate environment and if job-related. According to (Badea, 2014) "new media increase the volume, speed and daily flux of communication, connecting people, giving them a voice and stimulating discussions on shared interests". Thus, firms need to embrace modern forms of communication as these will aid their performance, if managed properly.

3. Methodology

For this article, a mixed research method was followed (Remenyi, 2014). The authors thus performed a survey (made available online, using Google Forms, in March 2018) to know the opinion of a sample of the population about the main research question: are social networks helpful or a distraction to a company's efficiency? The survey was shared on the authors' personal social network pages as well as with the University of Aveiro community, by e-mail. We received 352 answers to the survey. The questions asked in this survey, apart from personal data, were related to the respondents' opinions about the usage of social networks during work hours and what they think about social networks as a way of promoting internal communication in companies.

Furthermore, we also interviewed an employee at BRABBU. The employee was the head of the BRABBU Press & Communications department, which involves a significant amount of quite complex decision-making in the communications area, and involving a number of different stakeholders. The interview was not performed on-site, since the interviewee was not available for that type of interaction. Therefore, we sent our interview script by email, and the employee answered all of the questions, so we can say that our interview followed quite a rigid structure. The questions asked in the interview were related to the functions that the interviewee performs in the company. We thus gathered the interviewee's opinion about the firm's organizational culture, the role social networks play in the company and the importance of social networks for internal and external communication. The reason for doing the interview – "whereby the researcher seeks to obtain data related to

the research question" (Remenyi, 2014, p.95) – was to enrich our research data and to support our argument further that social networks may be used to the advantage of firms. BRABBU was chosen as the authors had previous knowledge that they were a modern firm in the sense that they embrace new technologies and their usage in the workplace. Thus, we used a mining framework, as described in Remenyi (2014, p.945): "the researcher believes that the informant has "the answer" which is being sought". For example, BRABBU won the award for the Best Viral Instagram, in January 2018, attributed by the Maison et Objet.

4. History of the company

The *Covet Design Group "thinkers and makers"* was founded in 2003. It is a revolutionary company based in the north of Portugal. The group has 15 luxurious brands and more than 500 workers, involving 5 different business levels: Industry, media, retail, luxury design brands, and brand & design Management. They produce and trade luxury products around the world with average prices in the tens of thousands of euros. The group forecasts a growth of around 30% in 2018, reaching a consolidated turnover of 35 million euros. In 2020, with an investment of around 50 million euros, the new headquarters of the group will be built, in Covet Town, Gondomar, with a capacity for 2,500 people. The products of the group's various brands are present in about 80 countries, exporting more than 90% of the production mainly to the United Kingdom, USA, Europe, Canada, China, Latin America and the United Arab Emirates.

> *"Our clients want an experience, we design for surprise and to move them, it is like a culture." - Amândio Pereira, CEO, (Lobo, 2018).*

Boca do Lobo was the first design brand of the group, and it has developed successful businesses that elevates new design worldwide. Despite that, our work will focus more precisely on *BRABBU*, a brand that emerged in 2011 intending to design and produce pieces that tell stories from nature and the world through design. The products are handmade in Porto, Portugal, by a team of highly qualified and dedicated artisans specialized in the craftsmanship of upholstery, case goods, lighting and rugs. Their design team works together with artisans every day to ensure the high-quality standards of their pieces.

The brand aims to *"reflect an intense way of living, bringing fierceness, strength and power into an urban lifestyle (…) BRABBU design pieces are a gift for the senses. Every day our tribe of designers and craftsmen search for the most innovative materials and techniques to bring the comfort and function that your spaces deserve"* (Brabbu, 2011).

The company has showrooms in its headquarters in Porto, Portugal and in London, the UK, but the brand commercializes its products in numerous countries such as Belgium, Switzerland, Germany, the USA and Russia. *"BRABBU loves the unknown, the adventure and the challenge. Our strong inspiration on nature makes BRABBU an attitude, a powerful way of living."* (Brabbu, 2011).

5. Findings

5.1 Survey about the use of social networks

In a universe of 352 respondents 82% were female and 18% were male. This significant difference could also be related to the fact that, in the academic world, in Portugal, women are in the majority – in higher education in Portugal over 194 thousand were women and just under 168 thousand were men (Pordata, 2017).

Approximately 50% of the respondents were between 18 and 25 years old (younger millennials, born from 1993 to the turn of the century). 21% of the respondents were aged between 26 years old and 35 years old (millennials). 11.6% of the respondents were aged between 36 and 45 years old (baby boomers). 12.2% of the respondents were aged between 46 years old and 55 years old (baby boomers). Finally, the rest were over 55 years old (baby boomers). The majority of the respondents (57.7%) live in Aveiro, Portugal.

Only four (one woman and three men) of the 352 respondents (Figure 1) answered that they do not use social networks. Among these people, only one person (a woman) answered that she should use social networks. Considering the question about the social networks that they know, those four people said "Facebook". Two of them referred "Instagram", "Google +", "Skype" and "Youtube". Only one of them said "Twitter", "Badoo" and "Whatsapp". In relation to the reasons why they do not use social networks, the majority referred facts such as

"lack of interest", "difficulties in the use of social networks" and "preference for personal contact". According to this survey, only 0.28% (one person) considers social networks are not important at all.

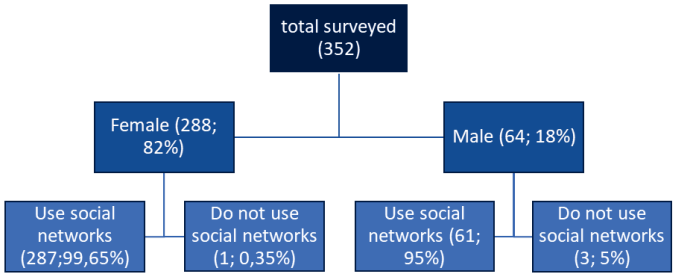
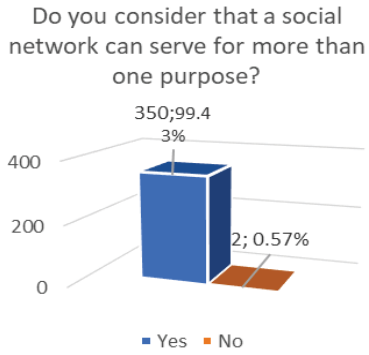


Figure 1: Total surveyed

98.9% of the people surveyed said they use social networks. The most popular social networks, according to our survey, are Facebook, Instagram, Youtube, Whatsapp and Skype.

When asked if social networks can fit more than one objective (Figure 2) 99.43% of the total people surveyed answered "Yes". Keeping in touch with the family and friends, entertainment and to search for information were the most common responses. Furthermore, two of the people surveyed referred that social networks can be used for Marketing, Sales and Promotion purposes (Figure 3). 76% of our sample said it is possible to have an efficient communication between workers through social media inside the company (Figure 4). This opinion prevails in every age group (Figure 5).



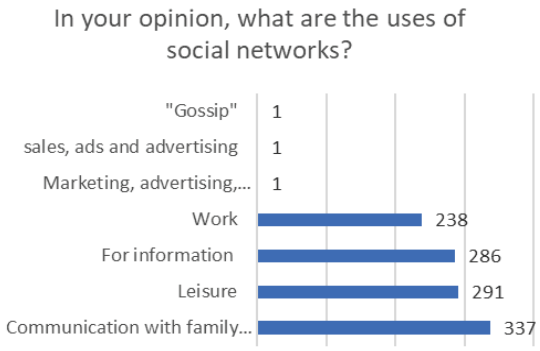
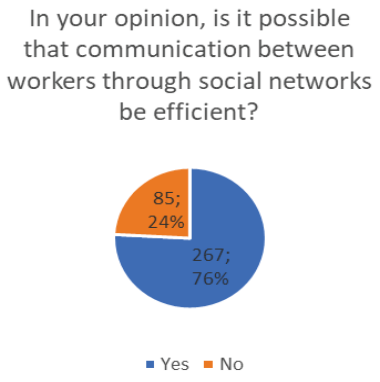


Figure 2 (on the left): Do you consider that a social network can serve for more than one purpose?

Figure 3 (on the right): In your opinion, what are the uses of social networks?



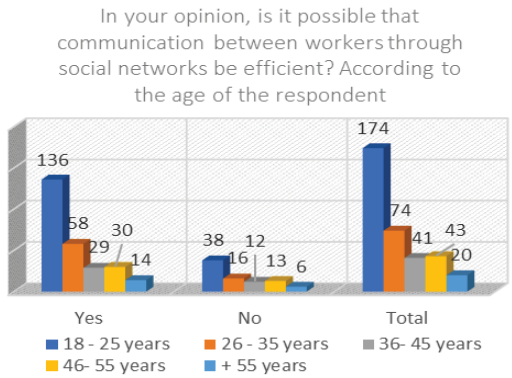


Figure 4 (on the left): In your opinion, is it possible that communication between workers through social networks be efficient?

Figure 5 (on the right): Can social networks be efficient? – According to the age of the respondent

Approximately 66% of the people surveyed think that the communication between colleagues in a company should be done personally (35.67%) or by e-mail (30.06%). In this question, only 11.93% of the people

surveyed answered Social Networks. Mobile phones (21.64%), Intranet (0.58%) and Portable Radios (0.12%) were also mentioned (Figure 6). It is important to refer that, amongst the people who referred Social Networks as a way of communication inside a company, only 35% are more than 25 years old (born before 1993), which means there is a trend for younger people (e.g. especially younger millennials) to take social networks more seriously, giving them space in business communication (Figure 7).

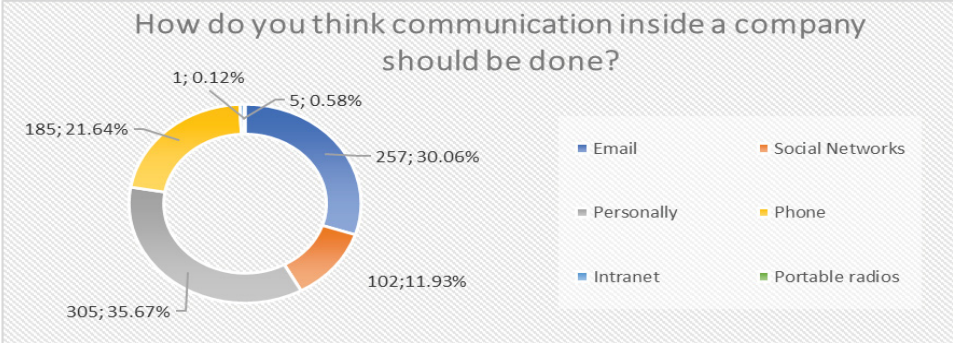


Figure 6: How do you think communication inside a company should be done?

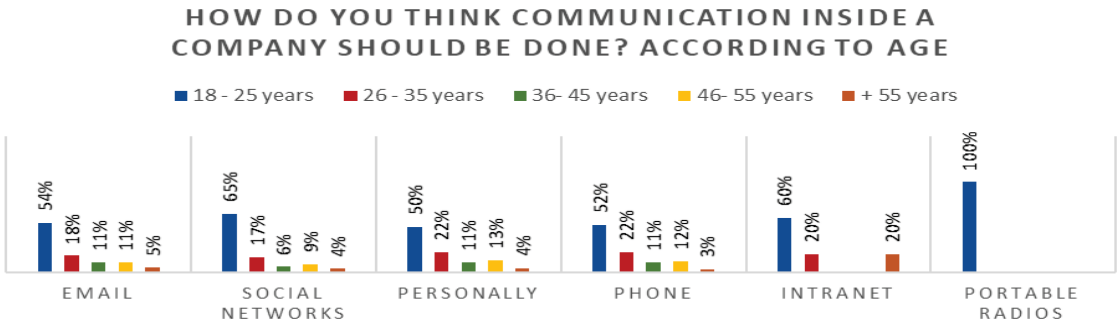
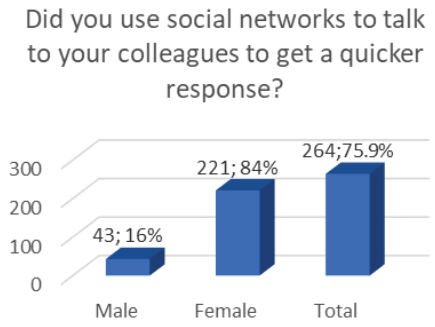


Figure 7: How do you think communication inside a company should be done? According to age.

When asked if they ever used this means of communication to talk to colleagues inside their company, 75.9% said yes (Figure 8). Facebook is the most used social network for this purpose (58%) (Figure 9).
There is no doubt that people think social networks are a great help when it comes to keeping in touch with expatriate workers (Figure 10**Error! Reference source not found.**), since 96% replied affirmatively.



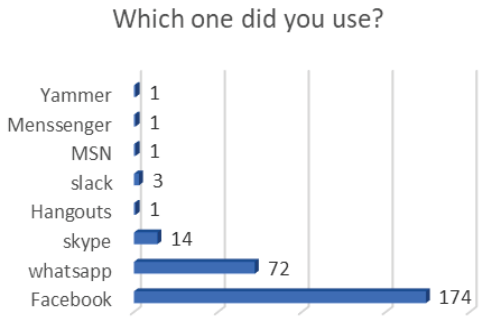


Figure 8 (on the left): Did you use social networks to talk to your colleagues to get a quicker response?

Figure 9 (on the right): Which one did you use?

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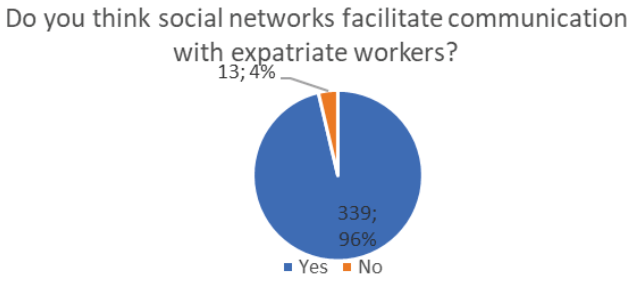

Figure 10: Do you think social networks facilitate communication with expatriate workers?

Although many people are not sure about this topic (34% of the males and 41% of the females), 50% of the male and female respondents think that Social Networks will be critical to all companies in the future. Men are surer than women, as a greater percentage of women are unsure (Figure 11).

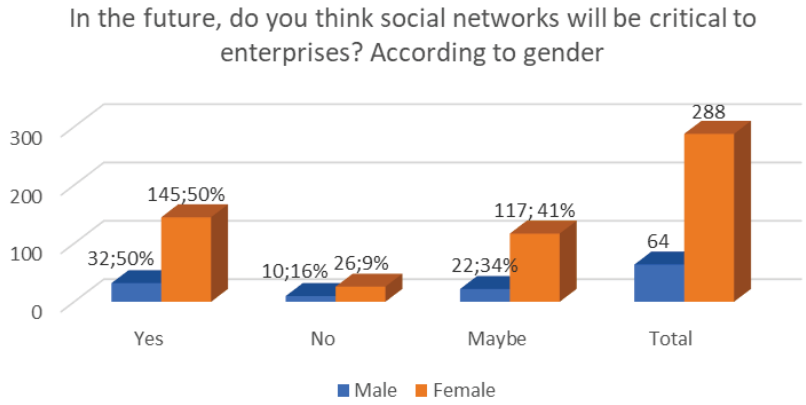

Figure 11: In the future, do you think social networks will be critical to enterprises?

In table 1 we present relevant opinions of the survey respondents about the use of social networks as a communication tool at work. Easy and effective communication, no barriers between employees, information storage, Marketing tool and good stimulation of informal and transversal communication between colleagues at different levels in the hierarchy and of different functions are some of the most popular answers, in terms of positive aspects. When it comes to negative aspects, people stated that social networks can be a distraction and, consequently, a bad tool for a company's effectiveness.

Table 1: Opinions gathered in the survey about the use of social networks as a communication tool at work.

Opinion about the use of social networks as a communication tool at work	
Positive aspects	Negative aspects
✓ Facilitates communication between developers who are working on a specific project;	× Means of distraction;
✓ Quick and effective communication;	× Tools for online communication between employees exist especially for work (example of this kind of social network: Slack) and so Facebook and Instagram should not be used (for example);
✓ Publicizing the work by creating greater consumer confidence;	× Used at work only in cases of extreme necessity
✓ Eliminate barriers between employees or companies;	× Use for other purposes
✓ Essential;	× Unnecessary
✓ Good stimulation of informal and transversal communication between colleagues at different levels in the hierarchy and functions;	
✓ Advantageous for people who are not in the same workplace, as for example in different branches;	
✓ Strong free working tool;	
✓ Enables simultaneous contact with various workers;	
✓ Information storage.	

5.2 Interviews

According to the interviewee Ana Pedro Lebre, head of BRABBU Press & Communications, it is very important to be well known in the market, to create interest. “We try to inspire the world with the latest trends, so that BRABBU Design Forces can win a place in the interior design, decoration and architecture’s world” (Ana Pedro Lebre). The Covet Group fights to keep alive Portuguese arts and craftsmanship that are almost extinct.

Besides all the design innovation, the strategy in the market takes a very important place in the group’s evolution; “the Covet Group has thinkers and makers: the ones who think about strategies and the ones who give life to all the projects” (Ana Pedro Lebre). The communication at its varied levels is still a challenge, despite of all the technological evolution. The sharing of knowledge between the different departments and even between the 15 brands of the group creates a unique synergy, essentially when we are talking about webmarketing, sales and press departments, which are fundamental for the company’s success. The importance of the Internet and social networks are undeniable for BRABBU: “Social networks are an art in the marketing and webmarketing domain. BRABBU won the award of the Best Viral Instagram in January of this year [attributed] by the Maison et Objet.” (Ana Pedro Lebre). The Internet world works well as a way for the brand to be closer to their clients: “we can guarantee that everyone who cannot be with us knows everything, and does not miss the fun” (Ana Pedro Lebre). The way news and information are exposed by BRABBU distinguish the brand by their originality and creativity, “we try to communicate in the most original ways, trying to offer daily materials and vibrant content that make us well known. We avoid communicating in a massive way. In the Press Department we try to pass the right message to the right person, which will guarantee the quality and not the quantity” (Ana Pedro Lebre). Regarding communication with the outside world, Ana Pedro Lebre thinks it is very important to consider classic communication. There are still good practices and strategies we should follow or adapt, bringing the innovation to classic methods. “One of the things we try to keep from getting old is precisely the communication channels of the brand. We always try to make both social networks, just as e-mail and e-mail marketing, fresh and inspirational…”. (Ana Pedro Lebre).

One of the advantages of this new technological era is the fact that a company can get to know better the profile of those who seek them in some way, and maintain the interest by creating a relationship, offering more of what is to the client’s interest. BRABBU uses social networks to establish communication between employees, using Whatsapp and Skype for internal communication and everything else is exclusively used for

external communication. “The use of these social networks facilitates information transmission and its organization itself. I think these tools are useful, but it also has disadvantages in terms of social and human expression: it is easy to become dependent on this contact and we can never forget that we are dealing with people and that from a motivational point of view human contact is the most useful and effective way to achieve great success.” (Ana Pedro Lebre).

Interviewee Ana Pedro Lebre, when asked if social networks are in fact more useful for internal communication or for external marketing, stated with no doubts that it is more important for external marketing. “We have at our disposal bold ways to communicate through social networks, in addition to having the possibility of creating an almost unlimited audience and from which we guarantee that those who like us, but do not have the possibility to see us up close, may have an approximate experience of our designs, stories and inspirations.” (Ana Pedro Lebre).

The interviewee considers that human communication is one of the oldest problems of humanity: “even if machines help us be faster than a few years ago, it all depends on how we use the tools… as I think there are still many people who do not deeply understand the importance of human relations in the efficiency of communication.” (Ana Pedro Lebre).

6. Discussion

By analysing the survey and the interview, we can point out two main perspectives of the main topic in discussion: the perceptions of millennials (born in or after 1982 and until the turn of the 20th century) and the perceptions of baby boomers (born after World War II and before 1982) (Au-Yong-Oliveira et al., 2018). If on the one hand millennials have the capability to see social networks as a tool for communication, on the other hand for baby boomers it is hard to consider them that way. As we can see through the interview with Ana Lebre, BRABBU is a young company, with young employees, with their innovative capabilities at their peak, thus, the brand uses social networks. This concept is already ingrained in the working environment, so BRABBU’s workers do not see social networks as a way of becoming distracted. The analysis of the survey leads us to conclude that this idea is not present in baby boomers’ minds, because in their point of view, the use of social networks during working hours is useless and restrains companies’ competitiveness.

After analysing all the information collected, we can consider that baby boomer executive boards and older generations of workers, in contrast to the millennials, did not grow up with technology around them. Furthermore, the lack of knowledge and to a certain point a fear of the consequences, leads to them completely disregarding the possibility of the use of social networks for the purpose of work.

As the survey shows, baby boomers prefer classic communication (including e-mail), while millennials value modern communication (the embracing of social networks). From an evolutionary perspective, it is considered that administrative frameworks are being renewed by younger generations, such as millennials, and so the methods used in the workplace will also be renewed. Thus, it is expected that the use of social networks in the work context may be a more present reality in the future.

There is thus an evolutionary trend in the type of tools that can be used for internal communication. Today, e-mail is still used as an example of classic communication. However, other ways of communication may provide faster, more intuitive and more dynamic communication, such as social networks. Social networks are already introduced in people's daily lives. However, are they already used in companies, in addition to being used for external marketing? Classic communication is still maintained, and modern communication, represented by social networks, has already been introduced in corporate relations, in particular in the case study analysed herein – BRABBU – where one may verify a coexistence of these types of communication.

Despite Skype and Whatsapp being the only social networks used at BRABBU, there are other working platforms that companies can use. People’s focus will not be questioned, if they use platforms made especially for work. An example of this kind of social network is Slack.

According to interviewee Ana Lebre, questioning the efficiency and effectiveness of a firm when using social networks, will depend on the type of purpose of the usage. If people use them for leisure, when they have to

use them for work it is normal to question if this will be effective and efficient. When work through social networks is already a work habit, the question is no longer posed.

In accordance with the literature, social networks are capable of boosting employees' performance and to contribute to their evolution as professionals, if the purpose of the use of social networks is job-related. According to (Jeanetta, 2017), "posing a question on social media is a simple and quick way to get several possible solutions. Even if none of the answers are used to solve the problem, the information they provide may spark a new solution". Also, "co-workers can use social media to interact with one another and build better relationships. A stronger relationship among employees leads to more cohesive and productive work teams" (Jeanetta, 2017). The use of modern tools to communicate, such as social networks, will depend on the predisposition of corporate employees.

According to (Herlle and Astray-caneda, 2012), who quoted Skeels & Grudin, and Stafford & Mearns, "due to the ease of Internet connections and access in the workplace, organizations can enhance business operations and employee communications by having their own inter-office social media platforms. This offers employees the opportunity to share knowledge and collaborate with each other".

In interviewee Ana Pedro's perspective, to achieve good results at work, when using social networks, it is essential to have discipline in their use; if not, there will be a dispersion of information which will lead to disorganization. We can conclude that to be effective and efficient in communication leading to good performance, organization is the key word. Nowadays the generation that leads, i.e. the executives of companies are still more engaged in classic communication (e.g. e-mail rather than social networks).

Nevertheless, it is understood that there is a tendency for social networks to lead internal communication efforts in the future. For now, there is still a need to innovate within what we call classic communication; innovation leads to more innovation, and in our perspective, this is the way to show that there is more than what the baby boomers are used to using. Social networks are positive and need to be used more – for internal corporate communication also and not only for external Marketing purposes.

7. Conclusions

Bearing in mind that the mixed methods approach followed in this article gave us a range of different information, we can conclude that social networks are still a controversial topic. It is unanimous that social networks are very convenient when there is a need to contact someone, but in the professional context there are still many doubts and "grey areas" which, in the near future, will perhaps be resolved.

Significantly, 65% of the survey respondents who referred to Social Networks as a way of communication inside a company were younger than 25 years old (e.g. young millennials, born after 1993).

As we discussed previously, people are still suspicious about the use of social networks during work hours, even though the great majority of the population uses them in their daily lives.

Albeit, even in a company where social networks are used for internal communication, we cannot replace human communication. This is an important issue that, in Ana Lebre's opinion, our interviewee, should be considered. According to Ana Lebre, "human contact is a source of motivation".

Considering the collected data, we can conclude that according to the survey, most of the respondents consider social networks as a possible source of distraction at work. However, according to the perspective of the interviewee, Ana Lebre, they are undeniably useful and essential when used in an organized and professional manner. We assume that we live in an era of continuous evolution and that we will have to wait until we get used to all of these communication tools available to us, taking advantage of the best benefits possible from them.

It should be noted how people were receptive to answering this survey, which is a sign of interest about this subject.

In the future, it would be interesting to research about the issue we pointed to previously: are social networks making us less "human"? Do we prefer to contact other people through social networks instead of via personal contact? This requires further studies.

Finally, limitations of the research include the fact that due to time (and space) constraints only descriptive statistics were performed on the data. In future, and given more time and space, we recommend that inferential statistics be performed, for example the chi-square test (for testing associations between variables).

References

2018 Digital Yearbook (2018). Available at: https://www.slideshare.net/wearesocial/2018-digital-yearbook-86862930 (Accessed: 4 April 2018).

Au-Yong-Oliveira, M., Gonçalves, R., Martins, J., Branco, F. (2018). The social impact of technology on millennials and consequences for higher education and leadership. Telematics and Informatics, vol. 35(4), July, pp.954-963. DOI: https://doi.org/10.1016/j.tele.2017.10.007.

Badea, M. (2014) 'Social Media and Organizational Communication', Procedia - Social and Behavioral Sciences. Elsevier, 149, pp. 70–75. doi: 10.1016/J.SBSPRO.2014.08.192.

Baruah, T. D. (2012) 'Effectiveness of Social Media as a tool of communication and its potential for technology enabled connections: A micro-level study', International Journal of Scientific and Research Publications, 2(1), pp. 2250–3153. Available at: www.ijsrp.org (Accessed: 4 April 2018).

Brabbu (2011) BRABBU Design Forces - Contemporary Home Furniture. Available at: https://www.brabbu.com/ (Accessed: 4 April 2018).

Chaffery, D. (2018) Global social media research summary 2018 | Smart Insights, Smart Insights. Available at: https://www.smartinsights.com/social-media-marketing/social-media-strategy/new-global-social-media-research/ (Accessed: 5 April 2018).

GlobalwebIndex (2018) Global time spent on social media daily 2017 | Statista. Available at: https://www.statista.com/statistics/433871/daily-social-media-usage-worldwide/ (Accessed: 4 April 2018).

Herlle, M. and Astray-caneda, V. (2012) 'The Impact of Social Media in the Workplace', 5, pp. 67–73. Available at: http://education.fiu.edu/research_conference/ (Accessed: 10 April 2018).

How Social Media Can Boost Your Productivity (2016). Available at: https://www.brightpod.com/boost/how-social-media-can-boost-your-productivity (Accessed: 4 April 2018).

Jeanetta, A. (2017) 7 Reasons Social Media in the Workplace can Help Employees | TOG. Available at: https://theolsongroup.com/5-reasons-social-media-workplace-can-help-employees/ (Accessed: 10 April 2018).

Leonardi, P. M., Huysman, M. and Steinfield, C. (2013) 'Enterprise Social Media: Definition, History, and Prospects for the Study of Social Technologies in Organizations', Journal of Computer-Mediated Communication. Oxford University Press, 19(1), pp. 1–19. doi: 10.1111/jcc4.12029.

Lobo, B. do (2018) Boca Do Lobo - Luxury Exclusive Design Furniture Manufactures. Available at: https://www.bocadolobo.com/en/ (Accessed: 4 April 2018).

Nightingale, D. J. et al. (2008) 'Origin of Email & Misuses of the Term "Email"'. Available at: https://vashiva.com/wp-content/uploads/2016/03/The-Origin-of-Email.pdf (Accessed: 5 April 2018).

O'Reilly, T. (2018) What Is Web 2.0 - O'Reilly Media. Available at: http://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html?page=5. (Accessed: 4 April 2018).

Olmtead, K., Lampe, C. and Ellison, N. (2016) How Americans Use Social Media at Work | Pew Research Center. Available at: http://www.pewinternet.org/2016/06/22/social-media-and-the-workplace/ (Accessed: 4 April 2018).

Pordata (2017). Contemporary Portugal data base. Available at: https://www.pordata.pt/Portugal/Alunos+matriculados+no+ensino+superior+total+e+por+sexo-1048, accessed on 29-05-2018.

Remenyi, D. (2014). Dictionary of research concepts and issues. Reading, UK: ACPIL.

Remenyi, D., Greener, S. (2016). Social media and digital scholarship for academic research. Reading, UK: ACPIL.

Psychological Theory of Entrepreneurship Tested at Gifted Children's Language Learning in LEGO-Simulation-Game

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Abstract: The aim of this paper is to present results of learning processes for gifted children, using the Action Regulation Theory on entrepreneurship in learning a basic vocabulary of the 6 major languages of the world. Why the focus on giftedness? The idea to develop a specific learning method for children that are gifted, evolved from the notion that the learning demands of these gifted children are not (enough) met. Children are gifted when their ability is significantly above the norm for their age. The major requirement for the learning processes of these gifted children, is challenge. The presented challenge for them is to communicate in the six major languages of the world: Chinese, Russian, Arabic, Hindi, Spanish and English. We earlier published that it is possible to combine language learning with entrepreneurship learning (edupreneurial method) that allows the participants to learn the basic vocabulary of a totally unknown language. A specially developed entrepreneurship LEGO-game (the simulation game LA- Game) provides an authentic entrepreneurial setting. The learning method has been tested in several experiments using languages such as Chinese, Korean and Hindi. We now present the results of learning experiments with gifted children: measuring their basic vocabulary Russian before and after LA-Game. In our view Frese's Action Regulation Theory is a general theory of learning entrepreneurship, that can be applied universally in any (action) learning process. All elements of this Action Regulation Theory are present in LA-Game as we published earlier. We will show that all of them: the facets of active performance, the differentiated steps in sequence of action regulation,the hierarchical structure in 4 levels of action regulation, the foci of action regulation and the action oriented mental model, fit also in the learning needs of gifted children. This theory is specifically relevant because it focuses on the regulation of learning actions. The identified specific 'market need' in learning and teaching processes for gifted children, explains 'innovative entrepreneurship' applied in our learning programs, so the "why, who, what, when, where, how and for whom".

Keywords: Action Regulation Theory, psychology of learning entrepreneurship, edupreneurial method, LA- Game, giftedness, entrepreneurship LEGO-game

1. Introduction

The psychological theory on learning entrepreneurship (Action Regulation Theory, ART) can be applied for other learning processes using an entrepreneurial teaching method that applies to a receptive mindset of gifted children who specifically want to learn in such a way. For this group, it is:

- relatively easy to organize experiments with new learning methods (there are specific school groups of gifted children, school organizations are open for experiments on teaching)
- Acquire observations of entrepreneurial learning. This due to what ART mentions as 'the cognitive ability and qualifications that are needed to be able to regulate on this meta-level'. Gifted children have these abilities.

In this paper we present the why (need), the who (gifted children), the what (basic vocabulary of a totally unknown language, Russian, so an easy to identify learning process), the when (sequence of ART), where (LA-Game), how (levels of regulation of ART) and for whom (gifted children with the need). The learning results by Kahoot surveys: before LA-Game, after LA-Game and 1 week after LA-Game, are presented. The process or the sequence of ART is demonstrated with short YouTube-movies of the experiment (links in are in a non-public mode, privacy!) which gives an indication of the validity of several elements of Action Regulation Theory for entrepreneurial learning.

2. Giftedness and their need for entrepreneurial learning processes

Gifted children have abilities significantly above the norm for their age, generally these children learn more quickly, deeply, and broadly than their peers. Gifted behavior occurs when there is an interaction among three basic clusters of human traits: above-average general and/or specific abilities, high levels of task commitment (motivation), and high levels of creativity. Gifted and talented children are those who possess or are capable of

developing this composite of traits and applying them to any potentially valuable area of human performance. As noted in the Schoolwide Enrichment Model, gifted behaviors can be found "in certain people (not all people), at certain times (not all the time), and under certain circumstances (not all circumstances)." (Renzulli, 1978). Characteristics are: high reasoning ability, creativity, curiosity, a large vocabulary, an excellent memory, able to master concepts with few repetitions, be perfectionist, often question authority, have trouble relating to or communicating with their peers.

The perception of his "school-teaching " by a gifted child (Bart)	The perception of learning processes by a gifted child (Bart)
	
"negative"	"positive"

Figure 1: different perceptions

According to specialists on education of gifted children like Linsen and Goethals (2003) teaching to gifted children need to: avoid routine jobs; steps in learning should be large; a reasonable level of abstraction should be present; divergent thinking should be needed and creativity ; internalization should be as independent as possible. Bronkhorst (2001) has similarly requirements for teaching gifted children: appeal their creativity; open assignments; high level of abstraction; high complexity; generate added value in relation to the regular learning content; activate an investigative attitude; evoke an attitude of reflection on operating; appeal to their meta-cognitive skills; provoke interaction; appeal to the self-dependence.

One of the key principles of gifted children is the holistic approach in thinking: the so called "top-down thinking". Instead of the question: "why?", it focuses on the question "how?". The meaning of the knowledge is essential for gifted children to store it as useful. The approach in school-education is generally bottom-up: stepwise built up with at the last step the goal and meaning. So the usefulness of knowledge in practice, the answer to the why-question is not essential.

Formulating learning goals is the main element of top-down learning: generating the perspective of the final goal. A gifted child than understands that his hard work will lead to a goal which he or she has not yet accomplished at the start of his or hers learning process. Top down learning implicates learning from the explicit level (generic, declarative level) to the implicit level (specific, procedural knowledge) and is analytic in nature (Sun, Merrill & Peterson, 2001)

Because gifted children request new learning methods, the teaching methods should change too and made applicable to the mind-sets of these gifted children. Teaching might otherwise lead to mislearning. For example, "instant payoff". Illeris (2009): '*in education, at workplaces and many other situations, very often people do not learn what they could learn or what they are supposed to learn. Mislearning due to misunderstandings, lack of concentration, mental resistance, etc. Because young people are highly engaged in a process of personal identity development*'. Illeris (2009) means '*that young people fundamentally meet all learning initiatives with questions such as: What does it mean to me? Or: What can I use this for?*' - implying that it is only worth paying attention to if it is subjectively accepted as a usable contribution to the present demands of the identity process.

In an earlier publication (Roelofs, 2012) we showed that it is possible to combine language learning with entrepreneurship learning to create such a new learning process. The process of conscious and unconscious learning referred to as "Reference Creation"; an "edu-preneurial" method of teaching that allows the participants to learn the basic vocabulary of a totally unknown language using an entrepreneurial network set up. The learning method has been tested in several experiments using languages such as Chinese, Korean and Hindi and a local dialect (Drents). In this paper, the focus is on Russian and gifted children.

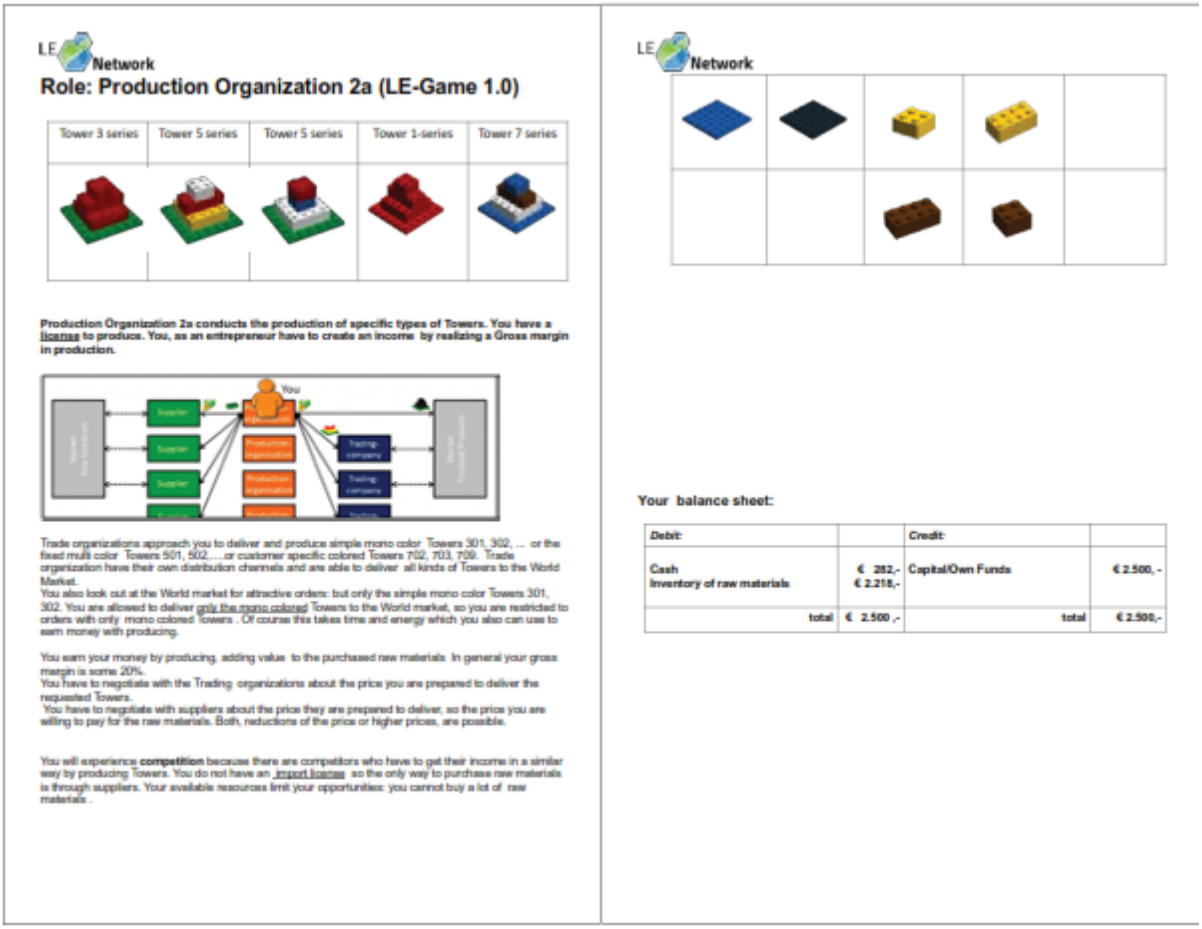
Language is a complex skill, where the learning process is similar to learning entrepreneurship. A well-known definition of Entrepreneurship is "the pursuit of opportunity without regard to resources currently controlled." Hence, learning a language could be similar, that is, the pursuit of communication opportunities. A basic vocabulary is necessary to be able to communicate actively. Similar to entrepreneurship, acquiring a new language vocabulary does not necessarily require conscious study of theory, such as the study of grammatical rules. Learning a new language happens naturally (and automatically) when you get lots of interesting and meaningful input, which can be provided by an authentic learning environment. As soon as a person has learned a reasonable amount of vocabulary, it is a lot easier to set the next step in the process of learning a language.

3. LA-Game explained

The simulation role game, LA-Game, is an entrepreneurial context using LEGO to teach and learn in a playful manner. In the simulation, several markets are created, where LEGO products are traded. Participants buy and sell commodities, produce and /or trade LEGO towers or LEGO parts. The use of LEGO makes LA-Game also quite sustainable.

The essence of the simulation game LA-Game lies in the conflict of interests among the different market players. In LA-Game, participants are exposed to real uncertain market situations and have to communicate with the markets in a foreign language. In LA-Game the objective is learning, but there is also a competitive element on making profit. The rules of LA-Game are:

- Everybody is entrepreneur in his/her role. In the simulation, several markets are created, where LEGO products are traded. Participants buy and sell commodities, produce and /or trade LEGO towers or LEGO parts;
- There are three variations in the roles: Traders, Producers (see figure 2) and Suppliers. The added value is created by the entrepreneurs by trading the raw materials, which can be bought (using Russian language!) at the Market Raw Materials and the finished products which can be sold (using Russian language!) at the Market Finished products;
- The market consists of two types of products: mono-coloured towers (sold by Producers & Traders) and multi-coloured towers (sold only by Traders);
- All participants are limited in their resources, have a (small) competitive advantage in their stock and have the same starting capital: € 2500 in cash and in kind.



LE Network

Role: Production Organization 2a (LE-Game 1.0)

Tower 3 series	Tower 5 series	Tower 5 series	Tower 1-series	Tower 7 series

Production Organization 2a conducts the production of specific types of Towers. You have a license to produce. You, as an entrepreneur have to create an income by realizing a Gross margin in production.

Trade organizations approach you to deliver and produce simple mono color Towers 301, 302, ... or the fixed multi color Towers 501, 502,....or customer specific colored Towers 702, 703, 709. Trade organization have their own distribution channels and are able to deliver all kinds of Towers to the World Market.
You also look out at the World market for attractive orders: but only the simple mono color Towers 301, 302. You are allowed to deliver only the mono colored Towers to the World market, so you are restricted to orders with only mono colored Towers . Of course this takes time and energy which you also can use to earn money with producing.

You earn your money by producing, adding value to the purchased raw materials. In general your gross margin is some 20%.
You have to negotiate with the Trading organizations about the price you are prepared to deliver the requested Towers.
You have to negotiate with suppliers about the price they are prepared to deliver, so the price you are willing to pay for the raw materials. Both, reductions of the price or higher prices, are possible.

You will experience **competition** because there are competitors who have to get their income in a similar way by producing Towers. You do not have an import license so the only way to purchase raw materials is through suppliers. Your available resources limit your opportunities: you cannot buy a lot of raw materials .

LE Network

Your balance sheet:

Debit:		Credit:	
Cash Inventory of raw materials	€ 282,- € 2.218,-	Capital/Own Funds	€ 2.500, -
total	€ 2.500 ,-	total	€ 2.500,-

Figure 2: An example of a role in LA-Game

Participants experience market competition in combination with scarcity of resources: pressures of scarcity of money, time and competitors. So, being continuously exposed to the market transactions and the risk during the game. The dynamics caused by these pressures of scarcity create both linear and non-linear learning processes. The context is Russia, each participant is triggered by senses and emotions (Damasio,1994). Positive emotions in experiencing successful transactions support the learning by doing process.

4. Methodology

Our methodology in publications is based on systematic generation of theory from data that contains both inductive and deductive thinking, like the grounded theory method, a systematic methodology in the social sciences involving the construction of theory through the analysis of data. Here one does not begin with a theory ... one begins with an area of study and what is relevant to that area is allowed to emerge [Glaser & Strauss, 1967 and Strauss & Corbin, 1990]. We did and do not aim for the “truth”, but we conceptualize what is going on by empirical research, especially by observing what is going on in our simulations. We formulate hypotheses based on conceptual ideas on learning (and teaching) processes in these simulations and test and re-test them in experiments with these simulations. So a kind of ‘simulation grounded theory’ that is shown in previous publications.

We apply the experimental method as a research method, because LA-Game can be played again and again, so our hypothesis can be validated or falsified whenever the experiments are repeated. This is exactly what we do. Here we use the testing environment of LA-Game, which offers participants the opportunity to experience the learning of a totally unknown language in a safe and simulated environment. LA-Game using LEGO is literally playful, as the word LEGO is Danish for “toy”.

We assume that our hypotheses on the learning and teaching process are valid; we have tested them with the help of the experimental method during simulations, by testing participants “before” and “after“attending an

LA-Game session. The effectiveness of the learning process is measured by the retention rate of the learned words. The elements of Action Regulation Theory are shown by videos of the participants.

5. Language learning as action learning of "tacit knowledge"

The idea that learning a language is consequently the creation of images which can be related to the dispositional representation in the personal, so subjective mind-set is supported by Damasio (1994). It is basically what is called constructivist learning, where it is assumed that the learner him-or herself actively builds up or construes his/her learning as mental structures, mental schemes in the brain. Damasio sees the brain as a "safe harbour" where the signals of the senses arrive in specific sectors, which are the basis for topographically organized representations, the source of mental images.

Damasio states that we share our mental image-based concept of the world with other humans and that there is a remarkable consistency in the constructions different individuals make of essential aspects of the environment (textures, sounds, shapes, colours, space), where these images can be perceptual or recalled. Damasio suggests that mental images are momentary constructions.

For language communication, Damasio adds: "Most of the words we use in our inner speech, before speaking or writing a sentence, exist as auditory or visual images in our consciousness". Damasio refers to Roger Shepard (1980) and Stephen Kosslyn (1982) when he argues that the value accorded to images is a recent development, part of the cognitive revolution that followed the long night of stimulus – response behaviourism. Also Damasio quotes Albert Einstein: "The words or language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be 'voluntarily' reproduced and combined…" Damasio speaks of **dispositional representations** with which one is able to reconstitute a picture, dispositional representations are in his view 'dormant firing potentiality which comes to life when neurons fire.' For learning processes it is relevant how these images can be recalled to be able to communicate in a foreign language.

Because you need to recall the words in your 'inner speech' to be able to use words functional for communication, these dispositional representations in our view are related to the effectiveness of a learning (and teaching) process.

The psychological approach to this 'inner speech' is similar to Vygotsky's (1978) concept of "internalization" that evoked from Action Theory. Similarly "internalization" can be interpreted as the internal reconstruction of an external operation.

Language can be regarded as a kind of tacit knowledge (Nonaka, 1994), the kind of knowledge which is highly personal and hard to formalize. The internalization of the knowledge where explicit knowledge is transformed to tacit knowledge is the key of learning processes.

LA-Game is an educational method based on experiencing successes, and learning from failures (Popper, 2006). It is "action learning" (Argyris C. , Schön D.A., 1978), learning by doing, so the effectiveness of the learning process is better than other learning systems such as lectures (Sousa, 2006). A learning environment based on pull learning, since the development of communication skills is far more demand driven than supply driven. LA-Game is also a "neutral-Kolb environment"(Roelofs, 2013) , where each participant can apply their individual specific Kolb-learning style. The role game simulation has the dynamics that makes it possible to learn from making mistakes and from experiencing successes in a safe learning environment. The difference between this kind of learning environment and a professional environment is that it is allowed to make mistakes, sometimes even encouraged to make mistakes. Making mistakes is regarded positive learning (Popper 2006). Playing makes people free: they dare to make mistakes.

6. Action Regulation Theory (ART) in LA-Game

The Action Regulation Theory (Hacker, 1986) originally focused on modelling working conditions. Frese cs. (2018) have applied it to entrepreneurship and we pointed out that Action Regulation Theory is a theory of learning entrepreneurship. (Roelofs, 2018). This Action Regulation Theory (ART) focuses on the regulation of

the activity process which is applied to the gap between the visible activity and the non-visible cognitive processes by using a hierarchical-sequential structured model of the stepwise actions.

In general the ART distinguishes three levels of regulation of activities:

- the intellectual regulation-level, the highest level of the mental action-plans, the goal setting and selection of goals. These goals are realized through concrete actions. So the hierarchical highest level of thinking about what to achieve and which action steps to take to do so.
- the perceptual-conceptual regulatory-level, the control process of the continuously monitoring of the actions using a feedback-loop to ensure achieving the planned goal or make adjustments otherwise. This is the level about the monitoring and making adjustments.
- the sensory-motor regulatory level, the automated , "internalized" routine actions. The not-having-to-think level. Often in language learning focuses on this automated level: learning words without any structure to increase the "automated" level.

Frese distinguishes four levels and more "building blocks" in ART, each of them fits in the characteristics of giftedness!

6.1 The facets of active performance,

Frese and Fay (2001) distinguish three facets of being active: self-starting, long-term proactivity and persistence/overcome barriers. All three facets of active performance are present in LA-Game:

Each role in LA-Game implies **self-starting**, that is activated by the pull aspects of the simulation context. There is no superior present who tells the participant what to do or not to do. In LA-Game, self-starting of information collection is based on active search, active exploration of the environment and the information available. (https://youtu.be/36jJKJNeMk4)

Each role in LA-Game implies **proactivity** of not to wait until a demand is explicitly made to which one must respond. We observed that even during the coffee breaks the actions continue.

Each role in LA-Game implies **persistence** because there are always bottlenecks and limitations due to changing prices, scarcity of LEGO materials of specific colours , etc. Each participant has to overcome adversity (" no one wants my yellow LEGO bricks..") and of course to communicate in Russian requires persistence.

6.2 The differentiated steps in sequence of action regulation

Before the sequence of action regulation can start, Frese adds a pre-phase of the regulation: 'the consciousness of regulation'. (https://youtu.be/Hvb17mS4KII) As we experienced, this is an important phase: as an individual you have to know that entrepreneurial behaviour is required. An "entrepreneurial mode", so a context that entrepreneurial operating is needed. In LA-Game we bring participants in such a mode (colored jackets, specific badges, https://youtu.be/9ZT4pHwgYc0)

6.2.1 First step: goal development and selection,

'Goals', according to Frese, 'are proactive, when future opportunities are transformed into goals, … Frese refers Austin & Vancouver (1996) that goals are 'internal representations of desired states in the future' and Hacker (1985), that an 'action is the smallest unit of behavior that is linked to a goal'. (https://youtu.be/gUOjOkJl6vg)

6.2.2 Second step: orientation or mapping the environment,

According to Frese, "individuals regulate their action based on information or signals they receive from the environment, and they also change their environment through action". The 'change of the environment' is literally observable in LA-Game.

Regarding information collection and prognosis, Frese states that : "Proactive information collection appears if owners systematically search and scan for potential future opportunities or problems. Overcoming barriers in information collection implies that one continues on when it is difficult."

This information collection can be observed constantly during LA-Game. The systematic search for opportunities is literally observable, because the participants are cruising through the games location, moving from one participant to another. (https://youtu.be/rRSK63hIF1U)

6.2.3 Third step: planning (plan development and plan selection),
Frese: "This phase involves the creation of and selection among different plans that are instrumental in attaining a goal… "as bridges between thought and action..". In LA-Game this planning process is executed within seconds or minutes. The mental simulations illustrate the learning process of Action Regulation Theory. (https://youtu.be/wgGrdjS5d6Q)

Figure 3: Impression of LA-Game

6.2.4 Fourth step: monitoring of execution,
Frese: *"People need to monitor their actions. This involves a comparison between the goal and the associated plan and the actual execution of behavior. .... During execution, ….can respond more or less flexibly to unexpected situations, adapt their goals and plans",* ..(Frese & Zapf, 1994).

This monitoring and adapting goals and plans are manifest in the dynamics of LA-Game. 'Adapting' means implicit that in Action Regulation Theory there is a learning process.

6.2.5 Fifth step: feedback processing
Especially in this fifth step of the action sequence, the learning aspect is highlighted. Frese: "Feedback provides people with information from the environment about their current performance or progress toward attaining the goal. Moreover, feedback enables learning which types of plans can be most successfully used in the future.. They then regulate their behavior to reduce any discrepancies and to achieve the goal". (https://youtu.be/RY9NpYGCXgk)

In LA-Game the feedback is a constant process on the actions of the participants which in communicating in Russian are stimulated to help each other with Russian words.

6.3 The hierarchical structure in 4 levels of action regulation
Frese identifies a **hierarchical structure** in the regulation of actions. Action sequences on lower levels (less conscious and more routine behavior) are regulated by higher levels that require more conscious operating, more cognitive effort and feedback. So a higher level of action regulation requires more learning (and teaching) effort. Four hierarchical levels are distinguished:

1. The sensorimotor level which does not require conscious attention.
2. The level of flexible action patterns. In LA-Game these flexible actions patterns can literally be observed. Participants moving more or less random trough the room of the playing session.

3. Intellectual or Conscious Level. This 'consciously regulate' is the challenge for each participant when playing LA-Game. This intellectual level sees Frese related to the mental simulation: "*This level is* concerned with conscious regulation of goal oriented behavior. (https://youtu.be/f1DrZRf-DLM)
4. Level of Meta-Cognitive Heuristics. According to Frese this is a complex level of regulation, because it embraces both conscious as well as non-conscious forms of regulation. At this highest level of action regulation, meta-cognitive templates, strategies, and abstract heuristics are used, to guide goal and plan development, and feedback processing as well as understanding the environment (Frese & Zapf, 1994). "*These meta-cognitions allow individuals to approach similar problems in an effective way* "illustrates the relevance of learning for future acting. The learning aspect of Action Regulation Theory is implicitly presented by Frese as "*freeing up higher levels of regulation*".

6.3.1 The foci of action regulation and the action oriented mental model

Because all actions are done within a certain situation or context, Frese differentiates three foci of performance:

1. Task focus. A strong task focus is generally associated with high efficiency and effectiveness of action regulation, because it links goals with relevant plans, behaviour and feedback. In LA-Game we see this task focus in delivering the order in Russian, or buying LEGO bricks in Russian.
2. Social focus. Actions are performed within a social context. Interactions with other people influence the action sequence. In LA-Game a social focus can be observed: personal networks clustering together, also in helping with Russian. (https://youtu.be/RY9NpYGCXgk)
3. Self-focus. The self as a focus of regulation, implies that the impact of the individuals' actions on their self -emotions and self-beliefs- are in the foreground. Frese: "*The self-system is regulated on the meta-level*". It implies that a cognitive ability and qualifications are needed to be able to regulate on this meta-level. Gifted children are supposed to have these abilities.

The action oriented mental model is the need to communicate in Russian with the markets. (https://youtu.be/FRZms8I3Gbw)

6.4 Basic vocabulary needed to "survive"

The major pull learning is caused by the need to "survive", therefore basic communication is needed: the basic vocabulary! As Damasio states: "*An organism is designed with automatic survival mechanisms, and to which education and acculturation add a set of socially permissible and desirable decision strategies that, in turn, enhance survival,…*". The simulation activates the power for associations, which result in the capabilities of participants to adapt to this realistic context which need communication in a completely new language to be able to "survive". Associations (word images) are activating dispositional representation through reasoning strategy. Damasio: "*emotion is needed for mastering the know-how" (Introduction, p.xxv).*

In the LA-Game simulation each participant is set back into an "unknown" context, basically "back to zero" and confronted with a totally new language. To be able to have success, communication is necessary. By confronting each participant with the language handicap, each participant is placed in a kind of "survival mode", where communication is demanded. This requires active and collaborative learning processes, not "pushed" but "pulled", any participant will apply and remember the words which are needed in communicating to 'survive'. (https://youtu.be/wob5qVcHdqc)

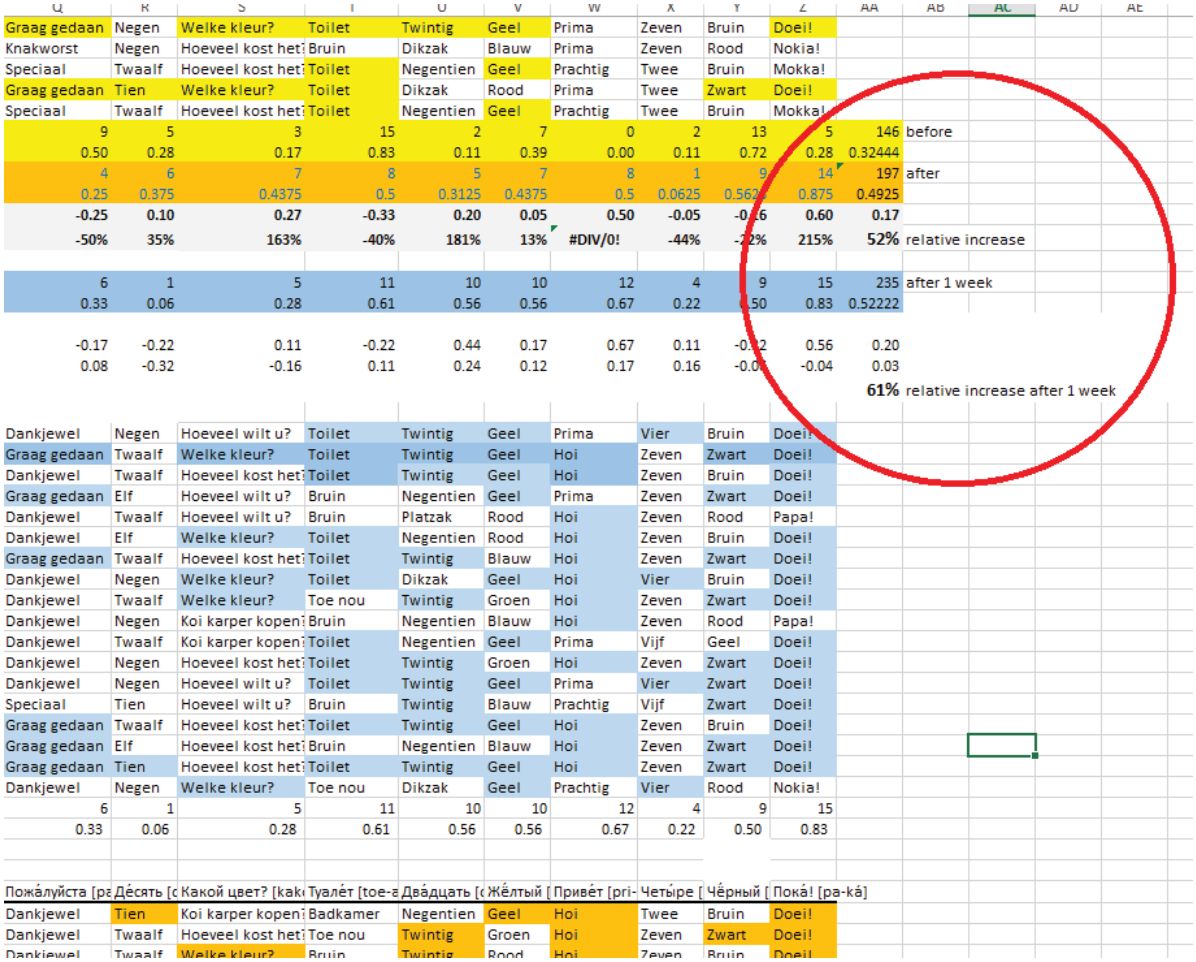
Theory like Damasio's, made clear that for learning a language, to communicate in a foreign language we had to create learning elements which activate or stimulate this making of 'mental images', these dispositional representations. To be able to communicate in such a new language you have to create your personal 'mental images'. This aspect of subjectivity emphasis the subjective element of learning processes. An element that is also highlighted for teaching gifted children.

For each language the basic vocabulary consists of circa 50-100 words, which can be compared with the first level of learning a language: "the Common European Framework A1"

7. The results of the test on Russian

We tested a number of words of a basic vocabulary Russian. So colors, simple numbers, greetings etc. We tested by using Kahoot survey, before and after the LA-Game course. The results showed an increase of 52% in

a few hours. Due to the chance element in testing (just gambling generates 25% good answers), the increase was even larger when corrected for this aspect. We repeated the same survey a week later: the results were even better: an increase of 61% good



Graag gedaan	Negen	Welke kleur?	Toilet	Twintig	Geel	Prima	Zeven	Bruin	Doei!		
Knakworst	Negen	Hoeveel kost heti	Bruin	Dikzak	Blauw	Prima	Zeven	Rood	Nokia!		
Speciaal	Twaalf	Hoeveel kost heti	Toilet	Negentien	Geel	Prachtig	Twee	Bruin	Mokka!		
Graag gedaan	Tien	Welke kleur?	Toilet	Dikzak	Rood	Prima	Twee	Zwart	Doei!		
Speciaal	Twaalf	Hoeveel kost heti	Toilet	Negentien	Geel	Prachtig	Twee	Bruin	Mokka!		
9	5	3	15	2	7	0	2	13	5	146	before
0.50	0.28	0.17	0.83	0.11	0.39	0.00	0.11	0.72	0.28	0.32444	
4	6	7	8	5	7	8	1	9	14	197	after
0.25	0.375	0.4375	0.5	0.3125	0.4375	0.5	0.0625	0.5625	0.875	0.4925	
-0.25	**0.10**	**0.27**	**-0.33**	**0.20**	**0.05**	**0.50**	**-0.05**	**-0.16**	**0.60**	**0.17**	
-50%	**35%**	**163%**	**-40%**	**181%**	**13%**	**#DIV/0!**	**-44%**	**-22%**	**215%**	**52%**	relative increase
6	1	5	11	10	10	12	4	9	15	235	after 1 week
0.33	0.06	0.28	0.61	0.56	0.56	0.67	0.22	0.50	0.83	0.52222	
-0.17	-0.22	0.11	-0.22	0.44	0.17	0.67	0.11	-0.12	0.56	0.20	
0.08	-0.32	-0.16	0.11	0.24	0.12	0.17	0.16	-0.06	-0.04	0.03	
										61%	relative increase after 1 week

Dankjewel	Negen	Hoeveel wilt u?	Toilet	Twintig	Geel	Prima	Vier	Bruin	Doei!
Graag gedaan	Twaalf	Welke kleur?	Toilet	Twintig	Geel	Hoi	Zeven	Zwart	Doei!
Dankjewel	Twaalf	Hoeveel kost heti	Toilet	Twintig	Geel	Hoi	Zeven	Bruin	Doei!
Graag gedaan	Elf	Hoeveel wilt u?	Bruin	Negentien	Geel	Prima	Zeven	Zwart	Doei!
Dankjewel	Twaalf	Hoeveel wilt u?	Bruin	Platzak	Rood	Hoi	Zeven	Rood	Papa!
Dankjewel	Elf	Welke kleur?	Toilet	Negentien	Rood	Hoi	Zeven	Bruin	Doei!
Graag gedaan	Twaalf	Hoeveel kost heti	Toilet	Twintig	Blauw	Hoi	Zeven	Zwart	Doei!
Dankjewel	Negen	Welke kleur?	Toilet	Dikzak	Geel	Hoi	Vier	Bruin	Doei!
Dankjewel	Twaalf	Welke kleur?	Toe nou	Twintig	Groen	Hoi	Zeven	Zwart	Doei!
Dankjewel	Negen	Koi karper kopen	Bruin	Negentien	Blauw	Hoi	Zeven	Rood	Papa!
Dankjewel	Twaalf	Koi karper kopen	Toilet	Negentien	Geel	Prima	Vijf	Geel	Doei!
Dankjewel	Negen	Hoeveel kost heti	Toilet	Twintig	Groen	Hoi	Zeven	Zwart	Doei!
Dankjewel	Negen	Hoeveel wilt u?	Toilet	Twintig	Geel	Prima	Vier	Zwart	Doei!
Speciaal	Tien	Hoeveel wilt u?	Bruin	Twintig	Blauw	Prachtig	Vijf	Zwart	Doei!
Graag gedaan	Twaalf	Hoeveel kost heti	Toilet	Twintig	Geel	Hoi	Zeven	Bruin	Doei!
Graag gedaan	Elf	Hoeveel kost heti	Bruin	Negentien	Blauw	Hoi	Zeven	Zwart	Doei!
Graag gedaan	Tien	Hoeveel kost heti	Toilet	Twintig	Geel	Hoi	Zeven	Zwart	Doei!
Dankjewel	Negen	Welke kleur?	Toe nou	Dikzak	Geel	Prachtig	Vier	Rood	Nokia!
6	1	5	11	10	10	12	4	9	15
0.33	0.06	0.28	0.61	0.56	0.56	0.67	0.22	0.50	0.83

Пожáлуйста [ра	Дéсять [с	Какой цвет? [как	Туалéт [тое-а	Двáдцать [с	Жёлтый [	Привéт [при-	Четы́ре [	Чёрный [	Пока́! [ра-ка́]
Dankjewel	Tien	Koi karper kopen	Badkamer	Negentien	Geel	Hoi	Twee	Bruin	Doei!
Dankjewel	Twaalf	Hoeveel kost heti	Toe nou	Twintig	Groen	Hoi	Zeven	Zwart	Doei!
Dankjewel	Twaalf	Welke kleur?	Bruin	Twintig	Rood	Hoi	Zeven	Bruin	Doei!

Figure 4: spreadsheet showing results

8. Conclusions

To bridge the gap between scientific knowledge and what is put into practice, it is possible to use LA-Game; an authentic learning environment with the dynamics, that makes it possible to learn from making mistakes and experiencing successes. Often it takes time and a great deal of energy to set the first step in learning a new language. LA-Game is a successful entrepreneurial learning environment for learning a basic vocabulary Russian because teaching takes place in a playful way. The challenging teaching method of this role game simulation, fits in the learning needs of gifted children, like the experiment of LA-Game shows.

The experiment visualizes and confirms several elements of Action Regulation Theory (shown in short YouTube-movies of the experiment) and the Kahoot surveys demonstrate clearly positive learning results (before LA-Game, after LA-Game and 1 week after LA-Game)

The experimental method we used with LA-Game shows again that learning a basic vocabulary of a complete unknown language, like Russian, is possible. For gifted children entrepreneurial learning is a market need that fits in their “entrepreneurial learning mind-set”. Entrepreneurial learning by gifted children applied in the LA-Game experiment, demonstrates also the validity of several elements of the psychological theory on learning entrepreneurship: Action Regulation Theory.

References

Argyris, C., & Schön, D. A. (1978). Organisational learning: A theory of action perspective. Reading, Mass. Addison Wesley.
Bronkhorst, E. & S. Drent, Anders kijken naar je methode. Compacting van taal-/ leesonderwijs. Enschede: SLO, 2001

Damasio, Antonio R (1994), Descartes' Error, Emotion, Reason and the Human Brain. G.P. Putnam's Sons, New York.
Frese, M. (2009). Toward a psychology of entrepreneurship: An action theory perspective. Foundations and Trends in Entrepreneurship, 5, 435-494.
Frese, M., & Gielnik, M. M. (2014). The psychology of entrepreneurship. Annual Review of Organizational Psychology and Organizational. Behavior, 1(1), 413-438.
Frese, M. & Zacher, H. (2018) Action Regulation Theory: Foundations, Current Knowledge, and Future Directions. The SAGE Handbook of Industrial, Work, & Organizational Psychology, 2nd Edition, Volume 2.
Hacker, W. (1986). Arbeitspsychologie. Stuttgart: Huber.
Illeris, K. (2009), "Contemporary theories of learning", New York/London, Routlegde
Illeris, K. (2007), "How we learn: Learning and Non-learning in School and Beyond", New York/London, Routlegde, OECD (2016) Entrepreneurship at a Glance. Paris: OECD Publishing
S.M. Kosslyn (1980). Image and Mind. Cambridge, MA: Harvard University Press
Linssen, I & Goethals, C (2003), Het handboek hoogbegaafdheid in theorie en praktijk, Consent onderwijsbegeleiding en innovatie, Locatie Weert, Roermond, ISBN9090142789
Nonaka, I. (1994) A Dynamic Theory of Organizational Knowledge Creation, Organization Science, 5(1), pp. 14-37
Popper, K.P. (2006). Auf der Suche nach einer besseren Welt: Vorträge und Aufsätze aus dreißig Jahren. Piper
Renzulli, J. S. (1978). What Makes Giftedness Reexamining a Definition. Phi Delta Kappan, 60, 180-184.
Roelofs, H.D., Nieuwenhuis, A. , Saleem, R. (2012), Reference Creation As An Effective Learning System For Teaching Languages (Chinese, Hindi) In A Network Of Participants Using The Edupreneurial Method And Zapp-Learning. First Steps Towards Organizing An Unconscious Learning Methodology, Second International Conference on Language, Thought and Education: exploring networks, University of Zielona Góra (Poland), June 1, 2012.
Roelofs, H.D. , Samplonius-Raut, S.(2011), The edupreneurial method: an authentic environment as a base for effective education, Conference "New Values for the Development of Tourism and Society", School of Business Administration Turiba, Riga, Latvia. January 15, 2011
Roelofs, H.D. , Samplonius-Raut, S (2010), The Edu-preneurial Pedagogic Method: providing risk and added value experience in a pull system for learning entrepreneurship, China-USA Business Review ISSN 1537-1514 October 2011, Vol. 10, No. 10, 993-1010
Shepard, R.N. , Cooper, L.A. (1982). Mental images and their transformations. Cambridge, MA: MIT Press
Strauss, A & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage
Sun, R., Merrill, E., & Peterson, T. (2001). From implicit skills to explicit knowledge: a bottom-up model of skill learning. Cognitive Science, 25(2), 203-244.
Vygotsky, Lev (1978). Mind in Society. President and Fellows of Harvard College. pp. 55–56.

Entrepreneurial Research through Design

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Abstract: This Paper reports on a longitudinal study of Entrepreneurial Leadership by Design. It takes a new perspective through a 'designerly' approach to research, conducted simultaneously with generative activity (Cross 2006). In doing so it highlights the similarities in cognitive approaches common to strategic design and entrepreneurial leadership. The methodological approach is based on abduction; the core reasoning process that underlies design, as the starting point for focusing on the design practice of problem framing as the foundation for innovative activity. Donald Schön's (1987) views on design as a reflective activity and the central role of frame creation (Dorst 2016) are taken up as situated action and situated cognition. In particular, the improvisational nature of reflection-in-action and subsequently reflection on reflection-in-action, are considered appropriate when investigating the complicated realm of socio- economic value creation. The research was conducted in the shared setting of studio practice known as Strategic Design Labs. Here collaborative design was employed as research methodology through a process of naming, framing and sense-making. In particular naming that which warrants attention (problem or paradox) and framing the context as a problem setting activity. Frame creation is a design-based approach that is purely problem-focused; as such it is the fundamental underpinning of a repertoire of generative methods employed in Strategic Design Labs. Here entrepreneurial leaders, be they expert designers, managers and/or stakeholder, platform strategic design activity so as to co-evolve multiple solutions in a co- creation process. This participatory action led to retrospective sense-making and subsequently yielded new hybrid research methodologies. The paper concludes with a holistic Design Dynamics Research Model Canvas that aggregates a range of design and business approaches into a combined methodology; its phases, methods, activity and instruments. This new model is of relevance to those seeking to investigate how entrepreneurial leaders engage in developmental innovation.

Keywords: Entrepreneurial Leadership, Design Dynamics Research, Socio- Economic Innovation.

1. Introduction

This paper seeks to articulate a new methodology that is simultaneously investigative and generative with respect to innovation. This approach is grounded in design led mindful experiential learning through the collaborative practice of shared value creation.

Etienne Wenger (1998) maintains that communities of practice are not amenable to design, instead they must be allowed to emerge. By extension presumably the same might be said for entire ecosystems that encompass the three pillars of Higher Education Industry and Government that make up the Triple Helix (Etzkowiitz, 2012).

We do, however, have to acknowledge that some kind of catalyst is required to accelerate innovation wholesale to create shared value at the societal level (Porter and Kramer, ,2011). Here the dynamism of Entrepreneurial Leaders (Hazy, 2015) is key to envisioning a preferred shared future and setting a strategic direction to attain it. Such Entrepreneurial Leaders navigate complexity and purposefully engage in developmental innovation to create new social and economic value. To do this they engage in a process of Strategic Design (Steinberg 2012, Varganti 2009). In this context, design is taken to mean intent and is consequently described as strategic design following Vasari's definition as 'the animating principle of all creative processes'.

Research into what entrepreneurial leaders actually do in practice has particular relevance to fostering entrepreneurial ecosystems that enable sustainable socio- economic innovation through open systems networks. In this paper the aim is to highlight the role of design for developmental innovation so as to expand the conceptual field to encompass multidisciplinary arenas. It follows then that if Entrepreneurial Leadership is crucial to the development of sustainable ecosystems that encourage innovative, how then do we in Higher Education foster more individuals with Entrepreneurial Leadership competencies?

The first step has to be a clearer understanding of how Entrepreneurial Leaders learn through their practice of Strategic Design – specifically how 'Research through Design'. This phrase connotes a symbiotic relationship between the enquiry that is the research and design that generates the innovation.

2. Nature of the research

> *"Everything can be taken from a man but one thing: the last of the human freedoms—to choose one's attitude in any given set of circumstances, to choose one's own way."* (Frankl, 2014)

In the belief that unique and uncertain situations come to be better understood in an attempt to change them, this research has been a longitudinal study based on over 30-year reflective practice in developmental innovation. The motivation for research and professional practice in socio- economic innovation was forged in the context of 1970s conflict in Northern Ireland, to conflict resolution and the requirement for social innovation for positive socio economic value creation. The research has adopted ethnographically-inspired or workplace-oriented perspectives (Nilsson, 2005) to conduct analysis of particular socio – economic development projects, in order to reveal the central role of design as reflection-in-action (Schön,1983) in the hypothesised modus operandi of entrepreneurial leadership. The inquiry has culminated in a concerted 8-year period of design led reflection and analysis to contextualize and conceptualize, and thereby make explicit, the tacit knowledge gained in the reflective practice of strategic design for developmental innovation.

In totality the work represents a journey of discovery where the milestones have been the published outputs as markers for new plateaus of insight and understanding. Thus the research has been episodic and exemplifies iterative development over time. The events having been assignments or roles, intentionally sought out as research opportunities, in different contexts to test and refine ideas and hypotheses. The choice of activities has been purposeful in order to triangulate, sense check and test an evolving understanding of the role of design in socio economic value creation in regional economic development, academic, and international contexts. The overarching quest being to arrive at core principles or threshold concepts (Meyer and Land, 2006) of Entrepreneurial Leadership that have been generalizing from the specific in different domains be it in the context of, regional government policy, higher education curriculum development or international enterprise development.

In essence the research sought to understand expressions of the creative process as applied to socio-economic developmental innovation and to test the hypothesis that business design – also otherwise known as entrepreneurship was a strategic design function employed by entrepreneurial leaders in a number of different developmental contexts. It further sought to establish that how entrepreneurs operate is essentially 'desigerly' action. (Cross,2006). Consequently, the overarching aim was to further the establishment of Strategic Design as a conceptual field with core principles that are applicable in a number of different problem scenarios in different domains and/ or in a multidisciplinary arena. And further to hypothesise that Strategic Design is the modus operandi employed by entrepreneurial leaders to effect developmental innovation.

3. Why Design?

The case for a scholarly or a scientific approach to research is a given, however with respect to developmental innovation understanding the strategic design process of working from the general to the particular and then extrapolating back to the general again is a specific and unique design dynamic of oscillating between the divergent and convergent. Design is directed towards meeting a particular need or function in a commercial and social context. But design is also a process that involves investigation, inquiry, analysis and evaluation leads to insights and new learning whereby designers construct new realities in accordance with Schön's theory of reflective practice. In this sense research can be said to be conducted through design.

In pursuit of creative inventiveness, design draws from many fields and is thus integrative and multidisciplinary. Consequently, the body of knowledge in support of design has to be regarded formally as unbounded (Archer 2007). It is this crossing of boundaries, multidisciplinary inquiry and synthesis that enables research and innovation by design; episodically engaging in generative design to create tangible outputs, then employing a post solution analytical evaluation before reframing to re-enter the generative phrase. It is this fluid movement between the divergent and convergent; the generative and evaluative that allows for a simultaneous satisfying of the potentially conflicting considerations of traditional sense of design and research.

For solving the seemingly irresolvable is in itself the kernel of the design process. (Whitbeck,2011)

4. Research Context

This Paper reports on entrepreneurial leadership research conducted in the shared setting of studio practice known as Strategic Design Labs. Consequently, the research context was invariably communities of inquiry, learning and practice; made up of actors from different perspectives in a setting for studio practice where a naming, framing and sense-making approach was employed as a strategic design research methodology. The tactic was termed the Strategic Design Lab. In these co creation laboratories for change research was conducted through a problem setting and solving approach enabled by the process of naming, problem framing, sense-making, boundary setting, (Schön 1987)

This method brought a dynamic, creative and innovative approach to team based reflective practice that engenders dynamic multifaceted research. In this manner the strategic design competencies employed by entrepreneurial leaders were revealed in communities of practice in reflective practicums or studio workshops. These were displayed in communicative contexts, normally developmental situations, that were used to collect the observations.

5. Research Philosophy

It is perhaps a truism to say that the relevance of the discipline of design in social, cultural and economic domains has increased exponentially over recent years and with it the recognition of the quest for different academic tools that are redolent of the discipline's cognitive force and agency (Ralf 2007). Thus cognitive design theory (Schön 1983, 1987, Archer 2007, Kolko 2010) is central to the methodological approach; specifically research through design.

A 'designerly' approach (Cross 2006, Bonsiepe 2007, Jonas 2007) to research, conducted simultaneously with generative activity, affords a new perspective on entrepreneurial leadership. Seen through the lens of strategic design, similar cognitive approaches that are common to design and entrepreneurial leadership are highlighted. For the strategic design process, of working from the general to the particular and then extrapolating back to the general again, is a specific and unique design dynamic of oscillating between the divergent and convergent. Accordingly, Donald Schön's view on design as a reflective activity and the central role of frame creation (Dorst 2016) were taken up as situated action and situated cognition. In particular, the improvisational nature of reflection-in-action and subsequently reflection on reflection-in-action, were considered appropriate when investigating the complicated realm of socio- economic value creation.

In essence, the research philosophy employed a constructionist view (Krippendorff 2006, 2007), where reconciliation is enabled by collaborative action. It was strongly influenced by Wenger's (1998) work on communities of practice, as these are continually engaged in sense making (Goodman 1978, Schön 1987). Unlocking creativity (Robinson 2009) at the societal level across the triple helix (Etzkowitz 2012) underpined the philosophy as did systems thinking (Senge 1990).

6. Design as Research Methodology

Some maintain that design is resistant to rigorous empirical inquiry because of its multifaceted nature and the complication of measuring the outcomes (Liedtka 2015). However, the methodological approach is based on abduction; the core reasoning process that underlies the design practice of problem framing as the foundation for generative activity (Stappers 2007, Dorst 2015).

The research methodology employed throughout has been participatory action specifically that of the reflective design practitioner through a process of naming, framing and sense-making. In particular naming that which needs attention (problem or paradox) and framing the context for this as a problem setting activity.

Frame creation is a design-based approach that is purely problem-focused. As such it is the fundamental underpinning of a repertoire of generative methods employed in Strategic Design Labs. Here entrepreneurial leaders, be they expert designers, managers and/or stakeholder, are able to platform their strategic design activity so as to co-evolve multiple solutions in a co- creation process. Table 1, below depicts the range of research methods as a holistic Design Dynamics Research Model Canvas. It illustrates the combined methodological approach; its phases, methods, activity and instruments.

Table 1: Design Dynamics Research Model Canvas

Design Dynamics Research Model Canvas				
Approach	**Phases**	**Methods**	**Activity**	**Instruments**
Participatory Action **Reflection in Action**	**Exploratory Community of Practice (Venture Platform)** (1) (2) (7) (8) (9)	**1.Domain Orientation** (1) (9)	Exploration Definition Planning	Expert Reference (1) (2) Focus Group (1) Stakeholder Maps (9) Territory(position) Maps(9)
		2. Issue Scoping (2) (7) (8)	Scoping Design Implications	Conceptual Enquiry(2) Laddering (8) Design Ethnography (7) Image Boards (7) (8)
	Generative Design Workshop (Strategic Design Lab) (2) (4) (6) (7) (9) (10)	**3. Elemental Analysis** (2) (4) (7) (9)	Atomisation Juxtapositions	Mind maps(7) Thematic Networks (2) Stakeholder Walk - Though(7) (9) Relational Schema (4)
		4.Reconfiguring (4) (10) (6)	Permutations Synthesis Iterative Generation Testing Refinement	Problem Based Thought - Experiments(4) (6) Parallel Prototyping (10) Observation (6)
	Evaluative Dissemination (Published Output) (3) (5) (6) (8) (10)	**5. Deployment & Evaluation** (8) (10)	Launch Monitor Feedback Review Correct	Focus Group (8) Laddering Effectuation Improvisation (8) User trials(10)
Reflection on Reflection in Action		**6. Reflection** (3) (5) (6)	Post Project Analysis	Literature Review (3) (5) (6) Self – Reporting(3) Data Analysis Conceptual Modelling(5) (6) Impact Assessment

Numerals in brackets through this submission pertain to different developmental enterprises

The research approach was characterised by a two-fold process of episodic toggling between:

1. Reflection in Action: during the generative, solution making Strategic Design Labs.
2. Reflection on Reflective Practice: Post outcome analyses and evaluation research yielding sense-making through mapping and model making.

This resulted in a cumulative build-up of knowledge derived either by reframing in a quest for more and better solutions in the same problem space; or in a different context, application of knowledge gained in an unrelated sphere.

Three distinct phases that were in turn **Exploratory, Generative and Evaluative** made up a sequential approach:

1. Exploratory: In the first phase strategic design is an exemplar of expert design practice, where designers and stakeholders engage in reasoning from desired outcomes via frames for possible design solutions (Schön and Wiggins 1992).

2. Generative: During the second phase, Strategic Design Labs enable a network of interested parties to come together around a problem, which they collectively view from a novel standpoint. They address the multifaceted nature of the problem by creating a new and broader context. This produces underlying themes that lead to the creation of a framework for action. The activity is recorded in template proformas, photographic and video evidence and public exhibition. In the Strategic Design Lab both the problem and the solution are developed and refined in concert in a co-evolution process (Dorst and Cross 2001) to simultaneously satisfy potentially conflicting considerations (Whitbeck 2011). Through this activity entrepreneurial leaders create new concepts for developmental innovation with respect to curriculum, enterprise, platforms and policy frameworks. In this way Strategic Design Labs initiate the practice of open innovation. Where:

the investigation is initiated by problem based inquiry or thought experiment

- stakeholders design and co-create their strategic direction
- a primary investigator takes on the role of catalyst, and reflective practitioner.

1. Evaluative: The third phase constitutes analytical research and evaluation. It is a process of sense-making that articulates relationships through the use of visual diagrammatic schema. This phase takes place at the interface between Reflection – in - Action and Reflection on Refection – in - Action.

   Reflection on the ensuing trail in practice informs the deliberate proactive choice of the next inquiry as the subsequent step in the learning journey.

The research employed a range of design and business instruments (Martin and Hanington 2012). These are aligned into six sequential methods. These methods have been identified during the retrospective sense-making of participatory action during the longitudinal study. Each method is employed, to a greater or lesser extent in all of the research contributions, with variations in emphasis being contingent on subject matter or context. The methods are: - **Domain Orientation, Issue Scoping, Elemental Analysis, Reconfiguring and Evaluation and Reflection: -**

1. **Domain Orientation** describes elicitation and modelling of the area, analysis from different perspectives and issue intelligence gathering. The research involved information gathering from industry sources; reference to knowledgeable expert actors through Focus Groups; as well as Stakeholder (market segmentation) and Territory (position) Maps.

2. **Issue Scoping** defines the problem architecture through identification of components and their relation to core values. Typical research techniques used were: Conceptual Enquiry, Design Ethnography, Image boards, Laddering and Focus Group.

3. **Elemental Analysis** helps understanding of complex issues by atomisation into constituent parts. Mind Maps, Thematic Networks, Stakeholder walk though, as well as Relational Schema were employed.

4. **Reconfiguring** is concerned with the practice of strategic design for innovation through alternative permutations and syntheses generation. The primary research techniques being Problem Based Thought Experiments.

5. **Deployment and Evaluation** is by trial for verification of functional appropriateness through situational testing. Methods include: Focus Groups, User trials, Design Ethnography.

6. **Reflection** describes post project analysis that involves reviewing success factors and limitations, as well as unintended consequences, to draw inferences through new cognitive connections. Data analysis informs the development of principles and conceptual models that make new contributions to knowledge, simultaneously interpreting and anticipating patterns of unmet emerging needs to form new lines of inquiry.

7. Outcomes

The research process and subsequent knowledge building has been an experiential journey steered by design principles and practices illustrated below in figure 1. Research Through Design. The inquiry into design as a research methodology centres on how developmental innovation is practiced by entrepreneurial leaders in concert with other actors across the triple helix so as to create new shared value creation (Porter and Kramer, 2011).

The research has led to issue scoping and elemental analysis through mapping Regional Economic, Educational and Policy Development initiatives onto a Framework of Transformational Drivers and Triple Helix Challenges.

This has yielded threshold and transfiguring concepts. Threshold Concepts (Meyer and Land 2006, Yip, and Raelin 2012) are the ideas that need to be comprehended as keys to understanding the field. Whereas

Transfiguring Concepts are generative devices, normally the province of creativity, that need to be mastered as part of a design process.

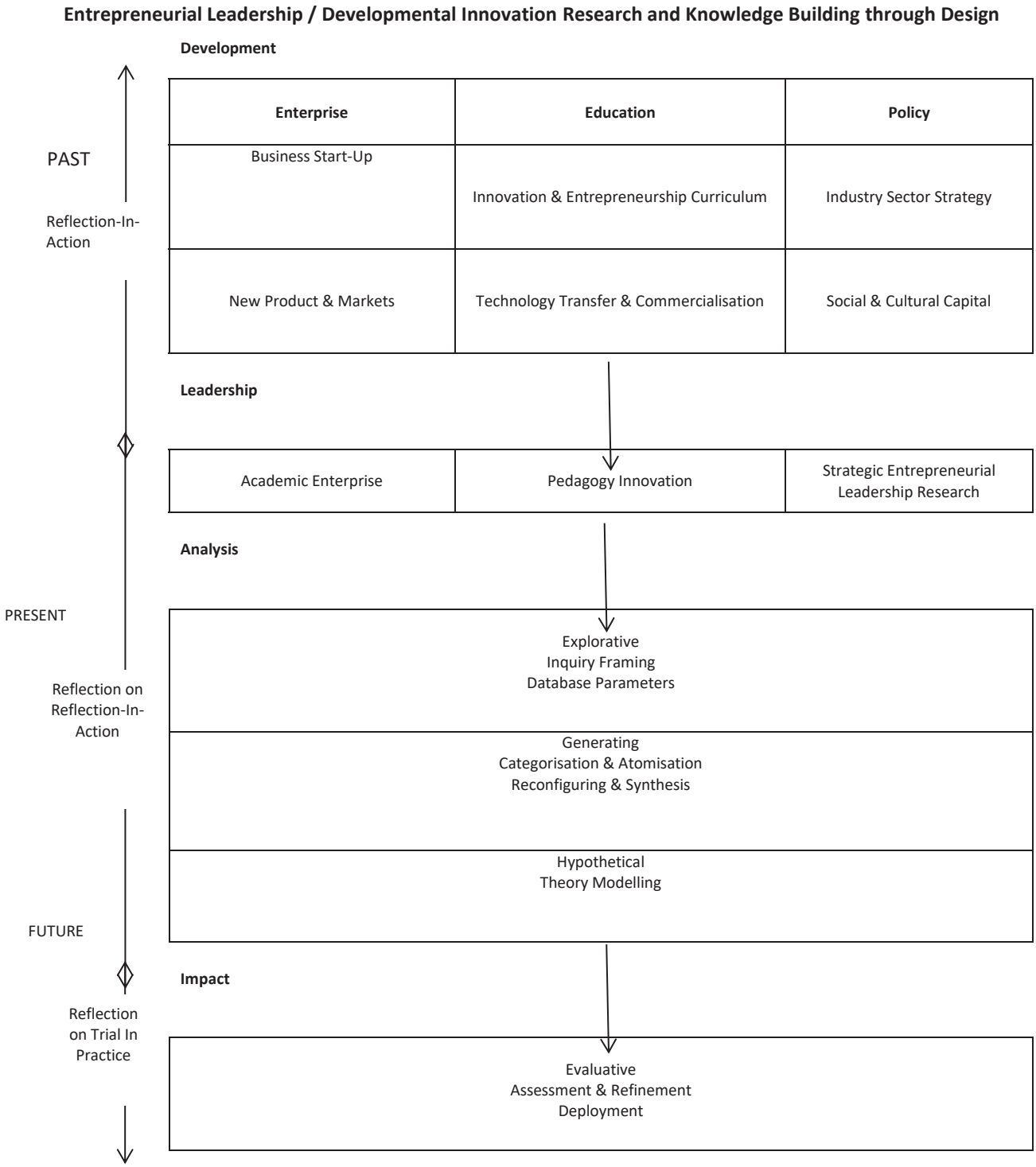

Figure 1: Research through Design

8. Conclusion and Recommendations

Reflection on the process of entrepreneurial leadership as practiced in different contexts has contributed to the extant body of knowledge through the construction of a Design Dynamics Organising Framework.These elements have coalesced to form a coherent theory of Design Dynamics that positions design as a pivotal, generative metaskill for adding value; specifically, as a set of cognitive and practical methodologies employed

by entrepreneurial leaders to deal with instability and adapt accordingly whilst engaging in developmental innovation. Future research is called for to test the theory of Design Dynamics in entrepreneurial ecosystems.

As one of the pillars of the Triple Helix, it is incumbent on Higher Education to play its part in shared value creation, both social and economic, by demonstrating Civic Entrepreneurial Leadership for regional development. This can best be done by building sound pedagogic foundations through attention to the research informed teaching and learning nexus. New methodologies that are a distillation of reflective practice, reflection in action, and trial in practice are all part of mindful experiential learning.

Research through design is an example of investigation and generative innovation that looks at iterative generative practice differently to draw parallels with entrepreneurship. As such it is an important new perspective when leading entrepreneurial academic design – the next stage in curriculum development, new studio practice methodologies and multifaceted ways of learning and knowing. Such underpinning holds out exciting prospects for a new generation of Masters level provision that are amenable to academic apprenticeships and grounded in complex ecosystems for example National Health Service, Frontier and Boarder Management, Good Governance, to name but a few.

Clearly there is a there is a need to apply, test and refine this new research by design methodology in different complex contexts, before creating new academic programmes that address leading innovation and strategic co creation so that future Entrepreneurial Leaders can navigate complexity and create shared value.

References

Archer, B. (2007), THE NATURE OF RESEARCH INTO DESIGN AND DESIGN EDUCATION KEYNOTE ADDRESS TO DATER 91, Department of Design and Technology, Loughborough University, 2007

Bonsiepe, Gui. (2007). The Uneasy Relationship between Design and Design Research in Design Research Now Ed Ralf M, Zurich Birkhauser Verlag AG Part of Springer Science+Business Media ISBN: 978-3-7643-8471-5

Cross, N. (2006). Designerly ways of knowing. Berlin: Springer. ISBN: 1846283000

Dorst, K. (2016). Frame Innovation in the Expnded Field, She Ji: The Journal of Design, Economics, and InnovationVolume 2, Issue 4, Pages 271-350 (Winter 2016).

Dorst, K. Cross N (2001).“Creativity in the Design Process: Co-Evolution of Problem–Solution,” Design Studies 22, no. 5 (September)

Etzkowitz, H. (2012). Triple Helix Clusters: Boundary Permeability at University-Industry-Government Interfaces as a Regional Innovation Strategy. Environment & Planning C: Government and Policy.

Evenson, S. & Dubberly, H (2011). Design as learning—or "knowledge creation"—the SECI model, Interactions, Volume 18, Number 1 (2011), Pages 75-79.

Frankl V.E(.2014). Man's Search for Meaning. Beacon Press(MA) ISBN 0807000000

Goodman, N. (1978). Ways of Worldmaking (Sussex, The Harvester Press).

Hazy, J K., Uhl-Bien, M. (2015). Towards Operationalizing Complexity Leadership: How Generative, Administrative and Community-Building Leadership Practices Enact Organizational Outcomes, *Management Department Faculty Publications*. 108. http://digitalcommons.unl.edu/managementfacpub/108

Jonas W (2007). *Design Research and its Meaning to the Methodological Development of the Discipline* Research in Design Research Now Ed Ralf M, Zurich Birkhauser Verlag AG Part of Springer Science+Business Media ISBN: 978-3-7643-8471-5

Kolko, Jon (2010). "Sensemaking and Framing: A Theoretical Reflection on Perspective in Design Synthesis". In the 2010 Design Research Society conference proceedings.

Krippendorff, K. (2007). Design Research, an Oxymoron? in Design Research Now Ed Ralf M, Zurich Birkhauser Verlag AG Part of Springer Science+Business Media ISBN: 978-3-7643-8471-5

Liedtka. J (2015). Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction Journal of Product Innovation Management Volume 32, Issue 6 November 2015
Pages 925–938 http://onlinelibrary.wiley.com/doi/10.1111/jpim.12163/full

Manzini E (2007). *Design Research for Sustainable Social Innovation* Research in Design Research Now Ed Ralf M, Zurich Birkhauser Verlag AG Part of Springer Science+Business Media ISBN: 978-3-7643-8471-5

Martin,B. Hanington,B.(2012). Universal Methods of Design. Rockport Publishers ISBN 978-1-59253-756-3

Meyer, J., Land, R. (2006) Threshold Concepts and Troublesome Knowledge: an introduction Meyer, J. and Land, R. (eds) Overcoming Barriers to Student Understanding: threshold concepts and troublesome knowledge (London: Routledge) pp. 19-32URL: http://www.informaworld.com/smpp/content~content=a755535080

Nilsson, M. (2005). *Workplace studies revisited*. Paper presented at IRIS 28, the 28th Information systems research seminar in Scandinavia, Kristiansand, Norway. Retrieved June 29, 2011, from http://en.scientificcommons.org/43453220

Porter M. E., Kramer, M. R. (2011). Creating Shared Value, how to reinvent capitalism—and unleash a wave of innovation and growth. Harvard Business Review https://ncg.org/sites/default/files/resources/HarvardBusinessReview_Creating_Shared_Value.pdf,

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books. (Reprinted in 1995).

Schön, D. A. (1987). Educating the Reflective Practitioner. Washington, DC: American Educational Research Association.

Schön, D.A., Wiggins, G. (1992). Kinds of Seeing and Their Functions in Designing. *Design Studies* 13(2)

Stappers, P.J. (2007). Doing Design as a Part of Doing Research in Design Research Now Ed Ralf M, Zurich Birkhauser Verlag AG Part of Springer Science+Business Media ISBN: 978-3-7643-8471-5

Steinberg, M. (2012) "Innovation and know-how as success factors of the future". Seminar Finnish Association of Consulting Firms (SKOL)

Vasari, G. Lives of the Artists Vol 1 (1965) Penguin Classic ISBN-13: 978-0140445008 ISBN-10: 0140445005

Verganti, R. (2009). *Design Driven Innovation*. Cambridge, MA: Harvard Business School Publishing Corporation.

Wenger, E. (1998). *Communities of Practice: Learning, Meaning and Identity*. Cambridge: Cambridge University Press

Whitbeck, C. (2011), Ethics in Engineering Practice and Research (Cambridge: Cambridge University Press

Yip, J., Raelin, J. A. (2012). Threshold concepts and modalities for teaching leadership practice. *Management Learning,* 43, 333-354.

Stereotypes as a Barrier to Introducing Innovations in Food Products

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Abstract: In studies of consumer behaviour on the market, a lot of attention is paid to the factors determining the choice of products. Among these factors there are also barriers and limitations, affecting consumers' decisions. The limitation in making decisions about the purchase of new, innovative products is the risk resulting from: ignorance of some new product components, lack of information about handling such product, inappropriate or unknown sensory experience of products, inappropriate sensory experience, fears of buying a product that may turn out unsatisfactory. The barriers associated with the purchase of such products include: difficulties in perceiving the product on offer, fears about new products, lack of information about the product, no possibility of comparison with other similar products, critical comments of the environment. These factors include stereotypes - well-established in society beliefs about a product, not always consistent with the latest knowledge. More and more often products appear on the market with new, atypical organoleptic features that cause mixed feelings for the consumer. It is caused by stereotypical thinking about products. The aim of the research was to show the influence of stereotypes on the selection of innovative food products. The research was carried out in a group of both: young people considered to be open to new things, and older, conservative one. The survey method, a projection method and a method of successive associations were used. It has been shown that respondents perceive sensory values of food products through the prism of stereotypes. This may negatively affect the process of commercialization of innovative products.

Keywords: barrier, innovation, consumer, stereotype

1. Introduction

The process of introducing new food products on the market is very complicated, and its effects depend primarily on behavioural responses of consumers, as a consequence, negative and suspicious feelings towards food technologies may lead to product failures. (Chen at al. 2013) When choosing a food product for itself, the consumer is guided by various factors that have the character of stimuli, brakes or conditions, and thus have a stimulating or inhibiting effect on changes in eating behaviour. Sojkin (2012), examining the factors of the commercialization process of a food product, as the main pointed out consumer's needs and behaviours. The consumer, by choosing innovative food products, is guided by messages reaching him:

- traditional (advertising, billboards, press advertisement, commercial leaflet),
- public relations (culinary programs, recipes in the press, information on the label)
- trade information (shelf display, information from sellers).

In addition, the consumer's innovativeness (curiosity, willingness to try new products or an impulse to buy) and the influence of the environment (family, price level) were considered important in this process. The limitation in making decisions about the purchase of new products is the risk that results from: adverse changes in the composition of the product, lack of information (problems with preparation), inappropriate sensory quality (flavours, taste), fear of losing funds. In addition, the author pointed to the barriers to purchase such products, which he divided into four groups: difficulties in perceiving the product on the offer, fear of new products (neophobia), lack of information about the product (insufficient information, no possibility of comparison, price of a new product), critical comments of the environment (family's assessment, lack of incentives for promotion) (Sojkin 2012). In turn, Jeżewska-Zychowicz (2014) presented a model of factors affecting the acceptance of innovative products, which she divided into three groups: social system (economy, politics, culture, religion, social norms, social trust), factors related to the innovative product (price, convenience of use, taste, appearance, presence of pro-health ingredients) and factors related to the consumer. The last group included socio-demographic factors (age, sex, education and income), psychological characteristics (tendency to explore, nutritional neophobia, dietary preferences, innovation) and psychosocial features (knowledge of food and food technologies, views on benefits and health risks, attitudes towards food).

Many authors believe that it is impossible to separate treatment of individual factors. Each of them must be seen in the context of the others. A thorough knowledge of these factors and the strength of their mutual connections creates the opportunity to influence the selection, acceptance and consumption of certain food products more effectively. Consumers are faced with numerous restrictions and barriers when choosing a product. These barriers include lack of knowledge about the object, uncertainty, risk (e.g. related to the purchase of a new, unknown product), perceived threats and prejudices. Prejudices against food arise from the individual's experience or social beliefs conditioned by stereotypes functioning in society. It can therefore be assumed that stereotypes affect the choice of food and nutritional behaviour.

2. Stereotypes and a food choice

The stereotype is defined as functioning in society generally well-worn belief on the subject, not always in line with current knowledge. A stereotype was defined as an image of some people, things or phenomena, fixed in the consciousness of many people and difficult to change (Bańko 2000). Stereotypes can also refer to non-human objects. Stereotypes play an important role in human life, in its cognitive processes, in the perception of other people or groups and in interpersonal communication. They facilitate and economize the lives of individuals and societies. Aronson et al. (1997) and Stephan and Stephan (1999) found that the use of stereotypes allows for time-saving and energy simplistic categorization and facilitates object without the need to learnt it in detail. Similarly, Domachowski (2001) treats the stereotype as a scheme emerging in the process of cognition, involving the inclusion of a person or an object into a certain category on the basis of the characteristic features that are assigned to it. The issue of stereotypical thinking about products and its impact on consumer behaviour, including the choice of food has been the subject of very few studies. The analysis of the results of these studies allows the thesis that stereotypes may concern various objects and their individual features, which determines the choice of products and consumer behaviour.

The evaluation of products, their quality and importance as well as the predisposition of people to generalization and categorization of objects are often based on stereotypical perception. Stereotypical perception of the product on the one hand may be a barrier for the consumer, and on the other hand, motivation in choosing, buying or consuming it. Stereotypical beliefs cause the exclusion or inclusion of products from the diet, which may determine dietary mistakes, bad eating habits, shortages or excess nutrients. It also affects the functioning of the market, the demand for specific products, sales volume and income obtained. Stereotypes can be a barrier when introducing new or innovative products to the market.

3. Experimental

3.1 Method

The aim of the study was to determine the effect stereotypical thinking on the choice of selected food products by getting to know consumers' opinion on selected products with typical and atypical features. Fruit and vegetables were chosen as the subject of the study. The study was conducted in a group of 177 people, which were both young people, open to innovation (88 people - 50%) and people in late middle age, more conservative (56-70 years) (89 people - 50%) (Rybowska 2018). The direct question method was used. The questionnaire contained two questions regarding the perception of products with typical and unusual features and the willingness to consume them. In the first question, the respondents were asked to give the colour of products with which these products are associated. For this purpose, the successive association method was used. The results of the research were presented as a percentage of indications. In the next question, the surveyed presents photos of selected vegetables with different appearance features (colour, shape). These products were divided into two categories: typical products (T), which were characterized by known features to which the consumer is accustomed and untypical, which differed in appearance from typical products. We made a deliberate choice of objects, suggesting their popularity, availability and market differentiation. Four vegetables were chosen (tomatoes, cucumbers, carrots and peppers in different varieties).

The respondents were asked to determine the willingness to consume the products shown in the pictures and rank them in the order from "I definitely want to consume" to "I definitely do not want to eat" (scale of rank), and then assigned numerical values to these terms. The obtained results were presented as an average value ($\bar{x}$), which was used to prepare a ranking (R) of varieties depending on the declared willingness to consume them. The lowest average value corresponded to the high intake of the product, while the highest average indicated products that the respondents would not like to consume. Using the Student's t-test, the significance of differences between typical and untypical products was assessed.

3.2 Results

All respondents associated tomatoes with the red colour, which was in the first place, followed by yellow (75% indications), raspberry (68%), green (24%) and black (12%). Tomatoes with an unusual colour were known by the younger part of population and it was they who indicated the colour of the vegetables. Older respondents (after age 56) indicated tomatoes with typical red (100%) and raspberry (78%) colour and yellow tomatoes (35%). Polish cucumbers, popular in Polish cuisine, were associated by consumers only with green colour (100% indications). Cucumbers with an unusual white or yellow colour are rarely available in Poland and therefore unknown to consumers. In the case of carrots, the respondents indicated two colours: orange (100%) and dark purple (15%). Carrot varieties with orange colour are the most popular on the Polish market, and those with a different colour are available from recently. Peppers were associated with red colour (100% indications) and green (100%) in the third place were yellow (63%) and white (15%) peppers. Older people most often indicated red and green, while young all mentioned colours. This research confirmed that consumers associate vegetables with typical colours, which is proof of stereotypical thinking.

In the next stage, respondents were asked for opinions about the different varieties of vegetables presented in the pictures, which were distinguished by different organoleptic features and ranked them in order according to the willingness to consume.

The subjects presented in the pictures were nine tomato varieties, which differed in the colour and shape of the fruit. It was shown that respondents would like to consume vegetables with typical, known appearance features that consumers are accustomed to (Table 1).

Table 1: The rankings of varieties of individual vegetables according to the declared intentions of consumption

Variety	Characteristic features	$\bar{x}$	SD	R
Tomatoes				
Zyska	Red colour, Extended cylindrical shape (T)	2,82	2,3421	**3**
Indigo Rose	Dark violet colour on the outside, red, spherical, medium-sized flesh	8,01	1,4838	8
Tigerella	Red in orange-yellow stripes, round, large	7,11	1,4548	7
Denar Polski	Red colour, pear shape	4,91	1,7626	5
Złoty Ożarowski	Colour: yellow, round, medium size	5,21	2,2391	6
Zebrina	Black colour, spherical shape	8,25	1,3356	9
Atol gruntowy	Red, spherical, medium-sized (T)	1,81	1,2465	**1**
Costoluto Fiorentino	Red colour, with flattened, ribbed fruits	4,22	1,5404	4
Faworyt	Red, round, large (T)	2,16	1,8672	**2**
Cucumbers				
White Wonder	Skin colour celadon-white, covered with a small number of warts, oblong shape, bulging (oval)	3,56	2,3597	4
Carosello Barese	Greenish-white skin, on the surface you can see distinct longitudinal ribs and delicate pubescence	4,98	1,1935	5
Lemon (Citrone)	Yellow colour, round shape	3,46	1,6726	3
Octopus	Green skin colour, oblong (T)	1,11	0,2601	**1**
Delicius	Green skin colour with white streaks, oblong (T)	1,87	1,1143	**2**
Carrots				
Deep purple	Purple bark colour and orange root core, typical shape	1,99	1,4872	**2**
Karotka	Orange carrot, typical shape (T)	1,14	0,4872	**1**
Gold Nugget	Yellow carrot, typical shape	3,10	1,2525	**3**
White Satin	White and crayfish carrots, typical shape	3,25	1,2537	4
Peppers				
Ożarowska	Red colour, typical shape (T)	1,34	0,7528	**1**
Marta	Yellow colour, typical shape (T)	1,42	0,8365	**3**
Quatro	Green colour, typical shape (T)	1,39	0,7695	**2**

Etiuda	Orange colour, typical shape	2,53	1,6273	4
Oda	Dark violet colour, typical shape	3,38	1,7501	5
Diament	White colour, typical shape	4,53	2,2423	6

(T) – typical; source: own research.

The first places in the ranking included tomatoes with a typical red vegetable colour and spherical or elongated shape, while on the last two places with a dark (purple and black) colour of the fruit. The age of the respondents did not significantly differentiate their opinions, although young people would eat tomatoes with unusual values more willingly than older ones. The respondents stated that they would eagerly eat cucumbers with a typical green colour and green with white streaks and a smooth skin, and would not like to eat cucumbers with a light skin colour. Cucumbers with an unusual celadon-white and yellow skin colour and unusual oval or round shape did not encourage them to eat. In the last place in the ranking there was a variety of cucumber with a typical oblong shape and a greenish colour of the mossy skin. Consumers expressed their willingness to consume carrot varieties with a typical orange colour, and those with unusual features were on the last places in the ranking. Respondents would be more likely to eat peppers with a typical than unusual colour, but in this case the greatest reluctance was found with regard to the pepper with a white skin colour, which was not sensory attractive. The dark colour of the peppers did not inspire their decisive reluctance. Pepper is used in the kitchen as an addition to dishes, and as a component of salads and the addition of its many-colored varieties affects the visual attractiveness of the dish.

Table 2 presents the results of the comparison of the willingness to eat vegetables with typical and atypical features. The respondents declared a greater willingness to eat vegetables with known characteristics recognized as typical for him. There were statistically significant differences in the willingness to eat vegetables with typical and atypical features.

Table 2: Declared willingness to eat vegetables with typical and unusual characteristics.

Product	**Varieties**	$\bar{x}$	**SD**	
Tomatoes	typical	1,96	0,8453	t= 15,329, p<0,001[a]
	untypical	6,58	0,3145	
Cucumbers	typical	1,55	0,5843	t= 12,651, p<0,001[a]
	untypical	4,87	0,8566	
Carrots	typical	1,24	0,4643	t= 11,561, p<0,001[a]
	untypical	3,67	0,7532	
Peppers	typical	1,75	0,6753	t= 13,322, p< 0,001[a]
	untypical	4,67	0,7484	

a - statistically significant difference, source – own research.

4. Discussion and conclusion

In recent years, more and more unknown fruit and vegetables have appeared on the Polish market. They are often popular products in other regions of the world, and sometimes completely new ones obtained by crossing varieties with others. They are often characterized by organoleptic features that are unusual for a given species (colour, shape, taste, smell) different from those to which the Polish consumer is accustomed. Such action is aimed at making the market offer more attractive and allowing the consumer a wider choice. The variety of food products can significantly affect the choice. Attachment to known attributes may be a barrier to choice, and at the same time to encourage the emergence of new stereotypes. The product must be of interest to the customer, and hence performs a specific marketing function. Such new products differ from typical products (prototypes) by different organoleptic characteristics. Most often it concerns the appearance of the product: its colour, size, shape and quality of the skin and its texture. It may also differ in the colour of the pulp or its texture (consistency). The change of these characteristics determines the culinary usefulness of new varieties (vegetables for salads, for cooking, for preserves). Definitely less often, such differences relate to taste or aroma, although examples of fruits and vegetables in which these characteristics have changed may be given: pineapple-flavoured strawberries, pear-flavoured apple etc. Often, the generation of new varieties also aims to create new functional products. In the case of fruit and vegetables, obtaining a dark colour was associated with an increase in antioxidant properties, thus increasing the health-promoting potential of these products, but also the culinary attractiveness desired by the catering industry and consumers. New varieties give the possibility to choose vegetables in colour, for example only purple (eggplant, broccoli, chicory, kale,

carrot, tomato, lettuce, radish and others). This selection influences the variety and attractiveness of the dishes served.

A product with typical features was a kind of message about its quality. The name caused the automatic association of the product with its characteristic features, evoking specific emotions and attitudes towards it, eg. the willingness to consume. So it can be talk about the symbolic meaning of typical products. This typicity also facilitated verbal communication, making it possible to shorten the message, which does not require additional, detailed description of the product. To determine it, it was enough to use the product name, and the message was correctly received and interpreted by the recipient. With the introduction of new varieties, the situation has changed dramatically, and simple and easy to communicate until now requires more time and commitment. A new group of stereotypes is emerging. In the era when products with an unusual colour are available on the market, using a typical colour to describe them becomes a stereotype. A good example of this can be tomatoes. At the moment when tomatoes appear on the market with a different colour, it is stereotypical to say that the tomatoes are red. The same applies to other vegetables and fruits. The thinking about these products and their qualities will also be stereotyped.

The occurrence of typical products with permanent unchanging features constituted a kind of order and facilitated communication, including market communication. Consumers perceive the quality of the product through the prism of colour, for example, red apples associate with ripe, sweet fruit, and green on the contrary: with sour and immature fruit (Baryłko-Pikielna and Kostyra 2007, Śmiechowska and Dmowski 2014). The introduction of new varieties with changed traits causes a disruption of this condition, and may even arouse fear and insecurity. A known product is considered safe, and this awareness is one of the determinants of attachment to a specific product or brand. A new, unknown product or product with changed characteristics may cause psychological discomfort to the consumer. Unusual changes in the product are associated with genetic and food GMOs. They arouse anxiety among consumers who do not know what to expect from such products, what organoleptic properties they possess and what effects they have on the body.

Consumers' habituation to constant, invariable features of the product in its original form resulted in automatism when making decisions and making purchases. He also expressed himself in thinking about the product, its features and application. Meanwhile, the change in the appearance of products causes disturbances in this thinking and, as a result, a barrier in its choice.

As a conclusion it could be said that stereotypical thinking may negatively affect the process of commercialization of innovative products.

References

Aronson E., Wilson T.D., Akert R.M. (1997) Psychologia społeczna. Serce i umysł. Wyd. Zysk i S-ka, Poznań. (in Polish)

Bańko M. (red.) (2000) Inny słownik języka polskiego. Wyd. Naukowe PWN, Warszawa. (in Polish)

Baryłko-Pikielna N., Kostyra E. (2007) Sensoryczna analiza żywności. [in:] Gawęcki J., Baryłko-Pikielna N. (eds.) Zmysły a jakość żywności i żywienia, Wyd. AR w Poznaniu, Poznań, p. 143. (in Polish)

Chen, Q., Anders, S., An, H., (2013) Measuring consumer resistance to a new food technology: a choice experiment in meat packaging. Food Qual. Prefer. 28 (2), pp. 419–428.

Domachowski W. (2001) Przewodnik po psychologii społecznej, Wyd. Naukowe PWN, Warszawa, p. 145. (in Polish)

Jeżewska-Zychowicz M. (2014) Uwarunkowania akceptacji konsumenckiej innowacyjnych produktów żywnościowych, ŻYWNOŚĆ. Nauka. Technologia. Jakość, 6 (97), pp. 5–17. (in Polish)

Rybowska A. (2018) Stereotype as a behavior determinant of food products consumer. Wyd. Akademia Morska w Gdyni, Gdynia.

Śmiechowska M., Dmowski P. (2014) Barwa jako element marketingu sensorycznego i ważny czynnik wyboru produktu. Zeszyty Naukowe Uniwersytetu Szczecińskiego Nr 825, Wyd. Naukowe Uniwersytetu Szczecińskiego, Szczecin, pp. 343–359. (in Polish)

Sojkin B. (2012) Konsument jako determinanta procesu komercjalizacji produktu żywnościowego, [in:] B. Sojkin (ed.) Komercjalizacja produktów żywnościowych, PWE, Warszawa, pp. 108-154. (in Polish)

Stephan W.C., Stephan C.W. (1999) Wywieranie wpływu przez grupy. Psychologia relacji. GWP, Gdańsk. (in Polish)

Entrepreneurship in the Tourism Sector: The Błędów Desert as an Area of Entrepreneurship and Innovation Development

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Abstract: Nowadays, tourism is one of the largest phenomena and the most important economy sector in many countries around the world. The number of participants of the global tourist traffic has already exceeded 1 billion people who perceive tourism as a way of spending free time. The aim of this publication is to present and evaluate entrepreneurial activities in the field of revitalization and stimulation of the tourist development of the Błędów Desert as a unique but relatively unknown desert area in Europe. The subject concerns its exceptional tourist value both in Poland and abroad. Deserts in Europe are a rare and distinctive element of the landscape. The analysis of a wide range of activities undertaken in recent years to develop the tourist destination of this once neglected area is worth discussing in the form of an article. The scale of activities, entrepreneurial initiatives and manifestations of innovativeness of many stakeholders can be considered as a model for other tourist resorts. This paper characterizers and discusses the tourist valuation of the Błędów Desert. It also describes the functioning of this tourist attraction in the past and lists special elements influencing its tourist potential and attractiveness for tourists. Next, the article analysis the activities of non-governmental organizations, local communities and self-government authorities in the Błędów Desert, presents the positive effects of joint activities of all interest groups and demonstrates the most important achievements and successes in this field. The main research problem of this work is the assumption that the joint activity of non-governmental organizations, local self-government and local communities can be a significant stimulus in the development of entrepreneurship and innovation in their areas of activity. The article is written with the use of dense book materials, magazines as well as netographic information and telephone conversations with representatives of local organizations and entrepreneurs associated with the tourism industry. The research methods used while writing this publication is literary criticism. The test results positively verify the thesis.

Keywords: Desert area, non-governmental organizations, local government, local community, tourism.

1. Introduction

Contemporary tourism belongs to the most dynamically developing areas of the economy. Tourism creates jobs, brings income, and has a significant impact on its surroundings. The vast majority of existing countries in the world feel the benefits of participating in the global tourism movement.

The purpose of the publication is to characterize and evaluate entrepreneurial and innovative activities on a example of the Błędów Desert, analyzed as a rare and fairly unknown desert area in Europe.

The work presents the history, characteristics and values of the Błędów Desert. It also indicates the most important elements shaping its tourist potential and attractiveness for tourists.

The analysis covers the effects of the work of non-governmental organizations, local communities and local government authorities operating in the Błędów Desert; as well as presents the results of joint activities and the most important achievements and successes in this field.

The main thesis in the work is the assumption that the joint activity of non-governmental organizations, local self-government and local communities can be a key impulse in the development of entrepreneurship and innovation in their areas of activity.

The article is based on books, magazines and netographic information and telephone conversations with numerous stakeholders. The research method used in the article is literary criticism and telephone interview.

2. Characteristics and touristic potential of the Błędów Desert

The Błędów Desert, popularly known in the literature as the "Polish Sahara", is the largest area of post-glacial origin sands in Poland, situated in the border of the Silesian Upland and the Olkusz Upland. It is also the largest area of inland sands occurrencing in Europe. The desert is located within the boundaries of the Eagles' Nests Landscape Park and is included in a network of nature protection areas “Nature 2000” (Skała 2005).

The desert is named after the village of Błędów (Dąbrowa Górnicza district), which at the same time is its western border. The eastern boundary of the Błędów Desert is the Klucze municipality. The northern border of the desert is the village of Chechło, and in the south it borders with a large forest area and the national road No. 94. In terms of administration, the "Polish Sahara" is located in the province of Silesia and Lesser Poland (Figure 1).

Figure 1: Location of the Błędów Desert

Source: https://www.gridw.pl/.

The desert covers an area of about 33 km². Its length is approximately 10 km, and the width approaches 4 km. The average thickness of sands is 40 m (up to 70 m maximum). The desert is divided by an overgrown belt stretching along the Biała Przemsza riverbed into two parts: northern - smaller one, and southern - larger one (Figure 2). In contrast to the northern part, the southern part is characterized by a more varied and deflating type of sculpture. There are many convex forms here (Szczypek and others 2001).

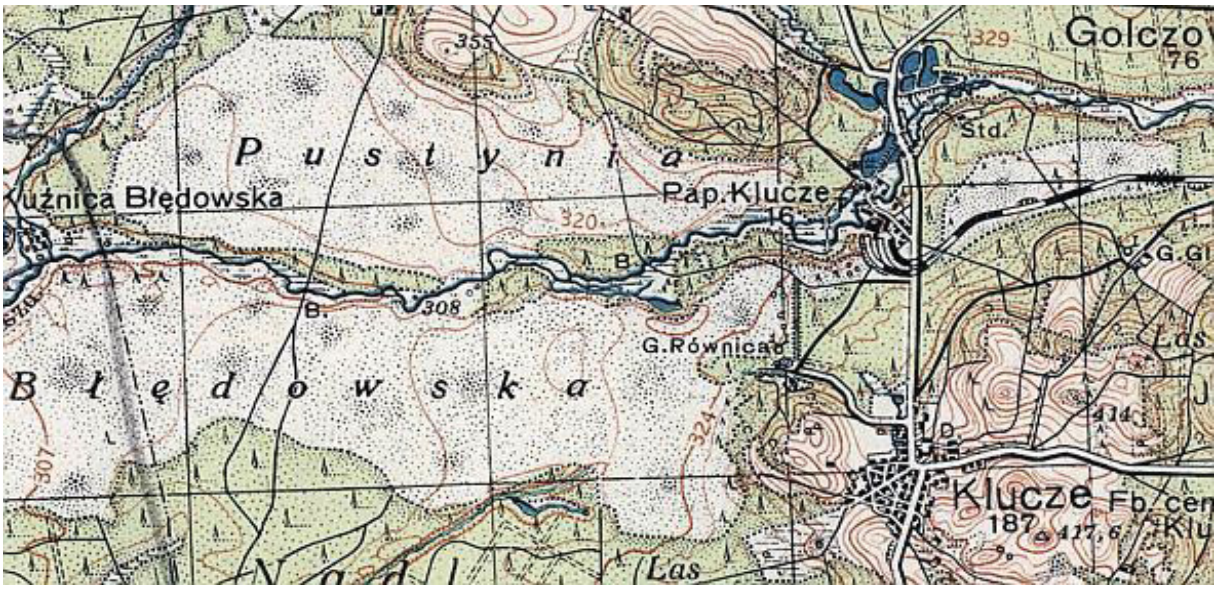

Figure 2: Map of the Błędów Desert

Source: http: //www.dabrowa.pl/DG_MAPOWNIK_PLAN_1929/19290000_m4_pl_dg_pustynia_cala_wig_4b-.jpg.

Unlike most desert areas in the world, the Błędów Desert does not have natural origin. Deserts such as the African Sahara or the Asian Gobi were created as a result of a persistently low rainfall, high temperatures and lack of water in the soil. In Poland, such natural conditions do not occur (Bryś, Gołuch 2009).

For the first time the term *Błędów Desert* was introduced to the literature in the mid-19th century and referred more to the specificity of the landscape than to the nature of the desert itself (Klimaszewski 1972).

The Błędów Desert was created as a result of human interference in the natural environment. About 10,000 years ago the area of today's desert was covered by dense pine forest. The intensive development of the mining industry and metallurgy in the area of Olkusz, dating back to 13th century, resulted in deforestation, the timber served as a material to strengthen the construction of shafts and drifts. As a result of intensive exploitation of wood resources, significant areas of the forest were cleared. Then, the thick deposits of sands located here were exposed by activating the aeolian processes (wind blowing caused by wind force) forming a desert area. The changes in the environment caused by the human interference lead to the creation of a specific microclimate in this area. Even in the 1920s, it was possible to observe the phenomena characteristic for natural deserts (mirage, sandstorms, dunes) (Leńkowa 1988).

Since the 1950s, the appearance of the desert has been transformed. As a result of the actions taken, a significant part of the desert was plowed and planted with the common pine, the red oak and the Caspian willow. In addition, pine and birch pine trees were planted in the western part of the desert. Such actions were aimed at stabilizing sand movements which posed a threat to the people living in the neighboring villages. These actions combined with the industrial dust and the observed rising water level caused a significant reduction in the surface of the discovered sand. (Alexandrowicz 1962).

The result of the above-mentioned activities was a significant change in the desert image for many years. Its current appearance with exposed sandbars has been preserved only in fragments near Klucze and Chechło. In addition, a sandstone main running through the "Polish Sahara" terrain completed the process of the destruction of a large part of the desert in order to supply sand for filling the nearby mines (Kazimierowski 2001). The derivative of the changes was also a clear loss of valorization of the desert tourist and a decrease in interest from tourists.

The desert area is characterized by outstanding natural values. In the Błędów Desert, especially its southern part, there are about 350 species of plants, many of them desert-like and typical for coastal dunes. Among the unique and protected species, the spiny broadleaf, the broadleaf and red-veined helleborine, the clam-do clematis, the sand dormer and the psammophyte (fescue, brush-gray) are worth mentioning (Kulpiński 2012).

Mainly birds and insects belong to the desert fauna. The birds worth mentioning are the bittern, the white-headed lapwort, the lonely wader, the lark frond, the pipit, the river plover, the turtle-dove, the golden wagtail, the nightingale, the nut-nut. There was also a stone-curlew and grouse here.

Among many species of insects which occur here, the following are particularly noteworthy: many species of beetles, the predatory ant and the Polish cochineal. The latter was mass-produced in order to obtain a red dye for fabrics in the fifteenth and sixteenth centuries. At that time, Poland was the main Europe’s supplier of this dye. Additionally, i. e. the common toad, the grass frog or the sand lizard can also be met in the area (Bogdanowicz et al, 2010).

In the past, this desert was used as a training ground for military purposes. During the World War I, the legionary infantry battalion trained there. During World War II, the desert served as a training field for German airmen and the soldiers of the famous Africa Korps. Currently, only the northern part of the desert serves as a military training field. In 1999, the desert was the place of NATO's maneuvers. Today, only a parachuting exercise takes place here, which may be a kind of attraction for observers. Only a few fragments of the bunkers, observation shelters and other military facilities have survived to the present day. As a curiosity, it can be added that the Błędów Desert was one of the locations for shooting the film “Pharaoh’’ based on Bolesław Prus’s novel.

The desert has been used for many years for tourist purposes. As a specific area in the country, as well as Europe, it is the destination for hiking and horse riding. Some tourists also travel through its expanses by bicycles or quads. Viewpoints and marked tourist trails also serve tourist development of the area.

In the Błędów Desert there are two interesting viewpoints – Klucze - Czubatka located 382 m above sea level; and Chechło- Dąbrówka, 355 m above sea level. Both points provide interesting views and are tourist destinations.

The Błędów village is connected with the Klucze village by the Yellow Desert Trail. The trail is about 25 km long. It runs through the entire desert area, mainly through the forests on the Jurassic hills where, from time to time, small outcrops of limestone rocks can be seen. The only horse raiding trail passing through the desert area is the Trans-Jurassic Horse Trail with a branch towards Chechło, through the ford on the Biała Przemsza river. The trail is about 250 km length in total and is marked orange. In addition, the following educational trails can help explore this area:

- Educational trail around the Błędów Desert (3 km) - red signs,
- Educational trail around the Klucze Land (1.5 km) - black signs,
- Educational trail of the Błędów Swamp (3 km) - brown signs.

The first of the trails leads through the hills characteristic for the Jura with rocky outliers and reclamated areas of the burnt sites after the great fire in 1992. Many species of protected flora and fauna can be seen there. The entire trail consists of eight thematic stops (Lamorski 2014).

An undoubted advantage of the Klucze Land trail is the large diversity in a relatively small area - from the most fertile, wet alluvial forests, through beech and mixed forests, to pine forests and the poorest and driest habitats in the Błędów Desert (Szczasny 2001).

The third trail makes it possible to discover marshlands near the Biała Przemsza river, numerous meanders, oxbow lakes and rare travertine rocks. The death place of Francesco Nullo from 1863 is also an attraction. The trail has two stops.

3. Błędów Desert as an area of entrepreneurship and innovation development

In the last few years, the economic situation of the Błędów Desert has begun to change significantly. The area, which was previously slightly forgotten, with relatively poor infrastructure and tourism development, has gained a new life and become a large tourist attraction even on a supra-regional scale. Until recently, the tourist traffic was small and mainly generated by the local residents, and now has clearly increased.

The key initiator and originator of the changes taking place is the Klucze municipality located in the desert. Thanks to the efforts of the municipality, the funds were raised for two important projects which effectively contribute to the development of entrepreneurship and innovation in the "Polish Sahara" area.

The first, important initiative was the *Active protection of a complex of priority habitats on sand in the Błędów Desert* project co-financed by the European Union. The objective of the project was related to the achievement of the proper level of protection of the largest complex of two sandy Polish habitats: the thermophilic grasslands and the inland dunes. In a broader sense, the project involved the restoration of the part of the Błędów Desert its typical desert features.

The solution to the problem was related to the removal of trees and shrubs on the area of about 300 ha of the Błędów Desert. Additionally, a buffer zone of approximately 100 ha was created for scientific and monitoring research, which will enable comprehensive analysis of vegetation dynamics and biodiversity changes (Figure 3).

Figure 3: Map of the "Błędów Desert" project

Source: http: //www.pustyniabledowska.eu/index.php? Option = com_content & view = article & id = 18 & Itemid = 19 & lang = en.

Implemented in the period 01.01.2011 – 31.11.2014, the project had a budget of about 2.5 million euro. Fifty per cent of the funds came from the European Commission’s Life Plus programme, the rest, or forty-five per cent, was contributed by the National Fund for Environmental Protection and Water Management in Warsaw, while the remaining amount was contributed by the Klucze municipality. It was the first such a complex project since the 1950s in this area. As part of the obtained funds, the following goals were achieved:

- cleaning and removal of unexploded ordnance and unexploded ordnance from the revitalized desert area,
- inventory of natural resources and scientific expertise,
- removal of trees and shrubs,
- implementation of environmental monitoring and measurement of the effectiveness of activities carried out,
- creation of new educational trails with infrastructure,
- creation of the Desert Information Centre,
- organization of a series of workshops and international conferences,
- development of a manual for the protection of sandy grassland habitats in Polish and English.

The results of the clearing of trees and shrubs can be assessed by comparing the situation in the desert in 2006 and in 2016 (Figure 4).

Figure 4: The appearance of the same fragment of the Błędów Desert in 2006 and in 2016

Source: http://malopolskie.fotopolska.eu/864995,foto.html.

One of the most important achievements of this project was the establishment of the Desert Information Centre in the village of Klucze. According to Kamil Wołek, an employee of this organization, the Desert Information Centre is the key coordinator of the development of local entrepreneurship and the promoter of the values of the Błędów Desert beyond this region.

The organization runs numerous thematic workshops, conferences and trainings. The promotion is also carried out through its own website and co-organizing numerous cultural events.

The activity of the Desert Information Centre bore important fruit in the creation of two new educational trails each 3 km long. The theme of the trails concerns eolitic processes and is addressed especially to geotourism enthusiasts. The trails marked red and green have 2 gazebos and 2 lookout points on the route. In the future, it is planned to enrich the paths with elements of the military equipment found here which would create the foundations for the development of military tourism. At the same time, an 18-meter high observation platform was built in the shape of an equilateral triangle on the Dąbrówka hill. This significantly improved the tourist valorization of this part of the Błędów Desert.

As part of the Life Plus programme, the consortium of Habitat Selection S.C. and Naturalists' Club from Świebodzin has made a physical inventory of the current state of preservation of valuable species of plants, fungi and animals found in the Błędów Desert. The results of the research showed the need to increase the area of desert habitats, in order to allow the expansive spread of specific species of flora and fauna.

The positive results of the project also include the issuing of several new professional publications which contribute to the popularization of the Błędów Desert. The publications relate to the protection of sandy grassland habitats, desert trails or natural issues related to the desert. In order to attract foreign tourists to the desert, some of the articles are available in the English version. However, bearing the youngest tourists in mind, the a special guide called “A maddening guide” (“O-błędny przewodnik") was created which, in addition to the sightseeing content, includes a description of desert games and activities. The guide intends to inspire teachers and parents to spend time with children in a desert environment.

Another plan implemented by the Klucze municipality is the project "Protection of the valuable natural area of the Błędów Desert and its promotion". The project is planned for 2014-2020 and received a budget of about half a million euro. As part of the undertaken activities, the removal of suckers of such species will take place: the Caspian willow, the poplar, the silver birch, the Scots pine, the sand reed and the sand blast. Other intended activities assume making the desert attractive for tourists.

The key and at the same time innovative achievements under the currently implemented project include the construction of the “Desert Village" in 2017 with gazebos, viewing beams, pedestrian bridges and sanitary infrastructure along with monitoring. The complex has also been equipped with information and educational boards. The “Desert Village" due to its avant-garde shape was called the “Desert Rose". The investment was built to the south of the village of Klucze and was intended to facilitate the tourist penetration of the eastern part of the Błędów Desert. According to the information of the Klucze municipality office, several thousand people visit this new tourist attraction every weekend (Figure 5).

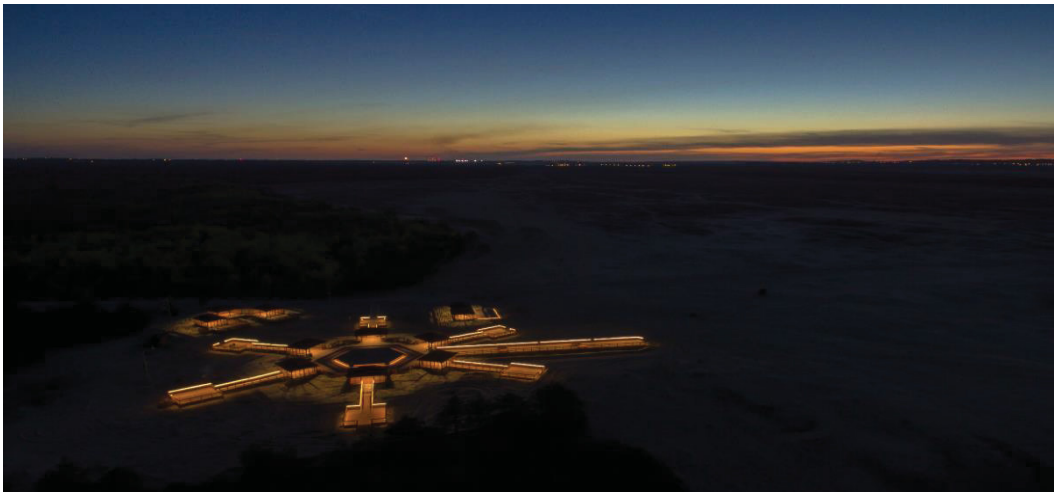

Figure 5: Desert Village ''.

Source: http://www.gmina-klucze.pl/art,2265,pustynna-wioska-dla-turystow.

In addition to the Klucze municipality and Desert Information Centre, an important contribution to the development of entrepreneurship in the Błędów Desert is played by Lokal Action Group (LAG) "Over the Biała Przemsza River" ("Nad Białą Przemszą") based in Klucze village. This non-governmental organization established in 2007 deals primarily with promotional activities. Jolanta Motyczyńska, a member of the board of the LAG "Nad Białą Przemszą", claims that by publishing folders, brochures and press publications, the organization contributes to the promotion of knowledge about the Błędów Desert and presents its qualities to potential tourists. The organization also plays a role of a coordinator in the field of obtaining EU funds under the "Rural Development Programme" for various economic projects concerning, among others, the development of the "Polish Sahara" tourist product. In the future, the efforts are planned to include for the construction of Nordic walking paths that would run through the desert area and the introduction of animals (e.g. goats) into the desert, which would prevent it from overgrowing. The idea of bringing camels to the desert is also considered an innovative and also interesting idea. It would give the opportunity to expand and enrich the existing tourist product.

The organization also activates the residents, the local government and tourists by organizing joint cultural events and festivals. During these events, among others, the local gastronomic products such as "bread with Jurassic lard", "spawn of a spring" or, "soup from Bydlin" are promoted. Thanks to the efforts of the LAG "Nad Białą Przemszą'', the desert has its own original gastronomic product, namely the "charm of the desert". The "charm of the desert" is a 51-per cent alcohol beverage produced for generations in the Błędów Desert, according to the unchanged recipe which entered the Minister of Agriculture's List of Traditional Products on December 21, 2012. The beverage is produced on the basis of rye growing around the Błędów Desert and water with sugar or local honey.

The growing interest in the "Polish Sahara" also translates into the development of accommodation and catering facilities in its neighborhood. The current state of the accommodation base in the Keynes municipality is presented in Table 1.

Table 1: Accommodation base in the Klucze municipality in 2018

Name	Type of object	Lokation	Established year
Manor House over the Backwaters	Hotel	Klucze	2014
Cottage at Funia	Holiday Home	Golczowice	2011
Jurna Cottage	Agritourism Farm	Godawica	2013
Forest Corner	Recreation Centre	Jaroszowiec	2013
Agrotourism Farm, Family Mrówka	Agritourism Farm	Golczowice	2008

Name	Type of object	Lokation	Established year
Valley of Frog Ponds at Tukaj	Holiday Home	Chechło	2007
Agrotourism at Felek	Agritourism Farm	Golczowice	2012

Source: Own study based on data: http://www.gmina-klucze.pl/p,92,noclegi

The analysis of the data contained in Table 1 indicates a significant increase in the number of accommodation facilities in the Klucze municipality in the period after 2011. The main role on the local tourist market is played by inexpensive agritourism farms.

4. In conclusion

The present-day Błędów Desert is certainly an area of developing entrepreneurship and innovation. Thanks to the cooperation of non-governmental organizations, local governments, as well as the residents themselves, the measurable progress has been made in increasing the attractiveness of tourism and the promotion of this undoubtedly unknown tourist attraction in Poland. For the first time in many decades, the Błędów Desert has gained new life. The thesis put forward in the publication has been proved. The cooperation of these entities can be a significant stimulus in the development of entrepreneurship and innovation in their areas of activity.

The progress of tourist development of the desert has also significantly influenced the situation in the field of the local entrepreneurship. The increase in the number of tourists or the expansion of the accommodation base prove the positive tendencies to which activities in the desert have led. More and more people are also employed in the tourism and tourist sector. It is to be hoped that the current plans will contribute to even more positive results.

On the basis of the arguments cited, we can answer the research question, that joint activity of non-governmental organizations, local self-government and local communities can be a significant stimulus in the development of entrepreneurship and innovation in their areas of activity.

References

Alexandrowicz, Z. (1962) Piaski i formy wydmowe Pustyni Błędowskiej, Ochrona Przyrody 28.
Bogdanowicz, W. i in. (2008) Fauna Polski – charakterystyka i wykaz gatunków. T. III. Muzeum i Instytut Zoologii PAN, Warszawa.
Bryś, H., Gołuch, P. (2009) Umweltwandlungen der rückgängigen Błędów Sandwüste dokumen-tiert auf multitemporalen Luftbild- und Satellitenkarten im Zeitraum 1926–2006. Allgemeine Vermessungs-Nachrichten (AVN), 11–12, Heidelberg.
Kazimierowski, P. (2001) Koleje piaskowe i górnicze. Biuletyn Instytutu Rozwoju i Promocji Kolei nr 53.
Klimaszewski, M. (1972) Geomorfologia Polski, Tom 1, PWN, Warszawa.
Kulpiński, K. (2012) Stan siedlisk napiaskowych i możliwości ich ochrony.
Lamorski, T. (2014) Przewodnik po ścieżkach dydaktycznych. Murawy napiaskowe wśród wydm i drzew. Klucze.
Leńkowa, L. A LeńkowaL.. (1988) Oskalpowana Ziemia, Wyd. „Śląsk", Katowice.
NATURA 2000. Standardowy formularz danych, 2008, http://natura2000.gdos.gov.pl/natura2000/ dane/pdf/pl/PLH120014.pdf.
Skała, C. (2005) Jura Krakowsko-Częstochowska, Pascal, Bielsko-Biała.
Szczasny, T. (2001) Ścieżka dydaktyczna. Dolina Białej Przemszy, Zespół Parków Krajobrazowych Województwa Śląskiego, Będzin.
Szczypek, T. i in. (2001) Pustynia Błędów. Fenomen polskiego krajobrazu, Kubajak, Krzeszowice.
https://www.gridw.pl/.
http://www.dabrowa.pl/DG_MAPOWNIK_PLAN_1929/19290000_m4_pl_dg_pustynia_cala_wig_4b-.jpg.
http://www.gmina-klucze.pl/art,2265,pustynna-wioska-dla-turystow.
http://malopolskie.fotopolska.eu/864995,foto.html.
http://www.gmina-klucze.pl/p,92,noclegi.
http: //www.pustyniabledowska.eu/index.php? Option = com_content & view = article & id = 18 & Itemid = 19 & lang = en.

Sustainable Food Systems: How Important are Bottom-Up Innovative Experiments?

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Abstract: The paper aims to analyse sustainable innovations in food production, commercialization and consumption, notably in the form of new production practices, new means of commercialization and new patterns of consumer behaviour. The main goal is to determine the importance of these recent experiments in the shift towards a more sustainable sociotechnical food system in Portugal, in a comparative perspective. In fact, there have been social, technological and organizational innovations in the food system in Portugal: novel forms of organic food production; new specialized retail chains; the transformation of food departments in large stores; and the creation of short food supply chains. These experiments – innovations deployed in "niches", or protected spaces -, may become more widely adopted depending on their degree of compatibility with the dominant regime or, conversely, their ability to substitute the dominant regime (Ingram et al, 2015). Tensions at the mainstream regime (Smith, 2016) or pressures exerted by the landscape (Geels, 2004) may boost the diffusion of these innovations, favouring a complex transition process. When developing initiatives to achieve a sustainable food system, the role played by institutions (local and national authorities and legal framework) is crucial, as is the involvement of a wide range of actors (e.g., farmers, food processing companies, retailers and consumers). New social practices are crucial to this shift, due to centrality of consumers in this shift (Spaargaren, 2011). Policies may support or hinder the emergence and deployment of experiments in the form of new products, processes, business models and practices. The theoretical framework draws on niche strategic management (Smith, 2006), sustainable transitions multilevel approach (Geels, 2004) and social practices approach (Spaargaren, 2011).
The paper aims to contribute to the literature by making a critical assessment of the impact of these experiments on the transition in the food system in Portugal, taking into account successful cases reported in the literature. It also aims to contribute to policy formulation regarding a sustainable food system.

Keywords: sustainability transitions, food system transition, social innovation, innovation in food production and retail, sustainable food policies.

1. Introduction

The need to move to a decarbonized economy within a relatively short period is one of the major issues facing society today. Making such a commitment implies dramatic shifts in the workings of the economy and the way we live. This means that large sociotechnical systems have to change in order to meet very demanding sustainability goals.

Large sociotechnical systems perform the major social functions, which include the production, distribution and application/use of energy, transportation, communication, housing and nutrition. Although energy and transportation are perhaps the focus of most attention, the food sociotechnical system has already originated a substantial body of research. In fact, as this system is the most directly linked with nature, it is acknowledged as being responsible for soil and water degradation and the decline of biodiversity through the continuing spread of cultivated land and livestock.

This paper aims to contribute to the study of the food system transition in Portugal. It analyses innovative cases taking place in food production and commercialization in Portugal. To conduct this study, we draw on the niche strategic management approach (Smith, 2006), the multilevel perspective (Geels, 2004) and the social practices approach (Spaargaren, 2011).

The paper is structured as follows. In section 2, we introduce the theoretical framework. In section 3, we address the specificity of the food system transition to sustainability. In section 4, we analyse the evolution of the Common Agricultural Policy and its contribution to transition. In section 5, we present some successful innovative cases in developed countries. In section 6, we analyse the Portuguese case. Finally, we discuss the results and draw some preliminary conclusions.

2. Theoretical background

Transitions, defined as regime shifts, are complex processes socially, economically and in policy terms and their study has given rise to a new research field: transition studies (Markard, Raven and Truffer, 2012).

In the transition process, large sociotechnical systems undergo major shifts. The socio-technical system (STS) is defined as a set of linkages between elements required to perform societal functions such as energy, transport, communications or nutrition. Its resources are knowledge, capital, labour, natural resources and the assignment of meaning. STS comprises production, dissemination and the use sub-functions (Geels, 2004).

Socio-technical systems are the result of human activity. The human actors, producers and users are integrated into social groups, who share roles, responsibilities, norms and perceptions. Many specialized social groups are linked to resources and sub-functions of the socio-technical system, acting within the limits and rules established by regulators, despite their relative autonomy and internal coordination. (Geels, 2004).

The actors reproduce and transform the system under the aegis of rules and institutions, and in an environment populated by technologies materialized in goods and infrastructures of various types. This context influences the perceptions of the actors. Therefore, the technological regime is now a broad concept because it encompasses the productive practices and technologies, the characteristics of the products, the skills, the ways of dealing with goods and people and of defining the problems, all this embedded in institutions and infrastructures (Rip and Kemp, 1998, *apud* Geels, 2004).

The actors' role is a major theoretical issue. Spaargaren (2011) has criticized the STS approach (systemic approach) on the grounds of its implicit 'determinism', due to the central role of technological innovation, infrastructures and products, and implying the neglect of the actors. He has also rejected the individualist approaches, whereby individuals are 'left alone' at the core of the decisional process (Figure 1). Conversely, he proposed an approach based on social practices, which are at the junction of structure and agency.

Individualist Paradigm **(social psychology/economics)**	**Systemic Paradigm** **(sociology/science studies)**
Individuals and their attitudes are key units of analysis and policy	Producers/states and their strategies are key units of analysis and policy
Behavioural change of individuals is decisive for environmental change	Technological innovation within the production sphere is decisive for change
Individual choices are the key intervention targets (micro level)	Socio-technical systems are the key intervention targets (macro-level)
End-users/consumers determine the fate of green products and ideas	Technologies and markets determine the fate of green products and ideas
Key policy instruments and approaches: social (soft) instruments (persuasion through information provision)	Key policy instruments and approaches: the use of direct regulation targeting providers (laws, market based instruments)

Figure 1: Individualist versus systemic approaches

Source: Spaargaren, 2011.

Smith (2006) and others (Kemp, Schot and Hoogma, 1998) see transitions arising from the interaction and co-evolution between innovations occurring in niches and the mainstream sociotechnical system. Geels (2004, 2010) and others (Smith, Voß and Grin, 2010) see transitions as multi-level dynamics, involving niches, dominant socio-technical regimes and the exogenous landscape. In both approaches different forces are involved - technological, economic (market), social, and institutional. In both, radical innovations play a major role and are mostly generated in niches (Kemp, Schot and Hoogma 1998; Hendry, Harbrone and Brown 2007; Schot and Geels, 2007; Lovell, 2007). Path dependency and lock-in in the installed regimes hinder this change. The sources of path dependency include cognitive frameworks, routines, habits, and attitudes; technical artefacts and dedicated infrastructures; incumbent practices enjoying economies of scale and network externalities; institutions and policies which evolved in parallel with the dominant regime (Smith, 2006).

In the paper, we adopt a sociotechnical systems approach but also resort to the concept of social practices, to study the food system transition.

The food system is a broad system defined by "the activities, infrastructure, and people involved in feeding the global population (eg. the growing, processing, distribution, consumption, and disposal of goods)" (Popkin, 2017, p 73). Its intrinsic features explain its specificity, namely:

- The intimate connection between food consumption and lifestyles.
- The nature of radical innovations fostering sustainability. These are mostly social, cultural and organizational innovations; however, technological innovations have been important in the modernization of agricultural practices. Examples include irrigation systems, mechanization and motorization, chemical fertilizers and pesticides, and the creation of genetically modified organisms.
- Disruptive technological innovation is occurring at the regime level, and is expected to continue to do so in the future.
- The multiplicity and diversity of producers.
- The integration of agriculture products within an entire and globalized food supply chain, which mediates the relationships between farmers and final consumers.
- In many subsectors, the great relevance of food processing companies, importers and retailers who have similar or even greater power than farmers.

Since consumers perform a major and transformational role in the the food system transition, they deserve attention and appropriate analytical tools. The diversity of experiments consumers carry out constitutes the basis for the proposal of a specific taxonomy, which is one of the contributions of this research. An analysis is also made of the link between policy and bottom-up forms of governance arising from social experiments and social innovation.

3. Food system transition

3.1 Food system evolution

Modern agriculture and agro-industries have been as much the outcome as the condition of the modernization model of food production since WW II (Grin, 2012); this has been driven by targets to increase productivity and improve efficiency that have resulted in the intensive use of pesticides, fertilizers, energy and water.

The modernization of agriculture practices coincided with the emergence of a mass consumption model characterized by the rationalization of commercial circuits (with the generalization of packaging, labelling, and branding), the increasing supply of conserved, deep-frozen and convenience food, and growing concern about hygiene and safety. New outlets were created – most notably supermarkets and mega-markets -, that offered a diversified and vast array of products, much of which was sourced from distant locations (Grin, 2012). In fact, the liberalization of the markets provided access to a much larger assortment of food.

This consumption model developed at a time of changing lifestyles (Grin, 2012), which involved:

- the mass entry of women in the labour market with the correlative simplification and rationalization of domestic tasks;
- the standardization and certification of food products;
- the emergence and spread of supermarkets and mega-markets;
- the deployment of innovative conservation techniques and devices;
- changes in dietary norms, with the increase in consumption of processed and ultra-processed food (Popkin, 2017) ;
- the diffusion of fridges and freezers in the households.

In advanced European countries, these transformations rapidly took hold following WWII – in large part due to the adoption of the American lifestyle -, and government policies contributed greatly to the speed of these changes. In food production, the Common Agricultural Policy, launched in 1962, both steered and reflected the major shifts in agriculture. It is therefore no surprise that consumers' growing concerns about food security and ethics are echoed in the revised versions of the CAP, namely for the current 2014-2020 period. The

question to be addressed here is whether the scope and speed of change are sufficient. Transition to sustainability is also necessary in this domain.

3.2 The emergence of alternative forms of food provision

Cristóvão and Tibério (2009) propose a categorization of alternative forms of food provision. It addresses different dimensions: i) consumption of locally produced food; ii) establishing direct relations between producers and consumers; iii) revitalization of distribution, transformation and production structures; iv) network building between producers, local governments, entrepreneurs and other leaders; v) promoting the local economy and rural development.

The above authors note that these movements emerged in Japan and the United States in the mid-20th century and extended to countries in Southern Europe, among others. They point out a need to clarify the multiplicity of concepts (e.g., 'foodshed', 'civic agriculture', 'alternative supply chains', 'localized agri-food system'- in Tibério and Baptista, 2013) related with the alternatives found in agri-food system. A systematization carried out within the 'Strategy for the valorization of local farm production' (Order nº 4680/2012, 3 April) had already clarified the concepts of 'local agri-food system' and 'agri-food short chains'.

A local agri-food system is a set of interconnected activities where production, transformation, distribution and consumption of food products aim to foster the sustainable use of territorial, environmental, economic, social and nutritional resources. The agri-short supply chain is defined as the commercial form that takes place through direct (producer-consumer) or indirect supply with no more than one intermediary. It is associated with both geographic and relational proximity between producers and consumers. (MAMAOT, 2013).

In terms of food system transition, a closer relationship between producers and consumers is important for several reasons:

- it allows consumers to take informed decisions;
- it may help producers to retain a larger share of the value created;
- it may therefore improve their income and the viability of their businesses;
- more traditional productive forms may remain cost effective and viable;
- land preservation is improved;
- the environmental impacts of transportation and distribution are reduced.

In some countries, "buying local" campaigns have been made; this includes promoting seasonal products as an alternative to buying goods imported from afar and the implicit negative impact of transportation.

Other studies point out the emergence of 'alternative food networks' (Roep and Wiskerke, 2012; Bui et al, 2016), which represent entirely new forms of provision, and begin with modest experiments in production, retail and consumption. These new practices take place in niches, or protected places.

While new practices in production and retail seem to be main driver, the consumers' role is very relevant here. Health concerns may become a lever of change, together with increasing awareness of and commitment to sustainability on condition that 'natural' food becomes more affordable and available. Bui et al (2016) describe the case of local and fresh food procurement for school canteens led by a parents' association in Drôme Valley, France. The purpose was to provide pupils with seasonal and quality food. Another case presented by the authors is the creation of a community-support agriculture box-scheme by a group of city-dwellers from a peri-urban area of Paris. Their aim was the preservation of a farmland area threatened by urbanization (Bui et al, 2016). In both cases, local authorities joined or supported the initiative at a later stage.

Different forms of government action are therefore crucial: examples of measures taken include the setting and implementation of safety norms in production, transportation and commercialization; the implementation of informative labels and the provision of information to enhance transparency; the granting of pecuniary incentives to support sustainable practices by farmers.

The complexity, multifaceted and slow nature of transition in the food system is explained by a number of factors; for example, the diversity of actors and the powerful interests at stake, and the historic persistence of nutritional habits.

To address the transition process, Roep and Wiskerke (2012) propose an approach based on three dimensions: governance, embedding and marketing. The coordination of activities deployed in the three areas is key to the success of emerging food supply alternatives. Each food network unfolds in a specific way. Using some main criteria (initiators, main objective, initial focus, and strategy adopted) the authors distinguish three main trajectories:

- Chain innovation – i.e. the construction of a new food supply chain, the main objective of which is to improve the farmers positioning;
- Chain differentiation – where new products are produced and commercialized within an existing chain;
- Territorial embedding – where a food supply chain is re-built to become a vehicle of regional development.

The authors present telling examples of each trajectory. In the Netherlands, a small pork supply chain, De Hoeve, is a case of chain innovation. It has innovated in housing systems with less environmental impact and managed to put together an association of pig farmers, a meat wholesaler and a number of independent butchers under the same hallmark. In Switzerland, they describe the case of a new beef label (Naturabeef) that managed to become commercialized by one of the two big Swiss retailers (Coop) as an example of chain differentiation. As to territorial embedding, they present a German example associated with a specific region, Rhon. Rhongut became a brand of high-quality organic food (originally meat and bread). This brand was launched by the founder of a chain of specialized organic food stores and a dedicated organic packaging and trading company, both operating under the name Alnatura (Roep and Wiskerke, 2012). These successful cases date back to the 1980s or 1990s; they proved economically viable while offering high-quality products and meeting demanding environmental norms and animal welfare concerns.

These cases do not represent yet a substitute for more intense industrialization of agriculture, resorting to intensive use of technological and scientific breakthroughs ('The Economist', 11 June 2016). However, they constitute emergent forms of production, distribution and consumption (Ingram et al, 2015), which should be encouraged, not only to preserve diversity but also to keep options open to the future of human nutrition.

4. Policies

The role of policies is of the utmost importance here. In the EU particularly, the CAP's updates have reflected a new vision of the linkages between increased efficiency + market mechanisms + farmers' income support + rural development + sustainability. This is the first dimension to be explored herein.

CAP should be considered in this reflection on transition. In fact, since its inception, CAP performs an important and decisive role in terms of farmers' decisions, land use, and, therefore, in food markets and consumption patterns.

The Mac Sharry reform of 1992 constituted a turning point in CAP's greening and sustainability path with the introduction of agri-environmental measures. The deepening of CAP's sustainability concerns through a multidimensional approach have led to further developments and milestones, including the financial strengthening of Rural Development Policy and its constitution as the second pillar of the CAP Agenda 2000. Nowadays, the financial support of the Common Agricultural and Rural Policy comes from a single European Fund - The European Fund of Agriculture and Rural Development – and contains several measures focused on sustainability.

It is necessary to investigate whether CAP's two pillars are environmentally and ecologically effective in terms of food production and consumption regarding nutrition and health. In fact, we are dealing with a sector-driven policy with established objectives in its two pillars, namely food supply and farmers' income support (pillar 1) and rural development (pillar 2), but without a clear and direct link with food security and safety in a broad sense, that is, the guarantee of food in quantitative and qualitative terms.

According to Walls et al (2016), "[A]n important determinant of diet is food price and availability, which is directly influenced by agricultural policy. (Walls et al, 2016, p 12). As recognized by the "WHO's Global Strategy on Diet, Physical Activity and Health (2004) [….], it seems essential for agricultural policy to be designed with nutritional priorities" (James et al, 2006, *apud* Walls et al, 2016, p 12).

In addition to food security, the European Commission also presented climate change and balanced territorial development as main challenges for the 2014-2020 CAP. It responds to these challenges with concrete measures and financial support from European funds. In the case of food security, the measures are related to the support and stabilization of the farmers' income and improving farms' competitiveness, including the improvement of the producers' positioning in the food value chain. Climate change is addressed through sustainable production practices, and 'green growth' through innovation and the development of mitigation actions. The promotion of a more balanced territorial development involves the structural diversity of agricultural systems and improved living conditions in the case of small farms as well as the development of local markets.

The development of local markets has been integrated in the European Regulation Nº 1305/2013 (17 December) on rural development support from the Agricultural European Fund on Rural Development. This regulation presents some policy measures that introduce a more integrated approach (supply-side; demand-side), namely through the "promotion of food value chains related with the transformation and commercialization of farm products […]" (Official Journal of the European Communities L347, p 500).
More specifically, it is possible to find measures associated with 'short circuits and local markets' and the 'promotion of local-quality products'. Therefore, CAP not only supports sustainable agriculture through agri-environmental measures, but it also addresses the food value chain through financial aid directed to short circuits.

In the Portuguese case, 'innovation and knowledge' are important drivers of change in Rural Development Policy (2014-2010) and correspond to central axes of financial support for farmers and other actors involved in the landscape of rural territories, namely research centres and rural development associations.

To sum up, CAP must be considered in the debate regarding the food system transition in EU countries. This policy has become greener and more market-orientated in its first pillar, while enhancing the role and budget of rural development (second pillar), namely through measures focused on value chain and the promotion of local products and local markets. It envisages diversifying the rural economy and thus affecting food security in the broad sense (including nutrition and food quality).

5. The Portuguese case

While experiments are less frequent in Portugal than in other developed countries, traditional forms of food production and distribution managed to survive the modernization surge of the second half of the 20th century. A prime example is the fact that the first mega-markets only appeared in the 1980s. Despite the massive destruction they caused in many traditional retail branches, small food outlets still operate in villages, small towns and city neighbourhoods by drawing on proximity relationships. Short supply chains are therefore both old and new, and sometimes old and new at the same time. This is the case of the revitalization of traditional farm production by using the internet for commercialization.

The Portuguese Rural Network proposes the following typology of short supply chains:

1. Markets of producers: "market dedicated to food and agri-food producers which sell their own production; products with local certification".
2. Markets of Bio producers: "market exclusively dedicated to agri and agri-food producers with certification in Bio Production; producers sell their own production; products with local certification".
3. Markets of local products: local or regional markets with direct sale of a local product or various related products.
4. Collective supply point: organization of farmers and agro-industry supplying their own products.
5. Agri-Food baskets: direct and regular supply of local and seasonal agri-food products. The baskets are delivered to a predefined place (e.g., consumer home, enterprise, cooperatives and shops).

Examples of these experiments are found in Portugal. Bio producer markets have opened up in Lisbon municipalities: Príncipe Real and Campo Pequeno in the centre of Lisbon; and AGROBIO markets in cities such as Algés, Almada, Amadora, Carcavelos, Cascais, Loures and Oeiras.

There is a long history of local or regional markets that sell local products directly. Some current examples involve wine production: Festa das Vindimas (Vintage Fair), in Palmela, and Festa do Vinho e das Vindimas

(Vintage and Wine Fair), in Loures. In other regions of the country, similar events take place annually and focus on their own regional products.

There are a number of successful cases of agri-food baskets. While the most outstanding is PROVE, the following should also be mentioned: Poiso da Abelha, Cabaz Horta Verde, Cabaz QPB, Marinhoa (meat), Quinta do Arneiro, Cabaz da Semana BioSOLO, Cabaz Dona Horta, Cabaz Papafigos, Cabaz da Horta.

PROVE – Promover e Vender – aims to supply local products, improving proximity relations between producers and consumers, and establishing short chains of commercialization among small farmers and consumers using ICT. The experiment started in 2006 in the municipalities of Palmela and Sesimbra. It has spread very successfully across the country through Local Action Groups (GAL), producers, consumers, but also municipalities, farmers' associations and other local partners. The baskets contain only seasonal products produced locally with sustainable techniques and respecting good farming practice.

In addition to short circuits, specialized organic and quality food retailers developed mostly in the metropolitan areas of Lisbon and Oporto. This is the case of Brio supermarkets (later Go Natural). More recently, some big retail chains entered this market, by creating departments of organic food or even buying the bio retail shops themselves.

However, the new practices are still limited in scope. As mentioned above, unlike other countries, these practices have been unable to create their own national chains or to integrate significantly in big distribution channels.

6. Conclusions

This paper is a first attempt to address the transition of the food system in the Portuguese case. We present three dimensions of the research: 1) a draft of the conceptual framework, drawing mainly on the sustainability transitions literature, with the contributions of social practice theorists; 2) a preliminary assessment of the European agricultural policy with regard to the transition to sustainability; 3) the identification of existing bottom-up experiments in food production, retail and consumption in Portugal.

At this stage, only provisional conclusions are drawn, namely:

1. The experiments in short chains emerged at the same time as the start of organic food retail shops, which are now expanding, and the rise of a new generation of farmers devoted to high quality organic products.
2. Provided they are able to scale up and become more cost effective, bottom-up experiments may become the basis of alternative food networks.
3. This option is not yet a substitute for the continuing industrialization of agriculture, resorting to technological and scientific breakthroughs.

Nevertheless, the new experiments constitute either a complementary or an emergent form of production, distribution and consumption that should be encouraged.

In order to improve our knowledge on the Portuguese case, we will conduct more in-depth case studies. Our aim is to contribute to the debate on the food system transition and to policy formulation.

References

Bui, S., Cardona, A., Lamine, C. and Cerf, M. (2016), "Sustainability transitions: Insights on processes of niche-regime interaction and regime reconfiguration in agri-food systems", Journal of Rural Studies, Vol 48, pp 92-103.

Cristóvão, A. and Tibério, M.L. (2009), "Comprar Fresco, Comprar Local": será que temos algo a aprender com a experiência americana?", in Moreno, L., Sanchéz, M.M. and Simões, O. (eds.), Cultura, Inovação e Território – O Agroalimentar e o Rural, Sociedade Portuguesa de Estudos Rurais, Lisboa, pp 27-34.

Geels, F.W. (2004) "From sectoral systems of innovation to systems", Research Policy, Vol 33, Nos. 6-7, pp 897-920.

Geels, F.W. (2010) "Ontologies, transitions (to sustainability), and the multi-level perspective", Research Policy, Vol 39, No. 4, pp 495-510.

Grin, J. (2012) "Changing governments, kitchens, supermarkets, firms and farms – The governance of transitions between societal practices and supply systems", in Spaargaren, Oosterveer and Loeber (eds.), pp 35-59.

Hendry, C., Harbrone, P. and Brown, J. (2007) "Niche entry as a route to mainstream innovation", Technology Analysis & Strategic Management, Vol 19, No. 4, pp 403-425.

Ingram, J., Maye, D., Kirwan, J., Curry, N. and Kubinakova, K. (2015), "Interactions between Niche and Regime: An Analysis of Learning and Innovation Networks for Sustainable Agriculture across Europe", The Journal of Agricultural Education and Extension, Vol 21, No. 1, pp 55-71.

Kemp, R., Schot, J. and Hoogma, R. (1998) "Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management", Technology Analysis & Strategic Management, Vol 10, No. 2, pp 175–198.

Lovell, H. (2007) "The governance of innovation in systems: the difficulties of strategic niche management in practice", Science and Public Policy, Vol 34, No. 1, pp 35-44.

Markard, J., Raven, R. and Truffer, B. (2012) "Sustainability transitions: An emerging field of research and its prospects", Research Policy, Vol 41, No. 6, pp 955-967.

MAMAOT - Ministério da Agricultura, Mar, Ambiente e Ordenamento do Território (2013) "Estratégia para a valorização da produção agrícola local" (Despacho nº 4680/2012, 3rd April)

Popkin, B.M. (2017), "Relationship between shifts in food system dynamics and acceleration of the global nutrition transition", Nutrition Reviews, Vol 75, No. 2, pp 73-82.

Roep, D. and Wiskerke, J.S.C. (2012) "Reshaping the foodscape. The role of alternative food networks", in Spaargaren, Oosterveer and Loeber (eds.), pp 207-228.

Schot, J. and Geels, F.W. (2007) "Niches in evolutionary theories of technical change – A critical survey of the literature", Journal of Evolutionary Economics, Vol 17, No. 5, pp 605-622.

Smith, A. (2006), "Green niches in sustainable development: The case of organic food in the United Kingdom", Environment and Planning C: Government and Policy, Vol 24, No. 3, pp 439-458.

Smith, A., Stirling, A. and Berkhout, F. (2005) "The governance of sustainable transitions", Research Policy, Vol. 34, No. 10, pp. 1491-1510.

Smith, A., Voß, J.P. and Grin, J. (2010) "Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges", Research Policy, Vol. 39, No. 4, pp. 435-448.

Spaargaren, G. (2011) "Theories of practices: Agency, technology, and culture. Exploring the relevance of practice theories for the governance of sustainable consumption practices in the new world-order", Global Environmental Change, Vol 21, No. 3, pp 813-822.

Spaargaren, G., Oosterveer, P. and Loeber, A. (2012) "Sustainability transitions in food consumption, retail and production", in Spaargaren, Oosterveer and Loeber (eds.), pp 1-31.

Spaargaren, G., Oosterveer, P. and Loeber, A. (eds.) (2012) Food Practices in Transition – Changing food consumption, retail and production in the age of reflexive modernity, Routledge, New York and Abingdon, UK.

Tibério, L. and Baptista, A. (2013) "Sistemas agroalimentares locais e comercialização em circuitos curtos de proximidade", Rede Rural Nacional, No.3, pp 6-9.

Walls, H.L., Cornelsen, L., Lock, K. and Smith, R.D. (2016) "How much priority is given to nutrition and health in the EU Common Agricultural Policy?", Food Policy, Vol. 59, February, pp 12-23.

Absorptive Capacity as a Factor of Firms' Innovative Behaviour

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Abstract: The paper aims to analyse firms' innovative behaviour and identify its connection with their absorptive capacity. Firstly, we study the innovation behaviour of Russian enterprises at a regional level. Toward this nd, the decomposition of innovation process into sub-processes is used. Four types of innovation product were specified depending on its level of market and technological novelty. Each of the types of innovation product is the result of some innovation processes implementation. Secondly, we distinguish different types of absorptive capacity for the transfer of technological knowledge from abroad. In the study, the absorptive capacity for technology transfer is defined as the ability to acquire advanced technologies. To that end, we analyse the import of embodied and disembodied technologies. Moreover, the disembodied form can be divided into two types. The first one is the adoption of R&D results and the second one is the acquisition of patents, licenses, and know-how. At the same time, we take into account that companies can not only buy R&D results but also can absorb them in partnership and cooperation. The ability to absorb technological knowledge from abroad is essential for firms' innovative strategies in developing countries. The four regions of the Russian Federation with developed manufacture were chosen to demonstrate the results obtained. The results of the study show that, if the development level of regional industry is relatively high, but lags behind the international technological level, the scaled process of innovation creation is based on the firms' capacity to adopt foreign technologies. Particularly, when firms both intensively invest in R&D and adopt disembodied technologies, they get able to change the structure of innovation process and thus become more creative. It is also established that intensive investment in in-house R&D is an essential factor for efficient application of technological knowledge transferred from abroad.

Keywords: innovation process, innovation behaviour, absorptive capacity, type of knowledge, regional companies.

1. Introduction

It is not infrequent that the neoclassical paradigm has a strong impact on the study of innovation (Hollingsworth, 2000; Nelson, 2008; Lundvall, 2010). Although the NIS concept is "a refutation of the neoclassical economics approach to the study of innovation" (Sharif, 2006, p.763), it uses specific arguments of the neoclassical theory (particularly regarding market failures). Moreover, empirical studies can be based on suppositions that contradict the nature of innovation. For instance, researchers use the concept of absorptive capacity (Cohen and Levinthal, 1990) frequently under the assumption about the homogeneity of knowledge (for example, Fabrizio, 2009; Tsai, 2001; Costa and Monteiro, 2016). This hypothesis does not allow to grasp not only the sources of firms' competitive advantage (Barney, 1991) but also the various forms of innovative behaviour. The existence of particular types of absorbed knowledge (e.g. George et al., 2001; Schmidt, 2010; Li, 2011) mainly explains the occurrence of these differences. For example, Li constructs a model which considers the impact of three types of investment in acquiring technological knowledge (in-house R&D, foreign technology import, and domestic technology purchase) on firms' innovative capacity in 21 high-tech sectors (Li, 2011). The paper aims to analyse firms' innovative behaviour and identify its connection with their types of absorptive capacity.

2. Definitions and methodology

Absorptive capacity is "the ability of a firm to recognize the value of new, external knowledge, assimilate it, and apply it to commercial ends" (Cohen and Levinthal, 1990, p.128). Cohen and Levinthal demonstrated that absorptive capacity has a great impact on innovation activities. These activities are "all scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations" (OECD, 2005). Innovation activity is usually considered as the consistent combination of different but connected innovation events to one another (Landau and Rosenberg, 1986; Guan and Chen, 2011). Within this framework, innovation activity is divided into a number of complementary and independent stages (Bernstein and Singh, 2006). These stages are the sequence of actions from the search for knowledge resources to the creation and launch of new products to the market (Roper et al., 2008). In the first studies on innovation process modeling (Utterback, 1971), innovation activity is represented as a set of primary steps, including the idea generating, the solution to engineering problems, the innovation introduction to the market and its diffusion. In further researches, the innovation process is considered as the linear (Clark and Fujimoto,

1991; Wheelwright and Clark, 1992; Cooper et al., 1997, 2002) or nonlinear sequence of structural phases (Cantisani, 2006; Kostas, 2006) which can overlap in time (Pavitt, 2006).

It is important to emphasize that there is no generally accepted classification of innovation stages. The allocation of innovation activity stages is typically not general and depends on the purpose of the particular study. The most widespread scheme (Hansen and Birkinshaw, 2007) is the dividing into the following three integrated stages: research and development, idea implementation and product launch, which is accompanied by its large-scale production.

Firms' innovative behaviour is broadly determined by absorptive capacity (George et al., 2001; Van Den Bosch et al., 2003; Nieto and Quevedo, 2005; Van Beers et al., 2008; Liao et al., 2010). The ability to absorb technological knowledge from abroad is essential for firms' innovative strategies in developing countries (Li, 2011). This is due to the fact that the majority of industries in these countries does not reach the level of technology of countries on the stage based on their own innovations (Golichenko and Samovoleva, 2015).

Foreign knowledge is often the base for the development of inner science and technology potential for the national companies.

To answer the research questions, we analysed Russian firms' innovation process inside-out and identified the connection with their absorptive capacity at a regional level. Four regions of the Russian Federation related to the group with developed manufacture (Aivazian et al., 2016) were chosen for this purpose. The data used in the study were provided by Russian innovation surveys dated 2009 – 2013. The firm data was collected from a random sample based on the Federal State Statistics Service database including industrial sectors numbered 15-37 and selected service sectors numbered. The design of the survey is based on the Oslo Manual (OECD, 2005) and is universally accepted as compatible with the Community Innovation Survey. The database includes more than 35000 firms. The questionnaire was sent to the managers of these firms aiming to identify their innovation activities.

In the study, we use the innovation process decomposition into sub-processes for the analysis of regional innovation processes (Balycheva and Golichenko, 2015). For that purpose, four types of innovation product were specified depending on its level of market and technological novelty:

1. new-to-market and newly introduced or significantly improved innovation product;
2. new-to-market and only modified innovation product;
3. new-to-firm and newly introduced or significantly improved innovation product;
4. new-to-firm and only modified innovation product.

Each of the types of innovation product is the result of some innovation processes implementation. The first type product can result from the new product creation process or from the innovation imitation process. In this case, the product copy is new to the local market but already known outside. Besides, this product can be manufactured by these processes combination. When the significant factor of innovation activity is R&D, the innovation process is likely directed to new product creation and introduction. If the large-scale acquisition of technologies takes place, there is every likelihood that innovation imitation process was implemented. If companies have the higher level of absorptive capacity to adopt technologies in disembodied forms, that absorptive capacity can be used as the basis for the creation process of new-to-market products.

The production of the second type is not considered in the study because the cases of the implementation of products that are new to the market and only modified are not separated in the statistics used. It is supposed that new-to-firm and newly introduced products (the third type) are the results of the imitation process of products that are already known in the local markets, or essential modifying of earlier innovation. It should be noted that the imitation processes can be accompanied by the processes of products modifying and production processes changing. The import of technologies in embodied forms can be applied for these processes implementation. The implementation of new-to-firm and earlier introduced products (the fourth type) means products modifying which does not affect the characteristics of market and technological novelty.

As characteristics of innovative products, the volume of shipped innovative products of manufacturing enterprises in Russian regions was used. Additionally, the degree of market and technological novelty was taken into account.

With the aim of analysing the connection between firms' innovative behaviour and capacity for foreign knowledge transfer and integration, it is useful to distinguish three types of absorptive capacity. The first and the second ones relate to the acquisition of knowledge in disembodied form. The first type specifies firms' ability to acquire and use R&D results. In the study, they are called "disembodied technologies of the first type". At the same time, we assume that companies can not only buy R&D results but also can absorb them in partnership and cooperation. The second type of absorptive capacity relates to the transfer of patents, licenses, and know-how ("disembodied technologies of the second type"). The third type describes the transfer of embodied technologies. It is worth noting that such absorptive capacity is similar to realized absorptive capacity (Zahra and George, 2002). We assume that if firms acquire foreign technologies, the majority of them are able to apply this knowledge. There are certain cases when companies purchase intellectual property to overcome entrance barriers though.

As characteristics of absorptive capacity, the number of imported technological knowledge of each type is used. Additionally, the number of joint R&D projects with foreign partners is taken into account. However, there is no information about the results of these projects in statistics, the indicators reflect the ability of firms to transfer and absorb external knowledge. We do not consider in detail the share of firms importing technology among all innovative firms. It is related to the fact that both innovation process and technology acquisition implemented mainly by large regional enterprises.

3. Innovation process and types of absorptive capacity of Russian regional firms

3.1 The Nizhny Novgorod region

The majority of innovative regional products is made by firms of the following branches: manufacture of coke and refined petroleum products; metallurgy; automobile manufacture. In such a case, the firms engaged in the manufacturing of coke and refined petroleum products make the most significant contribution to the sectoral structure of the regional industry. The secure growth of the share of innovative products in the total output is observed during the studied period. In 2010 there was the brisk change of the characteristics of products quality. The essential part of firms turned from the manufacturing of innovative products known in the local market to the release of products which are new and not-known in the trading area (see Figure 1). It is likely possible due to the change in the cost structure of innovation. For example, the share of costs of new products R&D in the total costs increased more than 4.5 times in 2010 in comparison with 2009 and made 23%.

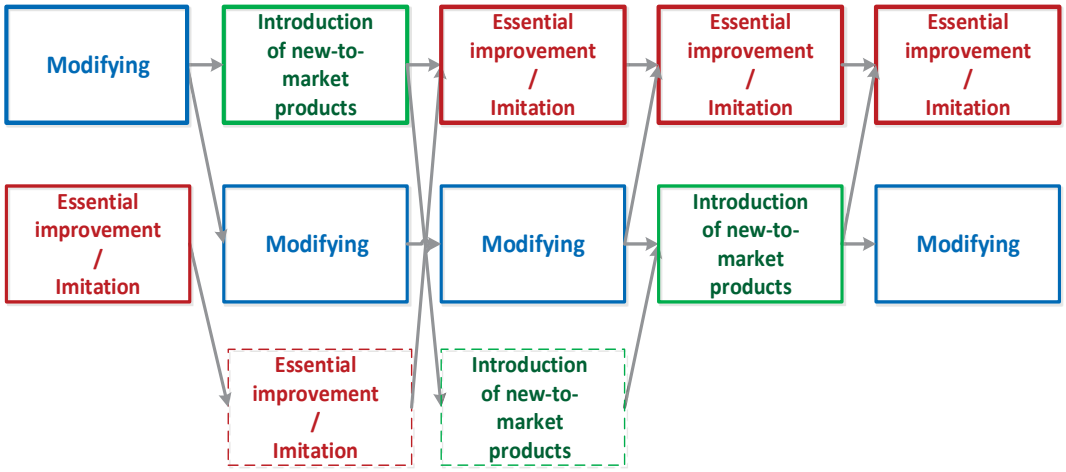

Figure 1: The structure of innovation process of Nizhni Novgorod regional companies (2009-2013).

These regional firms are also actively involved in the cooperation in the process of R&D. In 2010 they acquired first type disembodied technologies connected with foreign companies R&D results. It allows to do the groundwork for the further quantum growth of innovation activity and successful scaling of the results (see Figure 2).

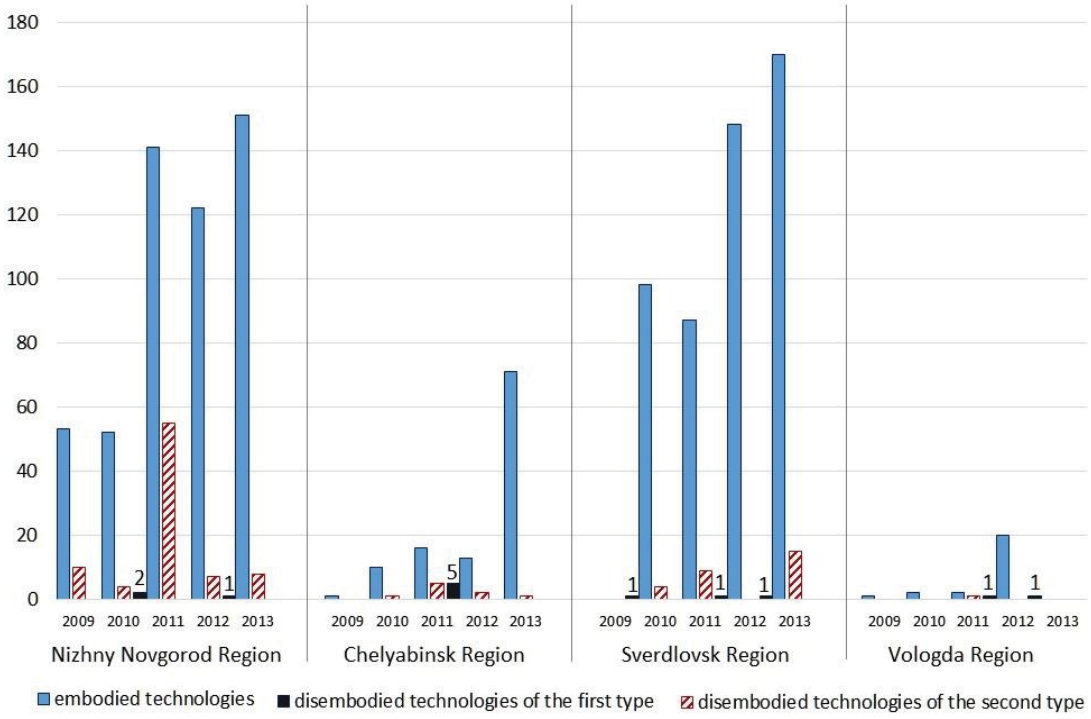

Figure 2: The number of technologies imported by product and process innovative enterprises.

In 2011 firms both acquired embodied technologies and continued to develop early introduced innovations to reach the necessary scale of production. For this purpose, they used in-house developments and foreign technologies of the second type. The companies intensively acquired patents, licenses and know-how, and in the end, there was the high scale of production achieved.

This goes to prove that the creation of new competitive advantages in the local market through new product launch is primarily based on the adoption and adaptation of imported technologies. Companies have to increase their absorptive capacity investing in in-house research to have the possibility of this technology adoption. It is proved by the essential growth of research and development of new products, services, and production methods within the period researched. Consequently, firms do proceed from innovation activity based on the insignificant modifying of former products to the innovation creation and imitation of products not-known in the local market but already known outside.

The acquisition of disembodied technologies and participation in cooperation have decreased from 2012 to 2013. It is possible to connect to the gain of competitive advantages of the companies capable of absorbing non-domestic technologies. They accomplished the innovation cycle for some period. The earlier laid groundwork (2010-2011) appeared insufficient for the maintenance of remarkable product novelty for a more extended period. In 2013 the drop in the sales of new-to-market products was observed. Besides, there is the tendency of sales decreasing of newly introduced innovative products. However, this tendency is not stable due to the products copying by the follower enterprises.

3.2 The Chelyabinsk Region

The vast majority of innovative products belonged to the metallurgical companies. They produced 85% of regional innovation output and 58% of all products. The innovative products with the essential market and technological characteristics prevailed in innovative metallurgical enterprises. More than 45% of total innovative products were new-to-market, and more than 94% of these products were newly introduced or significantly modified (see Figure 3) in 2012. These firms were vastly superior to the average characteristics of the metallurgical sector of the country. The other branches contribution to the sectoral structure of industry did not exceed 5%. Mainly, it is the enterprises engaged in the manufacturing of non-metallic mineral products.

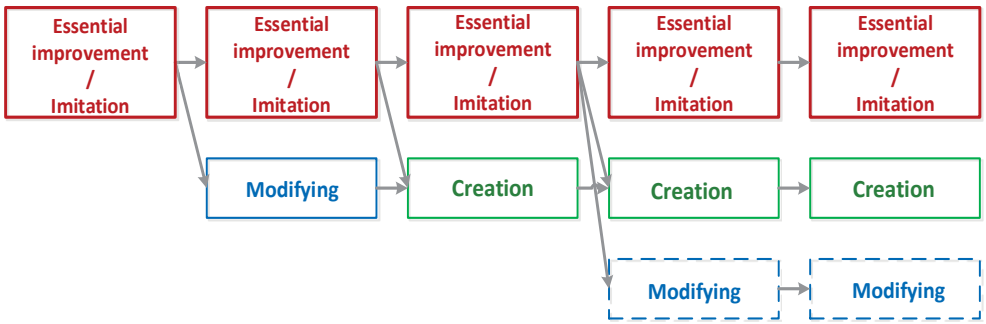

Figure 3: The structure of innovation process of Chelyabinsk regional companies (2009-2013).

Although the regional innovation activity is not high, it is possible to see its significant growth and changes in the structure. The share of innovative products in total output increased from 2% to 8% during the studied period. The growth of diffusion is caused by the essential change of innovation products quality. The sales share of new-to-market products increased from 1.6% in 2009 to 39% in 2012. This result was reached due to the increase in costs of research and development of new products as well as the acquisition of foreign technologies. For example, the repeated growth of investment in research projects, directed to new product creation and launch, was seen in 2010. As a consequence, sales of new-to-market products increased more than twice in 2011 in comparison with 2010. From all appearances, firms' inner potential was not enough for a further advance that is why they began to acquire foreign technologies (see Figure 4). Specifically, in 2011 the highest activity of the acquisition of all types of technologies was observed. These technologies applications lead to the increase in the sales of new-to-market products from 14% in 2011 to 39% in 2012. The companies, having achieved the high degree of products novelty, directed efforts toward the diffusion. With this objective in view, they raised the buying of embodied technologies.

Despite the relatively low sales of innovative products at the beginning of the studied period, the companies apparently possessed sufficient absorptive capacity to be able to significantly improve the fundamental characteristics of the activity in a short period. This hypothesis is also confirmed by the fact that firms did not incline to insignificant modifying allowing only to maintain the status of innovation products during the whole studied period. The base of their activity was the essential modifying of products and manufacturing processes and the introduction of products new to the market (see Figure 2).

3.3 The Sverdlovsk Region

The enterprises of the following industries make the most prominent contribution to innovative regional production: metallurgy, explosives manufacture, chemical production, manufacture of ships, aircraft, spacecraft and other transport equipment. Low sales of new-to-market products characterize all these branches. In other words, regional firms tend to produce new-to-firm products which are already known in the local market. Meanwhile, the dominant part of an innovative product is newly introduced or significantly improved. The firms engaged in modifying of early introduced products (see Figure 5) through technology acquisition and in-house R&D. Besides, they intensively use process innovation to decrease the production cost. The only exception is the metallurgical sector, where more than a half innovation production volume was insignificantly modified. In this case, the basis of innovation activity is the technology acquisition in embodied form (see Figure 2).

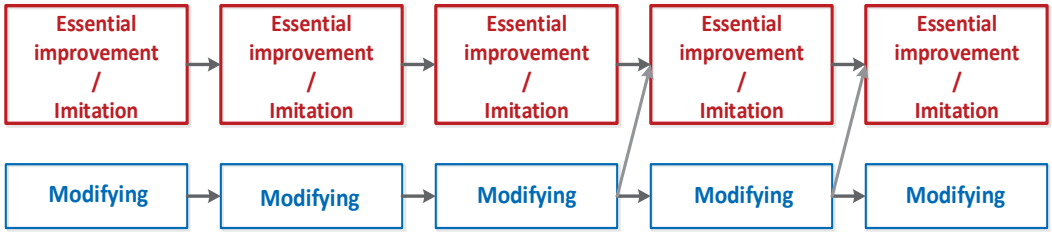

Figure 4: The structure of innovation process of Sverdlovsk regional companies (2009-2013).

Unlike Nizhny Novgorod companies, the absorptive capacity of the regional civil firms is not apparently enough for complex foreign technologies adoption allowing to introduce fundamentally new market decisions and participate in R&D cooperation projects. Firms do not tend to practice research projects results and actively

use disembodied technologies of the second type to improve previous innovations. After the period of active technology acquisition in 2010-2011, the growth in sales of newly introduced products was to observe. With the purpose of the process providing necessary equipment in 2012, firms bought it abroad. Consequently, by 2013 companies relied on insignificant modifying of earlier introduced products in much smaller degree and turned to release the products with high technology. Besides, technology acceptance and adoption stimulated firms to increase their R&D investment. These series of steps allowed to expand the sales of new-to-firm products with technological novelty. The share of such products increased from 53% in 2010 to 80% in 2013.

The basis of innovation activity was formed by essential products modifying as well as the imitation of products already known in the local markets (see Figure 4). In spite of the growth of quality of innovative regional production, firms did not manage to change widespread innovative processes and significantly increase innovation diffusion.

3.4 The Vologda Region

The innovation activity of the region is densely concentrated in the metallurgical sector, which also makes the highest contribution to the sectoral structure of industry (71% and 59% correspondently). The second place in product sales is taken by chemical industrial firms (10%), next are the enterprises engaged in electrical power distribution and transmission (7%), and food production companies (7%) follow further. For the metal manufacturer, the diffusion scale and characteristics of innovation products novelty are on low levels. The share of innovative products does not exceed 6% of which 94% of products are already known to the market.

In other words, companies maintain the innovation status of the products through insignificant modification which changes neither market nor technological products novelty. It is to note that firms do not aim to purchase technology in embodied or disembodied forms. Moreover, their activity in R&D cooperation with foreign partners is of negligible importance. It also stands to mention that not all Russian metals companies show low novelty of innovative products. It is possible to consider the companies of the Volgograd, Kirov and Chelyabinsk regions as examples.

The quality of innovation process of the Vologda region is rather low. A basis of regional innovation activity is the developments of external companies. Additionally, the used technologies are neither groundbreaking nor even new to the local market. The processes of earlier implemented innovations modifying and imitation of products already known in the market prevailed during the period 2009 – 2011. Low quality of the products did not allow companies to reach large-scale diffusion of innovation. Within that period there was the growth observed in expenditures on Russian technologies acquisition. It enabled companies to enhance the level of market innovation distribution throughout the 2012-2013 period. The diffusion scale remained low in comparison with the average Russian level, though. Insufficient level of firms' financial and absorptive capacity allowed them to participate neither in the processes of innovation creation nor in imitation of foreign technologies adoption (see Figure 5). Due to this reason, it was impossible to significantly increase the scale of innovation distribution and to generally improve the quality of innovation process.

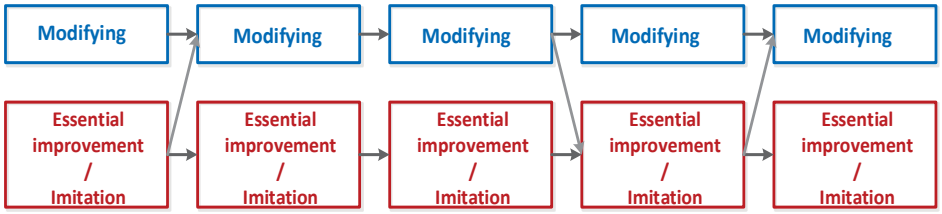

Figure 5: The structure of innovation process of Vologda regional companies (2009-2013).

4. Conclusions

The analysis of sample regions reveals that firms' innovative behaviour and, accordingly, the structure of innovation process relay to their absorptive capacity. Thus, it is possible to enable the widespread creation of products with high novelty when firms both actively invest in R&D and participate in international technology transfer, most primarily, in disembodied forms. Cooperation in research projects and acquisition of intellectual property rights provide a significant contribution to the innovation process structure.

When firms have the absorptive capacity allowing them to adopt foreign technologies in disembodied forms, it serves as an incentive for the beginning of a new innovative cycle to obtain the competitive advantages using new products creation. This situation prevails in the Nizhny Novgorod and Chelyabinsk regions.

When absorptive capacity is not enough to actively transfer the R&D results and participate in joint research projects, the acquisition of disembodied technologies of the second type forms a basis for improvement of previous innovations. The ability to adapt and adopt embodied technologies can be used for innovation diffusion. The example of the Sverdlovsk region also confirms it. When firms do not possess sufficient level of absorptive capacity to transfer foreign n technologies and not invest in in-house R&D, they introduce new-to-firm products and cannot increase the scale of production (the Vologda region).

The available statistical data shows that the innovative business of developed countries has a higher realised absorptive capacity of embodied knowledge compared with Russian firms. In Russia, for example, the share of innovative enterprises engaged in the acquisition of machinery, equipment and software is about four times smaller than in Finland or France. However, the percentage of innovative enterprises engaged in external R&D activities is 1.2 times larger in Russia than in France. In Finland, the value of this indicator is more than 1.4 greater than in Russia (CIS, 2014; RIS, 2014).

On the one hand, «importing foreign technology alone does not facilitate innovation» (Li, 2011, p.1240) since the most advanced technologies are not adopted. On the other hand, adoption and usage of disembodied technologies allow to improve firms' knowledge base and also create the opportunities to introduce innovations based on their ideas and experiments. As a whole, the insufficient level of absorptive capacity of regional companies is one of the reasons that interregional economic disparities are very stable in Russia (Bakhtizin et al., 2016). The lack of absorptive capacity represents a crucial obstacle to the gain of competitive advantages.

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References

Aivizian, S.A., Afanasiev, M. Yu., Kudrov, A. V. (2016) "Models of Productive Capacity and Technological Efficiency Evaluations of Regions of the Russian Federation Concerning the Output Structure", Economics and Mathematical Methods Vol. 52, No. 1, pp. 28-44.

Bakhtizin, A. R., Bukhvald, E. M., & Kolchugina, A. (2016). "Regions of Russia Economic Alignment: Trends and Tasks for the Policy of Regional Development", Advances in Systems Science and Applications, Vol. 6 No. 3, pp. 11-20.

Balycheva, Y., Golichenko, O. (2015) "The innovation process of Russian manufacturing companies", Proceedings of the 10th European Conference on Innovation and Entrepreneurship, ECIE 2015, pp. 45-53.

Barney, J. (1991) "Firm resources and sustained competitive advantage", Journal of management, Vol. 17, No. 1, pp. 99-120.

Bernstein, B., Singh, P.J. (2006) "An integrated innovation process model based on practices of Australian biotechnology firms", Technovation, Vol. 26, No. 5-6, pp. 561–572.

Cantisani, A. (2006) "Technological innovation process revisited", Technovation, Vol.26, No. 11, pp. 1294-1301.

Chen, C. (2004) "The effects of knowledge attribute, alliance characteristics, and absorptive capacity on knowledge transfer performance", R&D Management, Vol. 34, No. 3, pp. 311-321.

CIS (2014) Community Innovation Survey, [online], http://ec.europa.eu/eurostat/data/database.

Clark, K.B., Fujimoto, T. (1991) Product Development Performance: Strategy, Organisation and Management in the World Auto Industry, Harvard Business School Press, Boston.

Cohen, W.M., Levinthal, D.A. (1990) "Absorptive-capacity—a new perspective on learning and innovation", Administrative Science Quarterly, Vol. 35, No. 1, pp. 128–152.

Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J. (1997) "Portfolio management in new product development: lessons from the leaders", Research-Technology Management, Vol. 40, No. 5, pp. 16–28.

Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J. (2002) "Optimizing the stage-gate process: what best practice companies do", Research-Technology Management, Vol. 45, No. 5, pp 21–27.

Costa, V., Monteiro, S. (2016) "Knowledge Processes, Absorptive Capacity and Innovation: A Mediation Analysis", Knowledge and Process Management, Vol.23, No. 3, pp 207–218.

Da Silva, M.A. (2012) "A model of innovation and learning with involuntary spillovers and absorptive capacity", Economics of Innovation and New Technology, Vol. 21, No. 7, pp. 613-630.

Fabrizio, K. (2009) "Absorptive Capacity and the Search for Innovation", Research Policy, Vol. 38, No. 2, pp. 255–267.

Golichenko, O., Samovoleva, S. (2015) "The Balance of Externalities and Internal Effects in National Innovation Systems" Proceedings of the 10th European Conference on Innovation and Entrepreneurship, ECIE 2015, pp. 223-230.

George, G., Zahra, S., Wheatley, K., Khan, R. (2001) "The effects of alliance portfolio characteristics and absorptive capacity on performance: A study of biotechnology firms", Journal of High Technology Management Research, Vol. 12, pp. 205–226.

Guan, J., Chen, K. (2011) "Mapping the innovation production process from accumulate advantage to economic outcomes: a path modeling approach", Technovation, Vol. 31, pp. 336-346.

Hansen, M.T., Birkinshaw, J. (2007) "The innovation value chain", Harvard Business Review, Vol. 85 July, pp. 121-130.

Hollingsworth, J. R. (2000). "Doing institutional analysis: implications for the study of innovations", Review of international political economy, Vol. 7, No. 4, pp. 595-644.

Kostas, G. (2006) "Innovation process. Make sense using systems thinking", Technovation, Vol. 26, No. 11, pp. 1222-1232.

Landau, R., Rosenberg, N. (Eds.). (1986) The positive sum strategy: Harnessing technology for economic growth, National Academies Press.

Li., X. (2011) "Sources of External Technology, Absorptive Capacity, and Innovation Capability in Chinese State-Owned High-Tech Enterprises", World Development, Vol. 39, No. 7, pp. 1240–1248.

Liao, S., Wu, C., Hu, C, Tsui, A. (2010) "Relationships between knowledge acquisition, absorptive capacity and innovation capability: an empirical study on Taiwan's financial and manufacturing industries", Journal of Information Science, Vol. 36, No. 1, pp. 19–35.

Lundvall, B. Å. (Ed.). (2010) National systems of innovation: Toward a theory of innovation and interactive learning (Vol. 2), Anthem Press.

Nelson, R. R. (2008) "Economic development from the perspective of evolutionary economic theory", Oxford development studies, Vol. 36, No. 1, pp. 9-21.

Nieto, M., & Quevedo, P. (2005) "Absorptive capacity, technological opportunity, knowledge spillovers, and innovative effort", Technovation, Vol. 25, No. 10, pp. 1141-1157.

OECD and Eurostat (2005) Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd edition, OECD, Paris.

Pavitt, K. (2006) Innovation Processes, in The Oxford Handbook of Innovation eds. R. R. Nelson, D. C. Mowery and J. Fagerberg, Oxford University Press, Oxford.

RIS (2014) Russian Innovation Survay, [online], http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/science_and_innovations/.

Roper, S., Dub, J., Loveb, J.H. (2008) "Modeling the innovation value chain", Research Policy, Vol. 37, No. 6-7, pp. 961-977.

Schmidt, T. (2010) "Absorptive Capacity: One Size Fits All? A Firm-Level Analysis of Absorptive Capacity for Different Kinds of Knowledge", Managerial and Decision Economics, Vol. 31, pp. 1-18.

Sharif, N. (2006) "Emergence and development of the National Innovation Systems concept", Research Policy, Vol. 35, No. 5, pp. 745-766.

Tsai, W. (2001) "Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance", Academy of management journal, Vol. 44, No. 5, pp. 996-1004.

Utterback, J.M. (1971) "The process of technological innovation within the firm", The Academy of Management Journal, Vol. 14, No. 1, pp. 75–88.

Van Beers, C., Kleinknecht, A., Ortt, R., Verburg, R. (2008) Determinants of Innovative Behaviour. A firm's Internal Practices and its External Environment, Palgrave, New York, NY.

Van Den Bosch, F.A.J., R. Van Wijk and H.W. Volberda (2003) "Absorptive Capacity: Antecedents, Models, and Outcomes", Blackwell Handbook of Organizational Learning & Knowledge Management, pp.278-301.

Wheelwright, S.C., Clark, K.B. (1992) Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency and Quality, Simon and Schuster.

Zahra, S.A., George, G. (2002) "Absorptive capacity: a review, reconceptualization, and extension", Academy of Management Review, Vol. 27, No. 2, pp.185–203.

L'Oréal and its innovative differentiated positioning process in the beauty industry

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Abstract: In an increasingly globalized world, companies face the challenge of expanding into foreign markets. In the internationalization process there are cultural, governmental, geographic and economic issues that can affect the success of the company in its implementation process overseas. Marketing strategies and the standardization or adaptation levels of each element of the marketing mix can be seen as critical success factors that directly affect business success in the new market. Companies must decide between adapting their marketing strategy to local markets or rather standardizing them globally. Some companies use as a competitive advantage the adaptation of their strategy (partially or totally) through knowledge of the culture of the country to which they are internationalized. Adaptation has been the key to success for a number of brands, and L'Oréal is one of them. This study intends to focus on the internationalization strategy and knowledge of the culture of the countries to which they are internationalized, applied to cultural differences. It also aims to highlight the importance of product innovation in consumer markets at present, and to analyse beauty satisfaction and tendencies amongst millennials.

Keywords: Culture, internationalization, marketing, innovation, customer needs, adaptation

1. Introduction

In an increasingly globalized world, companies face the challenge of expanding into foreign markets. Markets are continuously enlarging and opening up, competition is ever-increasing, and digital evolution and technological innovation (Oliveira and Ferreira, 2011) have picked up the pace. Therefore, companies must progressively be able to respond to all challenges thrown their way. Internationalization is one of the business responses to the challenge of globalization. In recent decades, the world economy has been characterized by high growth in international trade. Increasingly, national markets give way to a global market, new formal integration spaces are created to facilitate trade, and new actors and new business models emerge. Hence, internationalization has been the slogan for business strategies.

Companies wishing to approach international markets have to make three types of decisions, involving: choosing the countries where they will sell their products and adopting a mode of implementation for each country; defining marketing strategies for the countries in which they are based, striving to reconcile two contradictory imperatives - that of adapting to local markets and adopting a coherent approach globally; and finally, equipping themselves with structures and methods of organization to ensure effective coordination of their international activities (Lindon et al., 2008).

The dilemma of standardization or adaptation of the elements of the marketing compound is one of the main challenges companies face in the internationalization process. Companies must decide between adapting their marketing strategy to local markets or standardizing it globally. Some companies use as competitive advantage the adaptation of their strategy (partial or total) through knowledge of the culture of the country to which they are internationalized. This adaptation has been the key to success for some multinational brands that seek to study, know and adapt to the culture of the country where they are internationalized, as is the case of L'Oréal.

Therefore, the present study intends to analyse the strategy of internationalization of L'Oréal and answer the research question "Are the Portuguese millennials satisfied with the current offers on the beauty market and with the L'Oréal Paris brand?", since no research has yet been made on this subject and beauty has gained increasing importance among young people. Therefore, an analysis of secondary data related to the brand (public brand reports, published articles and dissertations), three brainstorming sessions involving millennials

of different ethnicities (African, Latin, Caucasian and Eastern) and a questionnaire for Portuguese millennials were carried out to verify their satisfaction level with the current offers on the market (for hair and skin) and the offer of the L'Oréal Paris brand.

2. Key Concepts

2.1 Strategy

In order to respond to the challenges of the global market, many companies opt to internationalize (Sousa and Au-Yong-Oliveira, 2015) their business. Internationalization, as a strategic result, represents a solution to the problems arising from global economic crises and, when successful, constitutes a competitive advantage for companies. However, this process should not be taken lightly, because like any strategy, it involves certain risks.

In a highly competitive and globalized market, where companies carry out a daily fight for a prominent place and constantly strive to ensure their continuity, corporate strategy has acquired special importance.

Technological advances (Gonçalves and Oliveira, 2010), global economic crises and environmental problems are some examples of the transformations that the world today is experiencing and that can lead to business turbulence. Thus, it is necessary for business managers to be able to follow these changes in order to not be surprised by the competition and to ensure the survival of their companies.

It is in this field that strategy stands out as being a key factor in business success. Strategy, according to Hitt, Ireland and Hoskisson (2011), is an integrated and coordinated set of commitments and actions designed to exploit core competencies and gain a competitive advantage. This competitive advantage is achieved when the company implements a strategy that its competitors are unable to duplicate or that is too costly to replicate (Hitt et al., 2011). For Wild et al. (2005) a *"well-defined strategy helps the company compete effectively in increasingly competitive international markets."*

In sum, strategy involves creating a unique and valuable position in the market and, on the other hand, it is linked to the concept of "differentiation", since it is up to the company to decide which set of activities the company will accomplish to achieve its goals and which are distinct from those of its competitors.

All decisions and actions taken in the definition stage of a business strategy are part of the so-called strategic management process, which will allow the company to achieve strategic competitiveness and obtain above-average returns (Hitt et al., 2011). The process of strategy formulation seeks to involve all the departments of a company so that its policies and actions are coherent and directed towards the same set of objectives (Porter, 1980).

2.2 Positioning

Philip Kotler (1993), defines positioning in the market as the action and ability to project the product and communication of the organization, in order to be able to reach a differentiated position in the choice of the target audience. Positioning is one of the parts that builds a marketing strategy. *"It is possible to define positioning as a strategic choice that seeks to give a credible, different and attractive position to an offer (product, brand or insignia) within a market and in the minds of customers"* (Lindon et al., 2004). The voluntary choice of a positioning strategy by any company plays a fundamental role, since it influences the purchasing decisions of clients. It is therefore important that the company communicates this position clearly so as to build a solid image in the mind of the public. If this communication is not effective, there may be a spontaneous positioning created by the market, which often does not reflect the company's strategy.

Market positioning involves *"arranging for a product to occupy a clear, distinctive and desirable place relative to competing products in the minds of target consumers"*. It is about formulating competitive positioning for a product and a detailed marketing mix (Kotler et al., 1999).

According to Kokemuller (n.d.), *"positioning and differentiation are very closely related marketing strategies"* - positioning is the strategy for conveying what makes a company or a product bigger, different or better than the competitors, and differentiation is the way a company carries out its positioning by promoting distinct attributes or benefits.

2.3 International Marketing and Culture

Cateora and Graham (2002) define international marketing as the execution of business activities designed to determine the planning, price, promotion and distribution of goods and services of a company in more than one country.

The challenge of international marketing becomes more intimidating, because there are uncontrollable factors that vary from country to country - such as the competition, legal restrictions, government controls, climate and culture - that often affect the profitability of the good. *"The marketer cannot control or influence these uncontrollable elements, but instead must adjust or adapt to them in a consistent manner with a successful outcome."* (Cateora and Graham, 2002).

The task of cultural adjustment is the most challenging and important one that international marketers are currently facing. According to Wild et al. (2005) "culture is a set of values, beliefs, rules and institutions held by a specific group of people". Culture also includes what people consider beautiful and tasteful, their beliefs, their traditional habits and the way they relate to those around them. Aesthetics, values and attitudes, customs and manners, social structure, religion, personal communication, education, and physical and material environments are major components of culture. Culture often forces companies to adjust their business, policies and practices (Wild et al., 2005).

A company can opt for one of two strategies of internationalization – adaptation or standardization. The first is to adapt the marketing strategy and the marketing mix to the macro and micro international environment of each new market. The second is to develop a unique cross-border penetration strategy.

According to Cateora and Graham (2007), "*To appreciate the complexity of standardized versus adapted products, one needs to understand how cultural influences are interwoven with the perceived value and importance a market places on a product. A product is more than a physical item: it is a bundle of satisfactions (or utilities) that the buyer receives. These include its form, taste, colour, odour, and texture; how it functions in use; the package; the label; the warranty; the manufacturer's and retailer's servicing; the confidence or prestige enjoyed by the brand (…). In other words, a product is the sum of the physical and psychological satisfactions it provides to the user.*"

3. Methodology

A mixed methodology (qualitative and quantitative) was followed for this research project. In a first approach brainstorming was performed in order to raise possible pertinent questions concerning millennials' opinions. In order to draw conclusions for this work, an analysis of secondary data concerning the brand and a questionnaire (millennials residing in Portugal) were conducted.

3.1 Brainstorming

Brainstorming is a technique, generally used in a group setting, to quickly generate a large number of ideas about a specific problem or topic. According to Isaksen (1998), *"the word "brainstorming" has taken on a variety of popular meanings"*: for some it means simply to get together and have a casual discussion in order to come up with a few ideas and some believe that the term is the same thing as idea generation.

Krishnaswamy et al. (2009) defines brainstorming as *"a group process in which members, usually from different backgrounds, respond to a central question/theme."* The method is especially useful for tackling new problems or for identifying new ways of looking at old problems (Krishnaswamy et al., 2009).

This method was used for this study in order to analyse the difference of opinions among people of different nationalities and to identify pertinent questions to be analysed in the survey - and in a future focus group interaction (Morgan, 1997). In this sense, three brainstorming sessions were carried out in a classroom setting (in mid-March 2018) at the University of Aveiro (Portugal) with a total of 86 students from several countries (Portugal, Mozambique, Spain and the Czech Republic). The first session lasted for 2 hours (from 9am to 11am), with 24 students; the second session lasted for one hour (from 11am to 12pm), with 19 students; and the third for one hour (from 2pm to 3pm), with 43 students. During the sessions participants were shown images of adverts, products, ambassadors and L'Oreal digital influencers from different countries, and some issues were debated, namely:

- What do you think about L'Oréal?
- Do you use beauty products?
- Do you think it is important to use specific products for each type of skin or hair?
- Which products do you use?
- What public figures do you associate with the L'Oréal brand?

3.2 Analysis of secondary data

The analysis of existing secondary data has become an increasingly popular method of enhancing the overall efficiency of the health research enterprise. According to Vartanian (2011), *"secondary data can include any data that is examined to answer a question other than the question(s) for which the data were initially collected"*. The advantage of secondary data is that it can be located quickly and inexpensively.

The analysis of secondary data related to L'Oréal was used to study its strategy – namely, public annual financial reports of the brand, and published articles and dissertations on the brand. To study the international marketing strategy of the L'Oréal Paris brand, hypermarket websites from several countries were also analysed.

3.3 Questionnaire

According to Parasuraman (1991), a questionnaire is a set of questions designed to generate the necessary data in order to reach the objectives of the project. Although the author states that not all research projects use this data collection instrument, the questionnaire is very important in scientific research, especially in the social sciences.

For this study, a clear, short, precise and easy to understand survey was sought (and thus created by the research team), since a clear opinion of the respondent was intended. The objective of the questionnaire was to analyse the satisfaction of millennials in Portugal with the current offers of beauty products available in the market. The questionnaire took approximately five or six minutes to complete. Relatively to the population sample, millennials were surveyed, in Portugal, randomly selected, without any selection criteria discriminating literacy, sex, age, ethnicity and nationality, in order to obtain the most diversified answers possible. Approximately 124 valid responses were obtained. The questionnaire was elaborated with the use of the Google Forms platform and its administration was done by electronic means.

The questionnaire is composed of closed answers, in order to foster a clear opinion of the respondent, with three categories of questions – single answer questions, multiple answer questions and scale questions – in the latter category the Likert scale was used. The questionnaire was divided into three parts, the first containing questions concerning the personal data of the respondent, the second part asking about the satisfaction with beauty products in general, and the last part containing questions about the satisfaction of respondents with the L'Oréal brand.

4. Results

4.1 L'Oréal - International and Culture Knowledge Strategy

The beauty industry is a growing market – it grew 4% from 2009 to 2017 (L'Oréal Group, 2017). With a sales turnover of over 25.94 billion euros in 2016 and an increase of 2.3% over 2015, L'Oréal is the world's leading cosmetics brand, followed by Unilever (EUR 18.54 billion), P&G (EUR 12.45 billion), Estee Lauder (EUR 9.22 billion) and Sisheido (EUR 6.22 billion) (WWD, 2017).

L'Oréal is a French multinational cosmetics company specialized in hair products, perfumes, sunscreen and dermatological products. It was founded in 1909 by Eugène Schueller and is based in Clichy, France. The L'Oréal Group is present in 150 countries and has a portfolio of 34 cosmetic brands divided into four categories: consumer products, professionals, luxury products and active cosmetics.

L'Oréal's mission is "Beauty for All", which offers all women and men around the world the best in cosmetic innovation in terms of quality, effectiveness and safety, to satisfy all desires and needs. L'Oréal's strategy consists of "Universalization", which means globalization, and captures and respects differences - differences in desires, needs and traditions - offering tailor-made beauty products that meet the aspirations of consumers from all parts of the world. Over the years, L'Oréal has pushed the boundaries of science to invent beauty and

provide men and women around the world with the best of cosmetics, offering them products in harmony with their needs, culture and expectations, in their infinite diversity.

L'Oréal is aware of how different its consumers are: "*Consumers in India are not the same as in China or in Europe. Your cosmetic needs and aspirations are different.*" (L'oréal Group, 2012). In order to meet the needs and desires of all markets and since L'Oréal's mission is to offer beauty to consumers from all parts of the world while respecting their uniqueness, the most valuable assets to L'Oréal are Research and Innovation. The international development of the Group meant that L'Oréal had to adapt its organization to the need to coordinate the establishment and development of its brands on all continents. Thus, several geographical areas were created, each with operational responsibility by the subsidiaries in the countries of its region, as follows: Western European Zone; North American Zone; Asia Pacific; Latin America Zone; Eastern Europe Zone; and Africa, Middle East Zone.

To adapt to consumers around the world, L'Oréal research teams are present in all geographical areas.

Research and Innovation are reinvented to create cosmetic products adapted to the world's immense diversity. To this end, research platforms have been created, true centres of expertise that have Research and Innovation at the core of their development model. These research poles invent new products that can become successful around the world. In total, there are 20 research centres grouped in six regions (United States, Japan, China, India, Brazil and South Africa), 3 global centres in France and 16 evaluation centres. In 2017 the group spent 877 million euros on Research and Innovation and registered 498 patents (L'Oréal Group, 2017).

In a symbiosis with the local environment, these centres identify needs, scientific knowledge and cosmetic practices. The data collected enables researchers to develop new products that are perfectly attuned to the consumers' needs. The innovations developed will then be shared with other research centres in a coordinated way, and the needs identified in one country can subsequently lead to success on a global scale. The exploration of new scientific and technological territories is being enriched by this global dimension: with its deep knowledge of skin and hair, L'Oréal's research creates cosmetic products adapted to the diversity of the whole world.

To meet the needs of its customers in their diversity, L'Oréal has created a Consumer & Market Insights Department within the Innovation Division to generate a global database of consumer data by product category and by major regions of the world (L'Oréal Group, 2012). The development of innovative products and their adaptation to market demands is a continuous priority for the Group. If L'Oréal fails to anticipate or interpret changes in consumer behaviour and new trends, its sales may be affected. The Consumer & Market Insights Department, which is part of the Innovation Division, constantly watches for changes in consumers' cosmetics expectations by product category and regions of the world. This work allows L'Oréal researchers to develop new products that are aligned with the needs of the market.

4.2 L'Oréal Paris International Marketing Strategy

For the present study we analysed the Marketing Mix of L'Oréal Paris, a brand belonging to the Consumer Products Division of the L'Oréal Group, which aims to offer high quality products at affordable prices. It is the number one beauty brand worldwide (L'Oréal Group, 2017).

According to the L'Oréal Group (2017), L'Oréal Paris offers male and female beauty products of all types (makeup, skin care, hair care, styling, hair colour), on all continents. Regarding L'Oréal's products, the brand is divided into Makeup, Hair Colour, Hair Care, Hair Style and Skin Care. In Makeup, L'Oréal Paris offers consumers brands such as Infallible, True Match, Magic Nude and Colour Riche. In terms of Hair Colour, L'Oréal Paris provides consumers with brands like Colorista, Excellent Age Perfect and Féria. L'Oréal Paris has 3 different sub-brands, specializing in Hair Care: Elvive, L'Oréal Kids and Ever. Regarding Hair Style, the brand has Elnett and Studio Line. In Skin Care, the brand offers sub-brands such as Age Perfect, Men Experts and Revitalift. For the spring and summer seasons, L'Oréal Paris has Solar Expertise, a brand of sun care products.

All these brands are under the umbrella of L'Oréal Paris and not all of them are sold in all countries (L'Oréal Paris, 2017).

L'Oreal has an international standards portfolio of brands covering a wide range of products while satisfying the needs of every customer present in any part of the world. All its products pass the international standards when it comes to testing. Although the products are standardized, since a great investment is made in making products tailored to all the needs of each consumer, as mentioned previously, some packaging is adapted and public figures and the language of the package are also adapted for each country.

The price policy is the same for all countries, and varies according to the living standards of each country, maintaining a strategy of affordable price to consumers, typical of a mass market brand.

With regard to distribution, L'Oréal Paris being a brand of consumer products, it is distributed through retail channels, making it available to the mass market.

L'Oréal creates its promotions differently in each of the countries it targets. They also have a very strong advert slogan, "Because we're worth it," with a strong message to attract customers. The brand has an aggressive promotional strategy. In addition to the universal brand ambassadors, as is the case of Jennifer Lopez, L'Oréal Paris has local ambassadors in several countries. Local ambassadors are often public figures, actresses, or digital influencers. In Portugal, for example, the brand has Claúdia Vieira as an ambassador, in India, Katrina Kaif, a model and actress of Bollywood films, in China, Fan Bingbing, an actress, and in Brazil, Tais Araujo, Grazi Massafera and Juliana Paes.

4.3 The Satisfaction of Millenials with the Beauty Market and L'Óreal

According to Howe and Strauss (2007), “millennials” is a concept that refers to the generation that was born between the early 1980s and mid 1990s. This generation developed at a time of great technological advances, being characterized essentially by growing up with access to the Internet and all the new technologies related to it; and having an ambition and an orientation to success; and the fact that they are community-based (Freitas, 2014).

To answer the research question "Are the Portuguese millennials satisfied with the current offers on the beauty market and with the L'Oréal Paris brand?" three brainstorming sessions and a questionnaire were done. According to Pordata (2018), there are about 2,368 million millennials residing in Portugal.

4.4 Brainstorming

The brainstorming revealed that all millennials agreed on the importance of using specific products for each skin and hair type and that they are generally satisfied with the beauty products offered by the market.

Regarding L'Oréal's products, most millennials were satisfied with the brand's products; only one millennial African woman did not find products for her hair type at L'Oréal, saying that despite having already tried the branded products indicated for her hair type, they did not work on typical African hair. She also revealed that she has difficulties in finding L'Oréal foundation for her skin colour in most of the hypermarkets in Portugal.

All millennials were very price-sensitive when it came to choosing beauty products, claiming that they only bought L'Oréal when it was on sale, as they felt that the price of the products did not outweigh its benefits.

Although they consider L'Oréal to be a brand with quality and prestige, they find many cheaper substitutes in the market. Few millennials have shown themselves to be loyal to any brand of beauty, most having been heavily influenced by price or by their parents in choosing a brand, claiming that they use the brand that their parents buy or that they buy whatever is on sale.

As far as L'Oréal's promotion strategy is concerned, the millennials showed that they are easily aware that the adverts are very sales-oriented, feeling a little deceived. Many consider L'Oréal's advertising to be *"too artificial”* and that *“the results of using the products are not what they advertise."* Most say they do not feel influenced by the marketing used by the brand and that what influences their buying decisions most are the recommendations of friends or family.

4.5 Questionnaire

In the questionnaire, 124 millennial responses were obtained from participants between the ages of 20 and 35, of which 60 were males and 64 females. 65 respondents were Caucasian, 42 Latino, 7 African, 6 Asian and 5 from another race.

Most respondents agree or agree completely that their physical appearance is important (89%), that beauty is important to them (73%) and that they care about their physical appearance (84%); the most mentioned were hair care (68%), skin care (67%), exercise (61%) and healthy eating (52%). Most respondents agree or agree completely with the statement *"I often use beauty products"* and most of them use products specific to their skin and hair type.

Regarding satisfaction with the current offer of beauty products in the market, most agree that if prices were lower, they would invest more in beauty products; nevertheless, they were satisfied with the diversity of products existing in the market and consider that they find all the products they need in hypermarkets in Portugal.

Regarding satisfaction with the L'Oréal brand, almost half of respondents said they "*sometimes*" bought brand products and 23% only "rarely" bought them; only 7.1% *"always"* bought L'Oréal and 13.5% *"almost always"*.

Most respondents agree that L'Oréal has specific products for their skin and hair type. Generally speaking, most respondents are "satisfied with L'Oréal products", considering that they find all the products they need under the brand's umbrella; however, only 37% consider that L'Oréal has a larger variety of products than other competing brands. 42% of respondents say they do not agree or disagree that they identify with the L'Oréal brand packaging and ads; 35% agree, 13% agree completely and the others disagree or completely disagree. The majority of respondents consider buying L'Oréal products for their quality and because they are of a recognized brand, but they are hesitant about price accessibility. Most respondents said they have recommended L'Oréal brand products to a friend or family member.

5. Conclusions

The purpose of this case study was to study L'Oreal's internationalization strategy and to answer the research question "Are the Portuguese millennials satisfied with the current beauty and L'Oréal offerings?"

After analysing secondary data, it was possible to notice that L'Oréal Group's internationalization strategy is consolidating a global brand with local knowledge. In order to know locally its consumers and their needs and aspirations, the leading cosmetics group has research centres spread all over the world, and its strong commitment is in Research and Innovation. The development of innovative products and their adaptation to the demands of the local markets is a continuous priority for L'Oréal, which allows the developing of new products that are aligned with their needs. The brand bets on a strong strategy of internationalization of its marketing mix, and after analysing the marketing mix of the L'Oréal Paris brand it was possible to verify that the most adapted to the local markets is the promotion through local brand ambassadors present in commercial adverts and product packaging.

By analysing the results of the brainstorming sessions and the questionnaire, it was possible to verify that millennials residing in Portugal give a fair amount of importance to their physical appearance and to beauty care. They are generally satisfied with the beauty product offers in the market. Although most recommend the L'Oréal brand to friends or family, considering it to be a brand of quality and prestige, they have shown that they are not very loyal to the brand and that they tend to be very sensitive to pricing in their purchase decisions.

References

Cateora, Philips R. & Graham , John L. (2002) International Marketing (11th ed.). New York (NY): McGraw Hill.

Cateora, Philips R. & Graham , John L. (2007) International Marketing (13th ed.). New York (NY): McGraw Hill.

Freitas, I.J.V. (2014) Os millennials em Portugal: estudo exploratório a partir de um coorte etário sobre engagement consumidor-marca (Master's thesis). Retrieved from http://hdl.handle.net/10400.21/4444

Gonçalves, R., Oliveira, M.A. (2010) Interacting with technology in an ever more complex world: Designing for an all-inclusive society. In: Cynthia G. Wagner (Ed.), Strategies and Technologies for a Sustainable Future, World Future Society, Boston, USA, pp.257-268.

Howe, N. e Strauss, W. (2007) The next 20 years - How customer and workforce attitudes will evolve. Harvard Business Review, Julho-Agosto 2007.

Hitt, M., Ireland, R., & Hoskisson, R. (2011) Strategic management. Australia: South-Western Cengage Learning.

Kokemuller, Neil. (n.d.) Positioning & Differentiation Strategies of Marketing. Small Business - Chron.com. Retrieved from http://smallbusiness.chron.com/positioning-differentiation-strategies-marketing-69264.html

Kotler, P. (1993) Administração de Marketing: Análise, Planejamento, Implementação e Controle (3ª ed.). São Paulo: Atlas.

Kotler, P., Armstrong, G., Saunders, J., & Wong, V. (1999) Priciples of Marketing (2nd ed.). Upper Sadle River: Prentice Hall Inc.

Krishnaswamy K., Sivakumar A., Mathirajan, M. (2009) Management Research Methodology: Integration of Principles, Methods and Techniques. New Delhi: Pearson Education.

Lindon, D., Lendrevie, J., Lévy, J., Dionísio, P., & Rodrigues, J. (2004) Mercator XXI Teoria e Prática do Marketing (10th ed.). Lisboa: Dom Quixote.

Lindon, D., Lendrevie, J., Lévy, J., Dionísio, P., & Rodrigues, J. (2008) Mercator XXI Teoria e Prática do Marketing (11th ed.). Lisboa: Dom Quixote.

L'Oréal Group (2017) Key Figures. Retrieved from http://www.loreal-finance.com/en/annual-report-2017/key-figures

L'Oréal Group (2017) Cosmetics Market. Retrieved from http://www.loreal-finance.com/en/annual-report-2017/cosmetics-market

L'Oréal Group (2012) Annual Financial Report 2012. Retrieved from http://www.loreal-finance.com/_docs/pdf/rapport-annuel/2012/LOREAL_Document-de-Reference-2012_GB.pdf

L'Oréal Group (2017) Brands Overview. Retrieved from http://www.loreal-finance.com/en/annual-report-2017/brands-overview#loreal-paris-2

L'Oréal Group (2017) Consumer Products. Retrieved from http://www.loreal-finance.com/en/annual-report-2017/consumer-products/

L'Oréal Paris (2018) L'Oréal Paris. Retrieved from https://www.lorealparisusa.com/

Morgan, D. (1997) Focus groups as qualitative research. SAGE Publications.

Oliveira, M.A., Ferreira, J.J.P. (2011) Producing innovation: Comments on Lee and Yu (2010). African Journal of Marketing Management, 3(3), March, 65-67.

Parasuraman, A. (1991) Marketing research (2nd ed.). Addison Wesley Publishing Company.

Pordata.pt (2018) PORDATA. População residente segundo os Censos: total e por grupo etário. Retrieved from http://www.pordata.pt.

Porter, M. (1980) Competitive strategy. New York: Free Press.

Isaksen, S.G. (1998) A Review of Brainstorming Research: Six Critical Issues of Inquiry. Disponível a partir de: https://cpsb.com/resources/downloads/public/302-Brainstorm.pdf

Sousa, Tiago D., Au-Yong-Oliveira, M. (2015) A internacionalização de empresas portuguesas: Uma análise envolvendo casos de multinacionais e PMEs. Em: Au-Yong-Oliveira, M., Moreira, A.C., Ferreira, J.J.P., Gonçalves, R. (Editores), IMC 2015: Proceedings of the International Management Conference, atas da conferência internacional IMC 2015, 26 junho, DEGEI-UA, publicado por UA Editora, 104-115.

Vartanian, T. (2011) Secondary data analysis. New York: Oxford University Press.

Wild, J., Wild, K., Han, J. (2005) International Business: The Challenges of Globalization (3rd ed.). Upper Saddle River (NJ): Prentice Hall.

WWD. (2017) L'Oréal Gets Top Spot on WWD Beauty Inc.'s 2016 Top 100. Retrieved from http://wwd.com/beauty-industry-news/beauty-features/loreal-gets-top-spot-on-wwd-beauty-inc-s-2016-top-10866993

Entrepreneurship and Innovation in the Crafts Sector

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Abstract: There is consensus that the Crafts sector represents a high potential for the creation of economic and social value, notably through the creation of jobs as well as for the promotion of youth employment. The Crafts Sector has embraced major challenges over the times, including, substantial losses in the overall competitive edge of artisans Against this background the sector currently faces important challenges concerning the development of artisans' competences related to entrepreneurship and innovation, in order to promote the competitiveness and sustainability of their activities. Remarkably, though, the sector has survived the industrialization process largely due to the fact that the craftsman producers who survived have done an excellent job by innovating and reinventing their products, services and value models. Some studies emphasize the importance and the opportunities that the current technology and consumption contexts offer for other sectors, namely the crafts sector. Digital facilitators have been acknowledged as sources of opportunities for innovation in the production and processes of production and delivery of in the crafts sector without altering the identity features of the products. However, this potential can remain untapped if artisans fail to make of use of the technological opportunities. This article addresses the existing calls for contextualizing the crafts sector and for fostering innovation and entrepreneurship in this area, by investigating key obstacles and problems faced by craftsman, as well as by exploring existing experiences in overcoming them. The article builds on data collected in five European countries, under the scope of the Erasmus+ Project Craftsmanship+ "Fostering a New and Competitive Approach to Crafts and Semi Industrial high added-value sectors"1 , and involved desk research and interviews with CEO's, Founders and Co-Founders from existing business in crafts and semi-industrial activities. This article contributes in a timely manner to the understanding of the crafts sector by paying attention to the difficulties that artisans face in order to ensure the sustainability of their business initiatives. The importance and the economic contribution of the crafts sector is sizeable and undeniable but still does not attract the attention of support agencies at the same level as other sectors.

Keywords: Entrepreneurship, innovation, crafts sector, barriers, sustainability.

1. Introduction

The craftsmanship sector has experienced quite a few challenges over the times. In recent years we have observed a consistent decline in the craftsmanship activity, largely explained by the prevalent market demands that encourage large scale and low-cost production models (Blundel and Smith, 2013; Aguiar *et al.*, 2016; Alexandre *et al.*, 2017). The value and the cultural, social and economic importance of the craftsmanship activity to local communities is undeniable (Aguiar *et al.*, 2016). Nevertheless, consumers often look for quick solutions to meet their needs (Alexandre *et al.*, 2017). The cost of crafts products is often advanced by craftsmen as a factor which hinders the success of their sales (Ferreira, Neves and Rodrigues, 2012). These, so far, dominant perspectives led to the loss of competitive edge from craftsmen (Alexandre *et al.*, 2017). Many craftsmen who have survived are those who have adapted and reinvented their products by joining their traditional crafts knowledge with new ways of technological and scientific development (Blundel and Smith, 2013). The technological advances in industrial sectors show a strong responsiveness when it comes to the demands of our society (Alexandre *et al.*, 2017). The need for artisans to focus on a new attitude towards current markets and trends is real and digital facilitators are highlighted as a key opportunity to optimize the processes of production of artisans, without altering the identity features of a product. The problem seems to arise when craftsmen are unable to benefit from the advantages of technology and innovation (Ferreira, Neves

[1] This research has been developed in the context of the Project Craftsmanship+ "Fostering a New and Competitive Approach to Crafts and Semi Industrial High Added-Value Sectors" (http://www.craftsmanship-plus.eu), which has been funded with support from the EU under the Erasmus+ Program. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use that may be made of the information contained therein.

and Rodrigues, 2012; Alexandre *et al.*, 2017). The interaction and integration of different areas of knowledge when it comes to the development and creation of quality products assumes an increasing role in this sector.

Some argue that changes in mentality are vital (Ferreira, Neves and Rodrigues, 2012). In this vein we are observing new approaches between craftsmanship creativity and business (Blundel and Smith, 2013; Alexandre *et al.*, 2017). Sustainability is also seen as an extremely important asset for craftsmanship (Ferreira, Neves and Rodrigues, 2012). The pressure to innovate is enormous and change promotes the development of competences and means of facilitation that connect innovation with sustainability (Ferreira, Neves and Rodrigues, 2012). Long-established artisanal or craft-based products such as cabinet-making, ceramics, jewellery-making, weaving, among others, are regarded as 'far' from innovation largely because of the importance of tradition in the design of production processes – a tradition which is deeply ingrained and subscribes to a conservative approach (Blundel and Smith, 2013). It should not be forgotten that craftsmanship production is focused on the artisan's mastery during all phases, including the core production activities as well as the delivery to the final market and consumers (Ferreira, Neves and Rodrigues, 2012). Like in many other business, the crafts sector constantly faces challenges determined by external constraints, as well as from internal drivers, including subjective issues related to the personality and the skills of the craftsman (Dragin *et al.*, 2015). Often the artisan is the sole intervenient from the beginning until the very end of the process of production and delivery. The craftsman has a role in all phases of production and is the sole author of the product, from the moment where the idea was first conceived to the acquisition of the final product (Ferreira, Neves and Rodrigues, 2012).

In the European context, in most countries, craftsmanship has developed around specific national traditions. This has turned possible the diversification of the crafts sector in Europe. There are several jobs with a wide range of products and services which are vital to the sustainability and identity of local communities across Europe (Dragin *et al.*, 2015). Being able to create added value leveraging the regional production ecosystems, while exploring the origins of traditional know-hows of each region, creating jobs, retaining the population, and valuing the territory are being increasingly embraced among the goals of businesses in general (Ferreira, Neves and Rodrigues, 2012:37). It is known that small and medium enterprises (SME) play an important role when it comes to the competitiveness of the European economy. Micro enterprises, among which crafts businesses are commonly found, are part of the clear majority of SMEs in Europe. It should be pointed out that these businesses are also the biggest source of employment in the European Union (Dragin *et al.*, 2015). The importance of the crafts sector lies in job creation, as well as on the flourishing and appreciation of rural and urban areas and on the wellbeing of the population. In order to start their own business, craftsmen need to be equipped with a vast amount of skills related to entrepreneurship (Dragin *et al.*, 2015). To have a successful craftsmanship business "it is necessary to have skills combining work processes and market activities together with organizational skills and technical/legal skills as well as communication and personal skills" (Dragin *et al.*, 2015:77).

The wide geographic distribution of crafts artisans across Europe makes it imperative to foresight the sector beyond national borders. This article offers a timely contribute into the extend the understanding of the crafts sector, notably by addressing the difficulties that artisans face in the particular context of two different European countries to ensure the sustainability of their business, but also on how these companies managed to overcome their challenges and adversities.

2. Methodology

The present article addresses the results of three case studies whose aim is to contribute to extend the knowledge about key obstacles and problems faced by artisans in conducting their businesses, building on the analysis of their experiences in overcoming them. This research builds on a study conducted in five European countries: Portugal, Spain, Italy, France and Greece, under the scope of a transnational project whose aim is to develop knowledge to support creativity and innovation in in traditional crafts and semi-industrial business areas. Data was collected in 2016 through desk research and interviews with CEO's, Founders and Co-Founders from existing entrepreneurial and market approaches in crafts and semi-industrial activities. The interviews were prepared and piloted according to prevalent research methodology good practices, leading to a script with a set of structures questions. Data collection covered the analysis of 10 cases, in the 5 countries within the scope of the project, according to criteria described below, to ensure the theoretical validity of the samples. Therefore, there were 3 cases selected. These are descriptive cases, of well succeeded

Entrepreneurial and Market Approaches in crafts and semi-industrial activities and were collected in Italy and Greece. The paper offers also a comparative discussion regarding the main obstacles found, the factors which contributed to the success of the business, as well as the main ways of overcoming difficulties and issues found, which can inform the action of future and current entrepreneurs in the crafts sector.

2.1 Case studies selection

A preliminary task concerned the identification of representative cases in the crafts and semi-industrial activities in the 5 countries involved in the research project. A set of guiding criteria were defined to select activities in a consistent manner across all partners, targeting crafts and semi-industrial activities with growth potential. Moreover, a set of other pragmatic criteria were considered in the selection process with the purpose of enabling an effective and timely conduction of the activities. To this end, the process involved: i) a process of identification and selection of crafts and semi-industrial activities with growth potential; ii) a set of criteria to assess the growth potential of semi-industrial activities; iii) a set of criteria to assess the feasibility for final inclusion of 3 crafts and semi-industrial activities, from the sample identified in ii). The process for identifying and selecting crafts and semi-industrial activities with growth potential followed some steps: Scope Definition; Preliminary Identification; Growth Potential Assessment; Feasibility Assessment; and Submission for Joint Assessment by Project Partners.

The first step in the selection process aimed at specifying the scope for the identification of relevant activities, particularly the choice of a sectorial approach, or the identification of any other country-specific criteria, when applicable, that could justify a particular selection of activities.

In the following phase of preliminary identification, each partner conducted an exercise towards the identification of a wide range of crafts and semi-industrial activities, whose relevance for inclusion was assessed in the next step. The preliminary identification could be built on organizational knowledge and contacts, as well as on key factors that could be useful in providing clues for the identification of relevant activities. The identification process could rely on the conduction of consultation or personal interviews to these actors in order to gather the relevant information.

The next step was aimed at assessing the relevance of the preliminary set of crafts and semi-industrial activities based on their growth potential. To this end, a set of growth potential criteria was defined. The rating results were used as a guide for a shortlist of candidates. The calculation of the overall rating was obtained by averaging the ratings attributed to each criterion (e.g. using an ordinal metric for 1 – Very Poor to 5 – Very Good). Partners were advised to only include in the final selection those cases which obtained an overall rating above the group average. Table 1 shows the criteria used, as well as their definition.

Table 1: Criteria for characterizing the growth potential of crafts activities

Criterion	Description
Marketability	If the activity or technique has distinctive and unique production characteristics
Use sustainability	If the activity or technique has the potential to attract differentiated types of uses
Market sustainability	If the activity or technique has the potential to attract a substantial volume (national and/or international) of consumers
Productive ability	If the activity or technique can be performed with currently available and accessible technologies
Resources availability	If there is ease of access to relevant resources and raw materials
Value added	If the activity or technique has the potential to add value to existing or innovative products
Heritage value	If the activity or technique is a unique or exceptional testimony to a local or national cultural tradition

The phase of feasibility assessment stage, involved the examination of the selected shortlist of candidate activities towards a set of pragmatic criteria – geographic closeness; potential for a quality data collection and record; willingness of the artisan to participate in the project and to be involved in continuous contact; willingness of the artisan to share knowledge about the craftsmanship technique. After these steps, each partner identified two activities that were subject to a final assessment that was undertaken jointly by the project partners.

At the end, each partner submitted the list of the four pre-selected activities to the project partners and their corresponding information concerning the ratings attributed and any other relevant features so that a final joint an assessment by project partners was conducted. The purpose of this step was to exclude the

overlapping of activities, and check for any other potential consistency and relevance issues of the cases. After sharing this information, an agreement on the final selection was reached by all partners.

On Table 2 we present the characterization of all cases of the selected sample of entrepreneurial and market approaches in crafts and semi-industrial activities.

Table 2: Characterization of the sample

Case Study	Country	Craft Sector	Type of Entrepreneurial and Market Case	Goal
1 - Handmade leather sandals. The case of "Ancient Greek Sandals"	Greece	Handmade footwear/ Handmade leather sandals/ Design, manufacture, sales.	Promoting Entrepreneurship; New Technologies; Internationalization; Access to external funding (public and private); Skills and human capital; Promotion of Knowledge; Marketing.	Footwear design, manufacture; wholesale/retail; export/import
2- Handcrafted wooden eyewear. The case of "Zylo Eyeware"	Greece	Handmade wooden crafts/ handmade wooden eyewear/ Design, manufacture, sales	Promoting Entrepreneurship	Wooden sunglasses, eyeglasses, frames design and manufacture; wholesale/retail; export/import
3 - Maioliche Ficola	Italy	Ceramics	New Technologies; Internationalization; Skills and human capital; Promotion of Knowledge; Marketing	Transforming volcanic stone, terracotta and ceramic products

3. Analysis and results

3.1 Case study "Ancient Greek Sandals" - Handmade leather sandals

Handmade leather sandals inspired by ancient Greek patterns and shapes are very popular in Greece, especially among women, but also among tourists who visit Greece during summer. The company addressed in the study was created in 2012 and was active at the date of the study. The main activities of the Ancient Greek Sandals included footwear design, manufacture and wholesale/retail.

The case of Ancient Greek Sandals, an export-oriented Greek company operating in this specific footwear sector, was selected due to its clearly distinguishable fashion brand which enabled its dynamic presence in international markets from the very beginning. According to its CEO, marketing had a crucial importance for the company's development in order to reach international consumers and expand sales; this was offered as a rationale to explain why the company was heavily investing in its marketing strategy. Ancient Greek Sandals were handmade locally by skilled craftsmen using traditional techniques which have existed for centuries. Both co-founders have extensive experience in the footwear business, either in shoe designing or in shoe manufacture and wholesale/retail. When they came up with the idea of making leather sandals, they knew that brand building was among their top priorities if they wanted to carry through with a feasible business in the international arena, so they sought advice at an independent agency that provided integrated solutions to sales and communications. In 2014, the entrepreneurs behind Ancient Greek Sandals received the Award for Young Entrepreneur of the Year in Greece by the Stelios Philanthropic Foundation. Ancient Greek Sandals can be ordered at the company's website or can be directly purchased from several shops in 46 countries around the world.

3.1.1 Main barriers to be overcome and lessons learnt

According to an interview given by the company's CEO to Kathimerini newspaper in early 2014, taxation – especially regarding VAT refund – and the relevant legal framework regarding entrepreneurship was not perceived as being very favorable towards business operation, especially when it comes to newly established companies which need to invest their initial capital in promotional and other related activities. Even so, strong will and determination to carry through with the original project, along with a well-structured and export-oriented marketing plan, could bring about the desired results and help overcome some of the problems arising from burdensome and outdated administrative procedures or other unstable market conditions affecting local businesses. Moreover, Ancient Greek Sandals has quickly become a top foreign fashion brand for ancient Greek-style sandals largely due to its design and quality of raw materials and to its many followers on social media (e.g. Facebook); it is also a completely self-funded company with zero debt.

3.2 Case study "Zylo Eyeware" - Handcrafted wooden eyewear

The path from ideation to creation may be long and it usually takes a lot of effort and hard work to transform an original idea into a feasible business. The case of "Zylo eyewear" was selected precisely due to the entrepreneurial spirit of its co-founders who, back in 2012, decided to design and manufacture wooden sunglasses in the Syros Island. By that time, they had little experience with wooden handcrafts – however, this did not halt them from experimenting with wood and learning more about the material with which they really enjoyed working. Although aware of the challenges they were faced concerning the execution of their project, they were very optimistic and excited about it and joined forces with other designers, craftsmen and a photographer living in the same island at that time to start developing their project. The company was founded in 2013 and is still operating. All Zylo Eyewear items are created through a handcrafted process. The philosophy behind the company is that wooden eyewear should not be a luxury item but rather an artifact that comes from good technique, attention to detail and care for the material and the outcome; something that everyone should enjoy wearing. In this respect, the quality of materials is of primary concern for people of Zylo Eyewear, who carefully choose the lumber they use and refine it by hand. Apart from the aesthetic features in lines and shapes evoking the waves of the sea or the flow of the sand on the golden beaches of the Mediterranean, special attention is given to the ergonomics of the sunglasses' wooden frames, which are feather-lite, making them lightweight and easy to wear for hours. Finally, the company uses high quality lenses and does not use any chemicals or finishing products other than beeswax and olive oil salve. In 2015, Zylo Eyewear was invited as a best practices case to participate in a conference at the European Parliament regarding the strengthening of youth entrepreneurship. Zylo Eyewere handmade sunglasses can be purchased in 34 exclusives stores in Greece and abroad.

3.2.1 Main barriers to be overcome and lessons learnt

As with any entrepreneurial endeavor, turning an original idea into a feasible business is usually accompanied by issues and worries which must be addressed. According to the Zero Eyewear co-founders, the main difficulties were mostly concerning financing their project and having access to the required materials for sample testing and for experimenting with lines and shapes of the items they planned to create. Regarding financing, they decided to explore the possibilities of a global fundraising, so they started a crowdfunding campaign on Indiegogo, an internet platform for financing creative and entrepreneurial ideas, which – to their surprise– turned into a total success, vastly surpassing their initial expectations. After ensuring their seed capital, the next logical step to follow was to take careful and well-studied decisions as to avoid unnecessary expenses when it came to the material they needed to work with. However, it was again this obstacle that taught them how to handle and use wood in a correct way, taking full advantage of its potential in creating wooden eyewear.

3.3 Case study "Maioliche Ficola"

Umbria is one of the few regions in Italy that can boast of having four towns with the ancient tradition of ceramics (Deruta, Gualdo Tadino, Gubbio and Orvieto). Maioloche Ficola's main goals include transforming volcanic stone, terracotta and ceramic products. The majolica industry is an evidence of the economic/productive evolution of ceramics in Umbria. Of all the traditional crafts, the production of terracotta and majolica is the one for which Umbria is most well-known globally and also the one which has reached the highest levels of technical and artistic expression. Deruta exports 50% of its production of handcrafted ceramics abroad. A recipe that combines tradition, innovation and, above all, a connection to the territory.

Faced with crisis in the sector, the ceramic arts must defend themselves. The Grandi Maioliche Ficola case demonstrates the ability to offer products that are always up to date due to the great value linked to research and innovation. It is a company that has been operating in the ceramic and volcanic stone sector for many years, based in Deruta, in the heart of Umbria, where the whole production takes place. Grandi Maioliche Ficola offers a wide range of products such as indoor and outdoor tables, bases for tables, chairs, gazebos, coverings, tops for bathrooms, sinks, tops for kitchens, flooring, stairs, mirrors, ceramics, pottery and many other items. Its core business is the creation of hand-decorated volcanic stone tables and terracotta decorated pots, aimed at any domestic or public environment. The volcanic stone is a natural material formed from the rapid cooling of basaltic lava, usually used in construction. Tables are waterproof, frost proof, resist salty air and any other atmospheric agents, including very low temperatures; they are highly resistant to stains, scratches and shocks and resist the effects of any type of cleaning agent. All the decorations are exclusively hand-painted and can be chosen from hundreds of designs in the catalogue, or such decorations can even have an input from the customer himself, thus creating a completely customized table and making the customer's

dreams of owning a unique piece come true. Along with tables, Grandi Maioliche Ficola produces a wide range of volcanic stone, terracotta and ceramic products, such as kitchens and bathrooms countertops, flooring, ornamental panels, consoles, big pots and many more. Carrying out its production with passion and extreme attention to every detail, this company offers an original and high-quality product, making it the very best of what is made in Italy due to the strength, versatility and high technical features of the materials it uses (such as volcanic and lava stone) and the ability to combine the beauty of the decoration with the functionality of the product. The company was founded in 1987 and is still operating.

3.3.1 Main barriers to be overcome and lessons learnt

The case study revealed the relevance of innovation and technology even in handicraft enterprises, especially concerning its development on foreign markets. Innovation, whose foundation is the creation of new products or more efficient production processes, must necessarily raise the quality level of artistic craftsmanship that has suffered a negative bending over the years mainly due to the need to bring down prices in order to encourage the competitiveness and the lack of an adequate training of the workforce system.

4. Conclusions

The study cases addressed in this work offers a perspective about the diversity in craftsmanship businesses, even though only two different European countries are reported. The cases enabled the identification of problems or obstacles that artisans had to face in order to establish and manage their companies. It should be noted that, on the first case study, the issues related to taxation, especially regarding VAT refund, as well as the existence of a non-friendly legal framework, were the main obstacles mentioned. The case of Ancient Greek Sandals is a success because it has implemented an integrated marketing strategy from a very early stage, building on a distinguishable fashion brand, with the aim of improving the business competitiveness of the specific craft activity in international markets. In addition, it is a good practice example as it effectively promotes entrepreneurship and marketing policies taking into account the craft sector's needs to achieve successful results. Furthermore, Ancient Greek Sandals is a very inspiring as a successful project that invested on a local product in a different perspective, shifting the focus towards the design and high quality, thus competing successfully with other well-established foreign brands, in the handmade footwear sector. In this respect, it is an endeavor that could motivate other craftsmen or entrepreneurs in identifying potential in traditional local crafts and in applying efficient marketing strategies to enhance visibility and profitability of their local production. Finally, as already mentioned, Ancient Greek Sandals is a good practice example in that it employed a fresh and innovative way of promoting its products through effective communication strategies adapted to its target audience (e.g. website, social media, other promotional events, etc.) in order to expand sales worldwide and compete successfully with other players in the relevant market.

The case of Zylo Eyewear is a successful example of how an original idea can turn into a viable business, including non-favorable financial conditions, when the people behind the project put all their creativity and effort into fulfilling their goals and improving the business competitiveness of this specific craft activity. The way Zylo Eyewear started and developed its business activity as a craft enterprise has undeniably contributed to promoting learning-by-doing and risk taking, which are essential aspects of entrepreneurship. Apart from creating income for its co-founders – who were affected by the financial crisis as many others in Greece by the time they launched their project – Zylo Eyewear sought to form a small team with other professionals and craftsmen living in the same island in order to shape the future of their endeavor in terms of design, manufacture, marketing and sustainability. In addition, Zylo Eyewear, which is based in a small Mediterranean island, could inspire other craftsmen at a local level to try new ideas, experiment with materials and create high quality fashion items targeting new markets and expanding sales abroad. It is also a good practice example for improving the situation of craft enterprises within a certain region since it highlights their potential and prospects, especially within the context of creative industries. Finally, the case of Zylo Eyewear is an original and innovative project build upon the enthusiasm, hard work and creativity of its people that set clear goals and take small but steady steps towards achieving them.

Regarding the "Maioliche Ficola" case, towns of ceramic and small crafts traditions, endowed with a rich artistic heritage, are nevertheless facing severe problems: globalization exacerbating competition and ageing population of craftsmen, both leading to a continuous decline of the sector. The lack of development and marketing strategies and techniques at the enterprises pose a major obstacle for the much-needed improvement. The case of Grandi Maioliche Ficola is a successful case because it demonstrates the importance

of innovation when the goal is to bring pottery into everyday life, not only by making ornaments but also by making practical objects.

All responsibility is placed on the artisans (from the process of production to the commercialization of their product) and the obstacles that they face concerning the management of their businesses are numerous and artisans must have a wide range of entrepreneurial skills which shall enable them to effectively manage their businesses. The barriers they face are very speckled, as are the strategies they use to overcome them. In our opinion, the crafts sector requires more coverage and understanding across Europe and this study should be seen as a first approach towards a guidance that needs further development. The cases presented serve as a motto for already established artisans as well as for those who intend to start their own business once it alerts them to the existence of various barriers inherent to each business. It also intends to motivate them to struggle to succeed in their business, since other artisans have already experienced difficulties and have devised strategies to overcome them. With a superficial approach of the cases, this article sought to raise awareness of the need to study different realities associated with the craft, leaving as a suggestion the deepening of cases such as those that were presented and that may provide useful guidelines to other craftsman.

References

Aguiar, M. C. et al. (2016) 'A Influência Açoriana no Desenvolvimento de Projetos de Identidade Visual no Setor do Artesanato: Estudo de Caso Ara - The Azorean Influence in Development of Visual Identity Project in Crafts Sector: A Case Study in Ara', Educação Gráfica, 20(1), pp. 232–251.

Alexandre, C. B. et al. (2017) 'New design and manufacturing technologies for craft products', Procedia Manufacturing. Elsevier B.V., 13, pp. 1284–1291. doi: 10.1016/j.promfg.2017.09.054.

Blundel, R. K. and Smith, D. J. (2013) 'Reinventing artisanal knowledge and practice: A critical review of innovation in a craft-based industry', Prometheus, 31(1), pp. 55–73. doi: 10.1080/08109028.2013.770276.

Dragin, A. et al. (2015) 'Craft as a Business Development Challenge: Latvian and Serbian Craftsmen's Views', Procedia - Social and Behavioral Sciences. Elsevier B.V., 185, pp. 76–83. doi: 10.1016/j.sbspro.2015.03.433.

Ferreira, Â. S., Neves, M. and Rodrigues, C. (2012) 'Design e Artesanato: um projeto sustentável', REDIGE, 3(1), pp. 32–55.

Online sources

http://www.ancient-greek-sandals.com/en/eur/
http://www.ancient-greek-sandals.com/ViewShopStaticPage.aspx?ValueId=4095
https://www.facebook.com/ancientgreeksandals
http://www.rainbowwave.com/about.html
http://www.kathimerini.gr/794061/article/proswpa/synentey3eis/nikolas-minogloy-pws-taarxaioellhnika-sandalia-pathsan-se-46-xwres
http://www.lifo.gr/team/lookbook/49752
http://stelios.org/entrepreneurship/Award-for-Young-Entrepreneur-of-the-Year-in-Greece/past-winners.html
http://zyloeyewear.com/about
https://www.facebook.com/Zyloeyewear
http://www.huffingtonpost.gr/2015/02/26/life-zylo-ksulina-gualia_n_6742094.html
http://www.greekproductsabroad.com/2013/07/zylo-eyewear-wooden-greece/
http://www.lifo.gr/team/u12124/49766
http://www.viosimi.gr/index.php/europe1/3415-2015-11-17-20-26-14
https://www.indiegogo.com/projects/xylo-eyewear#/
http://www.brunellocucinelli.com/it/servizi/contatti
http://www.brunellocucinelli.com
http://www.brunellocucinelli.com/it
https://www.facebook.com/BrunelloCucinelli/
http://www.grandimaiolicheficola.eu/
http://www.ceramicamadeinumbria.it

An Empirical Study of the Production Technology Cluster and Regional Economic Growth in Russia

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Abstract: This paper presents results of the identification of the "production technology" cluster in Russian Regions and provides evidence of an existing significant relationship between volumes of gross regional product and main cluster characteristics. Firstly, we discuss the main theoretical and methodological aspects of using a top-down approach for cluster identification. We focus on the top – down approach for cluster identification, which was introduced by M. Porter, developed by Lindqvist, G. and applied by the "Institute For Strategy And Competitiveness", Harvard business school and European Cluster Observatory. Secondly, we calculate the main characteristics of the "production technology" cluster in 80 Russian Regions for the 2008 – 2015 period following the works by M. Porter and G. Lindqvist. After that, we provide conclusions concerning regional features of the discussed cluster and present calculation results for the regions, where the presence of the cluster is the strongest. Thirdly, we test hypotheses concerning the existence of the relationship between the degree of cluster localization in the Russian regions and volumes of real gross regional product using regression analysis tools. We find that there are positive relationships between cluster features and volumes of gross regional product. When we control the volumes of investment in fixed capital made by organizations and the work force volumes in the region positive relationships remain stable. However, in models with time effects some of the models show insignificant coefficients, what can be attributed to the multicollinearity effects between time effects and dependent variables. In conclusion, we discuss the importance of the "production technology" cluster as a factor of innovative regional economic growth.

Keywords: production technology cluster, regional development, economic growth, cluster identification.

1. Introduction

Regional economic growth is a current focus of research (Rodionov D. G., Rudskaya I. A., 2017; Rodionov D. G., Rudskaya I. A., 2018; Rodionov D. G. et al., 2017). Issues on the assessment of cluster structure development in regions are also widely looked at in scientific literature (Porter M. E., 2012). At the same time, parameters reflecting the economic, innovative, social, and ecological levels of growth in a region are distinguished as a result of the development of a cluster structure. (Ketels C., Protsiv S., 2014; Shabunina et all., 2017). It is worth noting that in most of the works it is the relationship between the general level of development of a cluster structure in a region and the indictors reflecting regional performance which is evaluated (Lindqvist G., 2009).

Meanwhile, questions on the development of separate clusters in the regions and on the analysis of their influence on a region remain of little focus in literature (Gutman et all., 2017; Rytova et all., 2016; Zhogova et all, 2017).

Thus, the goal of this study is to search for a relationship between regional economic growth and the development of a "production technology" cluster in Russia. To achieve this goal, the authors have uncovered the main theoretical and methodological positions relating to the issues of cluster identification using a top-down approach. They have assessed the level of localization, size, and focus of the "production technology" cluster group in 80 regions of Russia for the period of 2008 to 2016. They have also identified significant clusters and built four groups of regression models, which reflect the positive relationship between the development of the "production technology" cluster and the real GRP growth in the region.

2. Cluster and cluster identification

One of the key issues of cluster theory is the problem of cluster identification in individual territory regions. As foreign experience has shown, the existing methodical approaches with a low variety of tools differ significantly in practice. A number of paired categories can be identified in order to characterize the process and techniques of cluster identification; however, most of them come from two main approaches. In the first, which can be called "bottom-up", the clusters are identified for a specifically chosen territory, based on the

presence of previously known enterprises and industry leaders. The second approach uses a method, tentatively called “top-down”, where spatially localized production, focused on a specific kind of economic activity, is sought out. Further on, the national sample Etalon is used for the detection and initial analysis of specific regional clusters.

The point of standard (“etalon”) clusters is to determine the kinds of economic activity which are most often located near each other and subsequently possess a complementarity effect. Since “the degree to which sectors actually coalesce in a space speaks to the importance of local intersectoral contacts» (Porter M.E., 2012), if there is spatial proximity between two or more sectors, then it will serves as a mutual reinforcement for the specialization sectors of the cluster.

The “top-down” approaches to cluster identification take into account two constant cluster characteristics, functional connectivity and geographical proximity, which are traditionally subdivided into two kinds: 1) functional, focused on identifying specific kinds of clusters; 2) spatial, focused on identifying geographical clusters.

It is generally accepted nowadays that the best results of “top-down” cluster identification are reached by combining functional and spatial approaches. These synthetic approaches include the approach of M. Porter.

M. Porter’s method has become a classic and one of the most widespread methods in other countries. Many European and a few domestic attempts at identifying and mapping clusters do not just use the Harvard approach as a technique, but base themselves on its results.

As a result of the multiple studies by M. Porter, we fully managed to determine the structure of standard clusters, based on the diversity of activity presented in the American classifier SIC (Standard Industrial Classification) (Porter M.E., 2012).

Subsequently, the standard cores of cluster groups have been widely used by the US Department of Commerce, which supports the US project of cluster mapping (U.S. Cluster Mapping, 2018). In the European Cluster Observatory project on the identification and mapping of economic agglomerations of E.U. countries, the composition of cluster reference cores was adapted for the European Union taking into account the application of the European classifier NACE (European Cluster Observatory, 2018).

The complete adaptation of foreign classifiers of economic activities to the Russian counterpart OKVED has not taken place as of yet.

Solving this problem by adapting the structure of cluster standard cores to the Russian economy in accordance with the classification of activities by OKVED will allow the composition of the most probable cores of cluster groups of Russian federal subjects to be determined and can be widely used as an adequate basis for the approbation of foreign methods of cluster analysis.

3. Top – down approach for cluster identification

Within the top-down approach, the filling of cluster groups on the territory of federal subjects in accordance with the identified standards allows for the formation of conditional clusters. However, cluster identification suggests confirming the hypothesis of their existence on a given territory. This is achievable through the use of statistical tools according to the methodology proposed by the European Cluster Observatory (European Cluster Observatory, 2018).

The presence and development of positive economic externalities that influence the activity of businesses within the cluster is determined by the presence of a specific “critical mass” of the cluster group core. Due to this, the formed standard cores of the cluster groups should be examined for the presence of this “critical mass”, which determines the relative strength and competitiveness of the local cluster.

At the basis of this method is the assumption that the volume and level of quality of the knowledge being circulated between businesses and organizations included in the examined cluster depend on the size of the cluster, the level of its specialization, as well as the degree to which the examined region is aimed at

manufacturing products in related areas within the cluster. These three factors are defined by the European Cluster Observatory as the "Localization coefficient" (1), "Size" (2), and "Focus" (3). The value of the factors, within the threshold values, reflect whether or not the examined cluster has achieved a sufficient "critical mass" to generate positive external effects and relations. These indicators are calculated using employment statistics and are reflected in formula form as the following:

$$Focus = \frac{Emp_{ig}}{Emp_{g}} \quad (1)$$

where LQ is the "Localization coefficient"; Emp_{ig} is the number of employed in the cluster group i in region g; Emp_g is the total number of employed in region g; Emp_i is the number of employed in the cluster group i; Emp is the total number of employed.

$$Size = \frac{Emp_{ig}}{Emp_{i}} \quad (2)$$

where Size is the "Size" of cluster group i; Emp_{ig} is the number of employed in the cluster group i in region g; Emp_i is the number of employed in the cluster group i.

$$Focus = \frac{Emp_{ig}}{Emp_{g}} \quad (3)$$

where Focus is the "Focus" of cluster group i; Emp_{ig} is the number of employed in the cluster group i in region g; Emp_g is the number of employed in region g.

G. Lindqvist (2009), a Swedish economist from the European Cluster Observatory, establishes the following criteria as the threshold values which mark the significant cluster groups in a region:

1. "Localization coefficient" (3.1) ≥ 2;
2. the region should be included in the 10% of regions leading in "Size" (3.2);
3. the region should be included in the 10% of regions leading in "Focus" (3.3).

Fulfilling the constraints for each indicator earns the cluster group one "star". Thus, the maximum any cluster group can receive is three "stars". The number of "stars" determines the strength of the cluster group.

Apart from this, none of the "stars" can be assigned if the total number of employees at the cluster core does not exceed 1,000 people.

In the end, implementing the methodology described allows data on the number and strength of the examined cluster groups to be obtained for all regions of the country (group of countries) being studied.

It is worth noting here that the constraint for the indicator "Localization coefficient" is of a variable value.

Thus, when studying the "core" of clusters (i.e., clusters in the "narrow" meaning of the word), M. Porter determined the threshold value of the localization coefficient to be at the level 1.0 (Porter M.E., 2012); however, the US Department of Commerce uses a threshold value of 1.3 (U.S. Cluster Mapping, 2018). We suggest using a threshold value of 1.3 for our study when identifying strong clusters.

In this way, adapting the results of the synthetic approach to the Russian economy in the process of cluster analysis allows cluster "standards" characteristic of the examined territory to be identified. Meanwhile, the use of criteria from the European Cluster Observatory makes it possible to, first of all, use employment statistics to check the hypothesis put forward on the strength of specific cluster groups in one region or another according to the number of assigned "stars", and second of all, to identify regions in which the examined clusters are significant. Identifying such regions allows us to talk about both the existence of inter-territorial clusters, the accounting of which allows a more effective regional policy to be conducted, as well as about the existence of competing "foci" of concentration in the corresponding industries, which are capable of

taking for themselves the employment of other cluster groups due to the effect of more significant positive agglomeration externalities on their territories.

Applying the criteria for the level of cluster group development allows us to identify strong clusters on the territory of the country and its regions. However, it does not provide enough information about the factors of the geographic concentration of the cluster, i.e., the agglomeration external effects which determine the level and potential of growth for the cluster group on the examined territory.

4. Results of the growth assessment of the "production technology" cluster in Russian regions for the period of 2008 to 2016

In order to assess the development of the "production technology" cluster in regions of Russia, the authors have compared the kinds of activities from the classifier NACE, which were attributed by M. Porter to the "production technology" cluster, with the activities corresponding to them from the classifier OKVED-2001 (see table 1).

Table 1: Relationship of activities included in the cluster "production technology", according to the classifiers NACE and OKVED - 2001

Types of activities according to NACE (Europe)		Types of activities according to OKVED (Russia)	
25.3	Manufacture of steam generators, except central heating hot water boilers	28.3	Manufacture of steam generators, except central heating hot water boilers; manufacture of nuclear reactors
28.15	Manufacture of bearings, gears, gearing and driving elements	29.14	Manufacture of bearings, gears, gearing and driving elements
28.22	Manufacture of lifting and handling equipment	29.22	Manufacture of listing and handling equipment
28.29	Manufacture of other general-purpose machinery n.e.c.	29.24	Manufacture of other general-purpose machinery n.e.c.
28.41	Manufacture of metal forming machinery; Manufacture of other machine tools	29.4	Manufacture of machine tools
18.91	Manufacture of machinery for metallurgy	29.51	Manufacture of machinery for metallurgy
28.96	Manufacture of plastics and rubber machinery;	29.56	Manufacture of other special-purpose machinery, n.e.c.
28.99	Manufacture of other special-purpose machinery n.e.c.		
30.99	Manufacture of other transport equipment n.e.c.	35.5	Manufacture of other transport equipment n.e.c.

Further on, the authors calculated the level of localization, size, and focus of the cluster for 80 regions of Russia over the period of 2008 to 2015 and identified 31 regions where there was at least one cluster during this period in accordance with the criteria presented above (see table 2). The results of the calculation are presented in graphic form for the eight regions where the "production technology" cluster developed the most successfully (see figures 1 and 2). As of 2015, the largest focus of the cluster is in Ryazan, Vologda, and Belgorod oblasts and makes up 1.5%, 1.2%, and 1.15% of all those employed in the region, respectively. The largest size of the cluster is in Moscow Oblast, Saint Petersburg, and Sverdlovsk Oblast, where the employed make up 5.9%, 5.8%, and 5% of all those employed in the cluster in Russia, respectively. Likewise, the leaders in the parameter of localization are Ryazan, Vologda, and Belgorod oblasts with the values 3.04, 2.44 and 2.3.

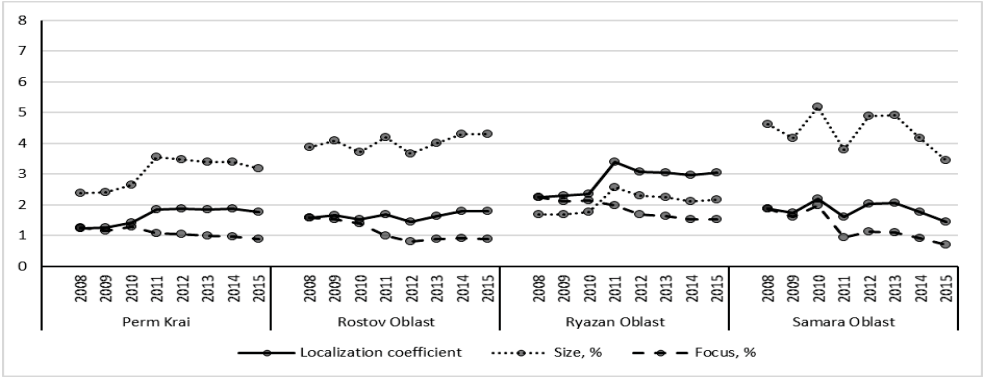

Figure 1: Dynamics of level change in localization, size, and focus of the cluster "production technology" in a number of regions in Russia

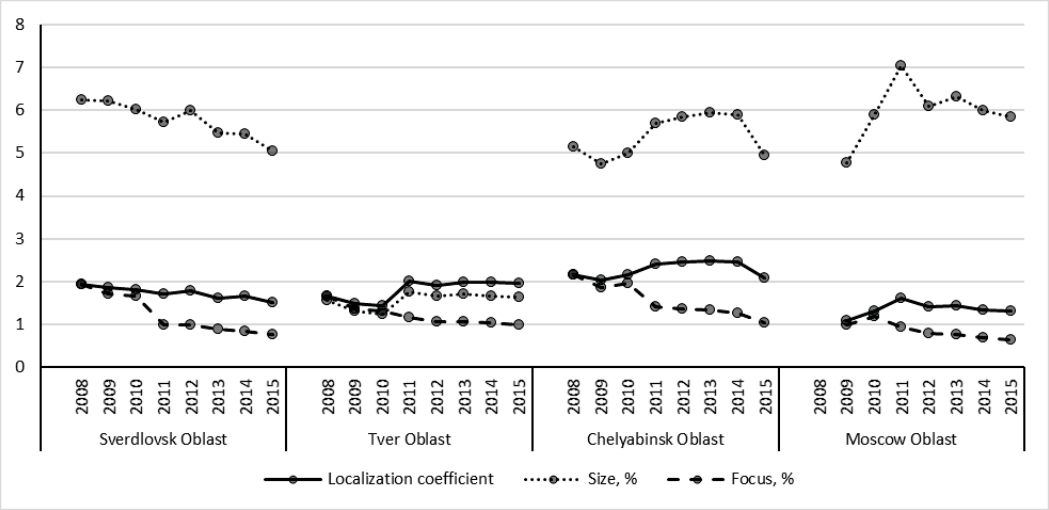

Figure 2: Dynamics of level change in localization, size, and focus of the cluster "production technology" in a number of regions in Russia

Table 2: Number of stars assigned to the "production technology" cluster in certain regions of Russia

Region	2008	2009	2010	2011	2012	2013	2014	2015
Altai Krai	0	0	0	2	1	1	1	1
Belgorod Oblast	0	0	0	2	2	2	2	2
Vladimir Oblast	2	2	2	0	1	1	0	0
Volgograd Oblast	1	1	1	0	0	1	1	1
Vologda Oblast	2	2	3	0	2	2	2	2
Moscow City	1	1	0	1	0	0	1	1
Saint Petersburg	1	0	1	1	1	1	1	1
Ivanovo Oblast	1	0	0	0	0	0	0	0
Kaluga Oblast	0	0	0	0	0	0	1	1
Kemerovo Oblast	1	0	1	1	1	0	0	0
Kostroma Oblast	1	2	1	0	0	0	0	0
Krasnoyarsk Krai	3	3	3	0	0	0	0	0
Kurgan Oblast	0	0	0	1	1	1	1	1
Moscow Oblast	0	1	1	2	2	2	2	1
Nizhny Novgorod Oblast	2	2	0	0	0	0	0	0
Orenburg Oblast	2	1	2	0	0	0	0	0
Oryal Oblast	0	0	0	1	1	1	1	1
Penza Oblast	0	0	0	1	1	0	1	1
Perm Krai	0	0	1	3	3	3	2	2
Republic of Adygea	2	0	0	0	0	0	0	0
Republic of Bashkortostan	0	0	0	1	1	2	2	2
Republic of Khakassia	0	1	1	0	0	0	0	0
Rostov Oblast	2	2	2	3	2	2	3	3
Ryazan Oblast	2	2	2	2	2	2	2	2
Samara Oblast	2	3	3	2	3	3	3	2

Region	2008	2009	2010	2011	2012	2013	2014	2015
Sverdlovsk Oblast	3	3	3	3	3	2	2	2
Tver Oblast	1	1	1	2	2	2	2	2
Tula Oblast	1	1	1	1	1	1	1	1
Udmurt Republic	0	0	0	1	1	1	0	0
Chelyabinsk Oblast	3	3	3	3	3	3	3	3
Yaroslavl Oblast	0	0	0	1	1	2	1	2

5. Relationship between regional economic growth and the development of the "production technology" cluster in Russia

5.1 Model, hypotheses, and research method

The relationship between the regional economic growth and the development of the "production technology" cluster in Russia was measured using tools of regression analysis available in the program STATA MP14. For the base tool of the study we chose Linear regression with panel-corrected standard errors, proposed by Beck and Katz (1995) as an alternative to the feasible generalized least squares (FGLS) based algorithm, which was proposed by Parks and Kmenta in 1986 (Hoechle D., 2007).

Within the framework of the study, 12 models were built and tested, in which the presence or absence of a relationship between the characteristics of the "production technology" cluster and the size of the GRP was assessed. These models were split into four groups depending on the hypothesis being tested.
The first group of model can be presented in equation form as follows:

$$\ln GRP_{it} = \beta_0 + \beta_1 \ln RIiFA_{it} + \beta_2 \ln TRE_{it} + \Upsilon_i Cluster_{it} + \phi_t Year_t + \varepsilon_{it} \quad (4)$$

Where:

$\ln GRP_{it}$ – is the natural logarithm for the GRP value (rub., in constant prices of 2008) being generated in region i at moment t;
$\ln RIiFA_{it}$ – is the natural logarithm for the investments (rub., in constant prices of 2000) in fixed assets being carried out in region i at moment t;
$\ln TRE_{it}$- is the natural logarithm for the number of employed in a region of workers (mil. people) in region i at moment t;
$Cluster_{it}$ is the binary variable, taking on a value of 1 if there is a "production technology" cluster in the region, and 0 if not.
$Year_t$ –is the binary variables, taking on a value of 1 if the observation refers to a specific year t, and 0, if not.

The functional form of the natural logarithm was used for the dependent and independent control variables with the aim of smoothing the heteroscedasticity that occurs as a result of the uneven social economic situations of the regions. Along with this, the logarithmic specification of the regression equation allowed us to linearize the presented function in line with the Cobb - Douglas production function. This makes it possible to interpret the coefficients for them as elasticity.

Within the first group of models, the H1 hypothesis is tested, according to which a statistically significant relationship between the GRP volume and the existence of the "production technology" cluster in a region exists.

The second, third, and fourth groups of models were constructed similarly to the first:

$$\ln GRP_{it} = \beta_0 + \beta_1 \ln RIiFA_{it} + \beta_2 \ln TRE_{it} + \Upsilon_i LQ_{it} + \phi_t Year_t + \varepsilon_{it} \quad (5)$$

$$\ln GRP_{it} = \beta_0 + \beta_1 \ln RIiFA_{it} + \beta_2 \ln TRE_{it} + \Upsilon_i Size_{it} + \phi_t Year_t + \varepsilon_{it} \quad (6)$$

$$\ln GRP_{it} = \beta_0 + \beta_1 \ln RIiFA_{it} + \beta_2 \ln TRE_{it} + \Upsilon_i Focus_{it} + \phi_t Year_t + \varepsilon_{it} \quad (7)$$

Where:

LQ_{it} is the value of the localization coefficient of the "production technology" cluster in region i at moment t;
$Size_{it}$ is the size of cluster group i at moment t, in %;
$Focus_{it}$ is the focus of cluster group i at moment t, in %.

Within the second model, the H2 hypothesis is tested on the presence of a statistically significant relationship between the level of localization of the "production technology" cluster in a region and the GRP volume. The third model tests the H3 hypothesis about the presence of a positive relationship between the size of the "production technology" cluster in a region and the GRP volume. The fourth tests the H4 hypothesis about the presence of a positive relationship between the focus of the "production technology" cluster in a region and the GRP volume.

In model groups 2, 3, and 4, the indices of 1 correspond to models constructed for 80 regions of Russia; 2 – for 13 regions, where achievement of the minimum required value for two of the three parameters was recorded at least once from 2008-2016 in the "production technology" cluster; 3 – for 13 regions adjusted for annual fixed effects.

5.2 Empirical results of the study

The main empirical results of the study are presented in the appendage. Based on the calculations, we can conclude that there is a relationship between the GRP volumes and the main characteristics of the "production technology" cluster (see tables 3 and 4).

Table 3: Empirical results of the estimation relationship between "production technology" cluster characteristics and Gross regional product (models 1 and 2)

MODELS / VARIABLES	Model 1			Model 2		
	1.1	1.2	1.3	2.1	2.2	2.3
Whether cluster "Information technologies" presented in the region or not	**0.909*** **	**0.0543*** **	**0.0556*** **			
	-0.0643	-0.014	-0.0138			
LQ				**0.614*** **	**0.0584*** **	0.00998
				-0.018	-0.0101	-0.0189
Lagged natural logarithm of real investments in fixed assets		0.734***	0.737***		0.745***	0.602***
		-0.0449	-0.0446		-0.047	-0.0773
Natural logarithm of total regional employment		0.349***	0.347***		0.326***	0.465***
		-0.0546	-0.0544		-0.0585	-0.1
Constant	12.42***	4.424***	4.419***	12.01***	4.245***	6.045***
	-0.0143	-0.529	-0.526	-0.0211	-0.56	-0.894
Observations	400	320	320	400	320	76
R-squared	0.079	0.951	0.951	0.127	0.952	0.975
Number of RegionID	80	80	80	80	80	19
Year FE	No	No	Yes	No	No	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Empirical results of the estimation relationship between "production technology" cluster characteristics and Gross regional product (models 3 and 4)

MODELS / VARIABLES	Model 3			Model 4		
	3.1	3.2	3.3	4.1	4.2	4.3
Size	**0.542*** **	**0.0648*** **	**0.0207*** **			
	-0.0076	-0.00758	-0.00787			
Focus				**1.134*** **	**0.112*** **	0.0166
				-0.0366	-0.02	-0.0347
Lagged natural logarithm of real investments in fixed assets		0.728***	0.604***		0.745***	0.602***
		-0.0436	-0.0773		-0.0469	-0.0772
Natural logarithm of total regional employment		0.287***	0.421***		0.326***	0.465***
		-0.051	-0.109		-0.0584	-0.1
Constant	11.88***	4.397***	5.985***	12.02***	4.245***	6.041***
	-0.017	-0.51	-0.9	-0.0222	-0.56	-0.895
Observations	400	320	76	400	320	76
R-squared	0.504	0.954	0.976	0.127	0.952	0.975
Number of RegionID	80	80	19	80	80	19
Year FE	No	No	Yes	No	No	Yes

Thus, according to the results of models 1.1 – 1.3 there is a statistically significant relationship between the GRP volumes and the existence of a cluster in a region. That is, in regions where the presence of this cluster has been recorded; the GRP is on average higher (hypothesis H1 is confirmed).

Models 2.1 – 2.3 show the presence of a positive relationship between the levels of localization of the "production technology" cluster in a region and the GRP volume. That is, in regions with a higher employment level in the "production technology" cluster; the GRP is on average higher (hypothesis H2 is confirmed).

Models 3.1 – 3.3 show the presence of a positive relationship between the size of the "production technology" cluster in a region and the GRP volume. That is, in regions where the employment share in the "production technology" cluster is greater in relation to all those employed in the region; the GRP is on average higher (hypothesis H3 is confirmed).

Models 4.1 – 4.3 show the presence of a positive relationship between the focus of the "production technology" cluster in a region and the GRP volume. That is, in regions where the employment share in the "production technology" cluster is greater in relation to all those employed in the region; the GRP is on average higher (hypothesis H4 is confirmed).

Therefore, these relationships are maintained in the models even when we control the volumes of investment in fixed capital made by organizations and the work force volumes in the region. However, in models with fixed annual effects, the coefficients for the variables "Focus" and "LQ" were not significant. This can attest to the fact that the effect from these variables is completely absorbed by fixed annual effects.

6. Conclusion

It is hard to overestimate the relevance of measuring the influence the development of information technologies has on the GRP level in today's world. This paper shows that the assessment of this contribution can be carried out from different sides including with the use of macroeconomic data across a cluster structure of regions. Based on the theoretical and methodological developments done by M. Porter and G. Lindqvist, the authors have analyzed the basic characteristics of the "production technology" cluster, chosen on the basis of employment data, in regions of Russian. Using the method of econometric analysis, the authors identified an existing positive relationship between GRP volumes and the characteristics of the "production technology" cluster on the example of regions in Russia. Whereby, the positive significant relationship was maintained both in models constructed for all regions and in models constructed for regions in which there was a cluster recorded at least once during 2008 – 2015.

It is worth noting that the conclusions made in this study reflect the situation in Russia, and the authors of future studies will need to carefully interpret the results during their extrapolation onto other regions.

As for the focus of future studies, the authors consider it relevant to conduct a more detailed examination of the "production technology" cluster and its influence on the GRP in regions. In particular, along with the cluster characteristics based on level of employment, the issues of assessing "Jacobian" proximity effects and "Marshallian" proximity effects and their relationship with GRP volumes in the regions are also relevant.

References

Beck, N., & Katz, J. N. (1995) "What to do (and not to do) with time-series cross-section data", American political science review, 89(3), 634-647.

European Cluster Observatory. Retrieved January 25, 2018, from http://www.clusterobservatory.eu

Gutman, S.S., Zaychenko, I.M., Kalinina, O.V. (2017). Selection of strategy implementation tool for shipbuilding cluster of Arkhangelsk Oblast. 29th International Business Information Management Association Conference - Education Excellence and Innovation Management through Vision 2020: From Regional Development Sustainability to Global Economic Growth, IBIMA 2017, p. 1430-1438.

Hoechle, D. (2007) "Robust standard errors for panel regressions with cross-sectional dependence", Stata Journal, 7(3), 281.

Ketels, C., & Protsiv, S. (2014) European cluster panorama 2014. Center for Strategy and Competitiveness, Stockholm School of Economics, October.

Lindqvist, G. (2009) "Disentangling Clusters. Agglomeration and Proximity Effects". Vällingby: Elanders.

Porter M.E. (2003) "The Economic Performance of Regions", Regional Studies, Carfax Publishing, 37 (6/7), 549–578 .

Porter, M. E. (2012) "The economic performance of regions. In Regional Competitiveness", Routledge, pp. 137-166.

Rodionov, D. G., & Rudskaya, I. A. (2017) "Regıonal Innovatıve Envıronment in Natıonal Economıc Development (The Case of Russıa)", International Journal of Ecology & Development, 32(4), 20-28.

Rodionov, D. G., Rudskaia, I. A., Degtereva, V.A., (2017) "Assessment of the effectiveness of regional innovation systems in Russia" Proceedings of the 29th International Business Information Management Association Conference - Education Excellence and Innovation Management through Vision 2020: From Regional Development Sustainability to Global Economic Growth, p. 3437-3450.

Rudskaya, I. A., & Rodionov, D. (2018). Comprehensive evaluation of Russian regional innovation system performance using a two-stage econometric model. Revista ESPACIOS, 39(04).

Rytova, E. V., Kozlov, A. V., Gutman, S. S., & Zaychenko, I. M. (2016). Analysis of the Regulatory and Legal Framework of the Socio-Economic Development in the Far North Regions of Russia. Journal of Advanced Research in Law and Economics, 7(7 (21)), 1828-1836.

Shabunina, T.V., Shchelkina, S.P., Rodionov, D.G. (2017). An innovative approach to the transformation of eco-economic space of a region based on the green economy principles. Academy of Strategic Management Journal, 16 (Specialissue1), p. 176-185.

U.S. Cluster Mapping | Mapping a nation of regional clusters. (n.d.). Retrieved January 25, 2018, from http://www.clustermapping.us/

Zhogova, E.V., Zaborovskaia, O.V., Mokeeva, T.V. (2017). Agglomeration and Network Effects in the Spatial Development of Production. Proceedings of the 30th International Business Information Management Association Conference, IBIMA 2017 - Vision 2020: Sustainable Economic development, Innovation Management, and Global Growth, IBIMA 2017, p. 1522-1528.

Research-by-Design: Stimulating Entrepreneurship and Innovation

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Abstract: Entrepreneurship is important in many ways. On many occasions, researchers have stressed the importance of entrepreneurship for economic growth. As a result, entrepreneurship is stimulated and supported by many initiatives in order to increase the number of entrepreneurs and to increase the success rate of these starting firms. Prior research mentions the drivers and the barriers for individuals to start a self employed career. Among the drivers the need for independency and the opportunities for a higher income gain the upper hand. On the barrier's side risks and uncertainty prevail. In the group of barriers for starting an enterprise two aspects are important: the need to find a proper business idea and the need to find complementary competences in one or more co-founders. This paper proposes a research-by-design approach tackling these two important barriers for entrepreneurship. Through the design of a product-service system the potential field of opportunities is scanned and mapped in order to find solutions for the most important gaps, which are -in turn- being evaluated by the process stakeholders. The research-by-design project follows a human-centered approach, integrating divergent and convergent thinking in the early development stages, in which we focus on the user's needs throughout the process of starting a business. The resulting product-service focuses on high potential entrepreneurs with a lot of experience in corporate business, having the skills for entrepreneurship but to whom the final step for a career switch is too big. The solution integrates 4 important aspects: finding complementary competences, developing and enriching business ideas, designing the business and formalizing the cooperation between co-founders. It also differentiates on required speed in the start-up process and the status of the business idea at that point. Both the research-by-design process and the resulting solution build on the product development methodology in the front-end of innovation in which analysis and synthesis alternate, in order to propose validated solutions for a specific need.

Keywords: research-by-design, entrepreneurship, cofounder, innovation

1. Introduction

Entrepreneurship is commonly accepted to be an important driver for economic growth. Prior research reveals that entrepreneurship has some positive effects on innovation, employment creation and economic growth (Van Praag & Versloot, 2007). The number of entrepreneurs in a certain region is a measure for the economic prosperity of that region. In her 2020 plan, the European commission focuses on the stimulation of entrepreneurship (European Commission, 2013) by funding relevant projects.

Stimulation of entrepreneurship suggests that the focus is on entrepreneurs to be. Ashcroft et al. (2009) make a difference between latent and potential entrepreneurs, both referring to not self-employed persons with a preference to be self-employed of which the first holds no specific business idea and the latter does. Both show a certain propensity towards entrepreneurship.

This research focuses on the barriers for entrepreneurship on an individual level and the way to overcome these barriers, in the specific context of Flanders, Belgium. Existing measures, taken locally by governmental organizations in order to support entrepreneurship (VLAIO, 2018) work in two directions. Firstly, a part of the initiatives focuses on individual propensity towards entrepreneurship with the intention to make potential entrepreneurs take the step into entrepreneurship. A second movement aims at increasing the personal capabilities of the starting entrepreneur in order to support him or her with the required knowledge, attitudes and skills for successful entrepreneurship (Dams, 2018). Our approach, however, focuses on potential entrepreneurs for which the barriers to entrepreneurship are not related to personal capabilities nor the lack of propensity towards entrepreneurship. The research digs deeper in the remaining barriers, offering both insights and practical solutions.

The project is conducted as a master thesis project in integrated product development at the University of Antwerp. The objective of this course, for the student, is to generate new innovative concepts for products or services or the combination of both, and to validate the novel concept with regard to desirability, viability and feasibility, which are seen as the cornerstones of any design thinking project (Brown, 2009). This way, the

project serves a double function: to generate an innovative concept for a problem and to add new knowledge to the knowledge base regarding the barriers for entrepreneurship.

2. Methodology

This research project follows a design inclusive approach. Horvath (2008) makes the difference between research in design context, focusing on research in design related phenomena and design inclusive research. The latter refers to research activities integrating the design practice and thus, making use of the knowledge constructing power of creative actions. The purpose of a design inclusive research is to generate both new theoretical understandings and practical solutions to multidimensional problems. The design inclusive approach is appropriate for relative complex problems to be addressed in the real world, in collaboration with practitioners, in order to yield plausible solutions. These solutions, then, can be refined through reflective inquiry (Kennedy-Clark, 2013).

The design inclusive approach combines analytical research methods and constructive design methods. The methodology comprises three major phases (Horváth, 2008):

- The phase of explorative research actions, including the analysis of the current understanding of the phenomenon and the formulation of research questions and design problems.
- The phase of creative design actions, in order to solve the design challenge.
- The phase of evaluative research actions, including the verification and validation of the design outcome.

The design phase itself, described by Horváth (2008), is limited to the sequential phases of conception, design and prototyping,. The approach during this project follows a more elaborate flow according to the design methodology used in the department of product design and development at the University of Antwerp (Braet & Verhaert, 2007; Jacoby, 2016). The design process consists of a process that runs through 5 elaborated phases:

- The phase of opportunity scouting and need detection consists of the exploration of existing problems and future opportunities with regard to market trends, users and technologies.
- The phase of idea generation, in order to find a multitude of possible options for innovation challenges.
- The phase of product and service definition, including the multidisciplinary analysis that leads to full requirements and specifications and a product or service architecture.
- The phase of system design solutions, integrating and solving the most critical aspects of the design challenge.
- The phase of product or service concept solutions, leading to the final validated concept in which all potential criticalities have been tackled.

Despite the fact that the 5 phases are defined as design phases leading to solutions, every phase consists of both analytical and synthesizing activities, alternating between divergent and convergent thinking and between design and verification.

2.1 Explorative research actions

The first part of the design inclusive research process concentrates on the definition of the new challenge.

Entrepreneurship is considered a very broad theme so the subject is narrowed to the specific case in which potential entrepreneurs with a propensity towards self-employment are confronted with barriers in order to actually take the step into entrepreneurship. This way the target group of the project is defined and the research actions focus on gaining insights in the specific needs of the target groups within the actual context.
The early analysis comprises three elements:

- Analysis of the target group, by means of expert interviews
- Analysis of the decision-making process, using a Customer Journey Mapping tool (Stickdorn & Schneider, 2012)

- Analysis of the context, including the stakeholders and the existing solutions in the market, using a context-mapping tool. Also, the freedom to operate within the law is checked.

2.2 Creative design actions

The creative design actions include the actual design process in which two major questions have to be answered: what is the future product or service (or combination of both) that could answer the needs and opportunities, and how should it be designed in order to meet the specific context and requirements. The phase consists of sequential analysis-synthesis cycles in which firstly different needs are formulated and selected. Secondly, a myriad of ideas are generated and selected in order to come forth with the idea with the largest innovative potential. In a third phase, the full definition is compiled and verified.

As from there the pre-development phases of the innovation design cycle are finished (Braet & Verhaert, 2007) and the project moves on to the actual product or service development in which solutions are formulated for the key partial problems and integrated in a coherent principle solution that meets all the requirements.

2.3 Evaluative research actions

Although the specific needs haven been validated throughout the process, it is important to verify whether or not the overall proposed solution meets the requirements.

The evaluative research actions consist of the validation of the design proposal through both feedback by means of expert interviews as through a proof of concept. In view of the fact that the design solution consist of a product-service combination, the first validation concentrates on the service part during a pilot event with both potential and latent entrepreneurs: the co-founder night.

2.4 Data collection

Throughout the process, expert interviews have been used for data collection for both exploration and validation. In the first phase, the explorative research actions, 15 expert interviews have been held within different categories (table 1). In the evaluation of the proposals, 8 interviews have been held with entrepreneurs and organizations that support starting entrepreneurs in Flanders, Belgium (table 1).

Data collection was performed through semi-structured interviews with a wide range of diverse stakeholders. The approach can be seen as a grounded theory approach since the data collected was used to conceptualize, new ideas based on the concerns of the stakeholders in order to determine the variables that affect the propensity towards entrepreneurship.

Table 1: expert interviews

Explorative research actions	**Category of experts**	**# interviews**
	Start-up owners	3
	Latent entrepreneurs	5
	Organizations	7
Evaluative research actions		
	Start-up owners	5
	Organizations	3

The interviews were analysed without full transcriptions. During the explorative research actions, analysis was based on collecting and comparing relevant statements regarding the barriers and incentives towards entrepreneurship. In the evaluative research phase, statements were collected regarding the proposed concept. In both situations, the rich information was necessary to understand the conditions for which the statements were relevant (Hutjes & van Buuren, 1992).

Although the research approach suggests a clear division between the three main phases, some of the evaluative research actions have been performed in close iteration with the creative design actions, thus leading to an efficient interaction between ideation and verification.

3. The design challenge definition

The exploration into the field op potential and latent entrepreneurs leads to the definition of the design challenge or the opportunity for which a design solution could be the answer. During the explorative research actions, following base opportunities emerged:

- How to provide the right trigger or incentive for latent and potential entrepreneurs to actually take the step into entrepreneurship?
- How to support latent entrepreneurs by defining and selecting the right business opportunity to start with?
- How to overcome the perceived risks and uncertainties associated with entrepreneurship?

In order to define the related decision making process, 5 customer journey maps (Stickdorn & Schneider, 2012) were composed with 5 respondents in order to define which stimuli, motives and barriers they encountered in their specific journey from an employed to a self-employed career as entrepreneur. The results of the customer journey analysis provide deeper insights in potential triggers for entrepreneurship. While the unavailability of the right business idea is a potential barrier for taking the step into entrepreneurship, the possibility to act together with a co-founder, having a business idea but not all the required skills, opens opportunities for incentives into entrepreneurship.

Since the opportunities are related to the context in which they might be solved, a context and stakeholder mapping analysis was conducted to in order to detect all factors that might influence the relation between the future user and the product-service (Sanders & Stappers, 2012) and thus, leading to boundary conditions for the eventual solution.

The market for supporting entrepreneurship in Flanders consists of a wide range of initiatives. Some of them are private, some of them are supported by the Flemish government. However, by analysing which opportunities were covered by one or more initiatives in the market, it was possible to detect the gaps regarding the above-mentioned opportunities:

- Smart matchmaking with possible co-founders
- Support for development of business ideas, taking into account the actual status of the emerging ideas

4. The design solution

Matchmaking with possible co-founders and developing new business ideas are the starting point for the ideation process. The design challenge was stretched with the additional driver to connect both opportunities. In an ideal situation the product-service to develop should integrate both aspects in order to create efficiency and effectiveness throughout the process. Developing business opportunities together is potentially a good way to interact with future co-founders.

The design process consists of different ideation phases in order to determine and evaluate a wide range of options. Since there are no stand-alone criteria to argue whether or not an idea is a good one, evaluation by comparing different ideas is the most appropriate option.

4.1 Ideation

In a first round of brainstorms, conducted in a small workshop with generic creative minds, the design brief was challenged against triggering concepts such as ‘engagement’, ‘inspiration’ and ‘information’. The quantity of ideas, in this round, is more important than the idea quality (Adañez, 2005). The main purpose of this session is to trigger new ideas and this way, extending the base of actual options. The brainstorm participants were asked to assess the different ideas against feasibility, impact, relevance and novelty.

4.2 Idea enrichment

The roughness of the ideas doesn’t permit to actually decide on the final idea to continue with. An idea enrichment phase was introduced to elaborate on the highest ranked ideas and to conceptualize first scenario’s associated with these ideas.

1. The first idea is an online inspiration platform that could inspire people to find business ideas. The scenario describes how ideas are gathered and posted, how potential entrepreneurs can reserve specific challenges and how they are inspired with tips and tools to actually deal with these challenges.
2. The second idea is an online matchmaking platform that supports to link potential entrepreneurs having business ideas to potential entrepreneurs lacking business ideas but having complementary skills. The platform focuses on automated profiling and matchmaking but supports the next step by providing tools and approaches to collaborate on the business ideas in order to actually connect and create an understanding.
3. The third idea is a pop-up environment that focuses on short triggers, mini evaluations and coaching on-the-spot, to stimulate entrepreneurship. It is a concept that lowers the first barriers for entrepreneurship by actually visiting the potential target groups within their proper context.
4. The fourth idea is a personal assistant concept, in which very personal support is alternated with group coaching sessions with fellow potential entrepreneurs. Through an extensive profiling, it is possible to find the gaps that need to be filled in individually.

For each idea, in this stage, was also assessed which potential business models could make these ideas viable in a private or a subsidized market.

Five respondents were asked to provide feedback through a semi-structured interview. They could score the enriched ideas on the predefined criteria of viability, feasibility, relevance, impact, novelty and potential interest. Additionally, they were able to comment on the specific details of the ideas, in order to determine boundary conditions or requirements related to these ideas.

4.3 Idea variations, product architectures and product definition

The prior phase has led to a ranking of ideas and additional information on how to optimize the different concept directions. Two ideas withstand the evaluation and again, they are enriched through the definition of alternative architectures. Product service architectures determine the functions of an idea and the way these functions interact with each other (Ulrich & Eppinger, 2008). The definition of the system borders actually determines which functions are included in the proposition and to which external functions it can be linked.

Through redefinition of the system borders, alternative architectures can be proposed, leading to alternative solutions (Braet & Verhaert, 2007) for the product service system.

With regard to the matchmaking platform, the alternative architectures show how additional features can be added to the service, ranging from an extended facilitation of possible co-founders, to the facilitating of individual advice and the information on formal aspects of the co-founding trajectory (Fig. 1). The architecture also provides the first options for the underlying business model, showing which parts of the service are free and which involve payment.

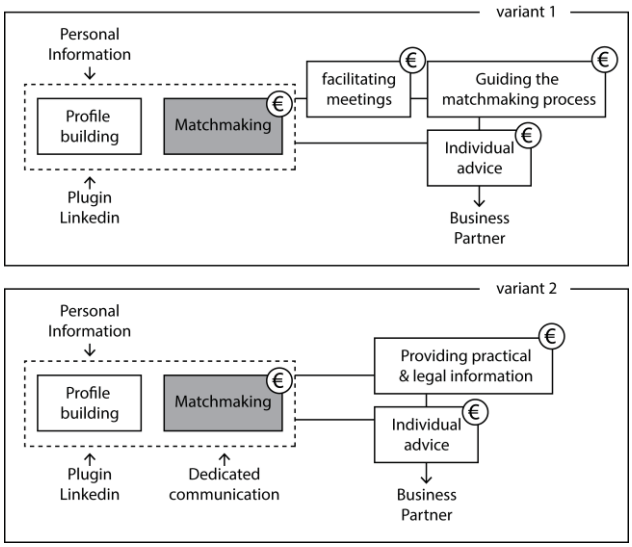

Figure 1: alternative product-service architectures for idea 1

With regard to the inspiration platform, the alternative architectures show different additional functions, related to the base function of providing latent entrepreneurs with business opportunities (Fig. 2). The main difference relates to the fact whether or not facilitating the further development of the business idea is included in the service. A personal guidance trajectory for further development makes part of the service. Those additional features open possibilities for revenues.

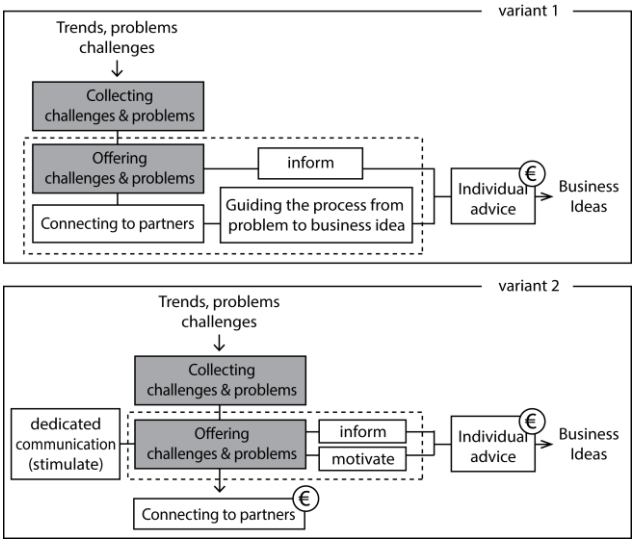

Figure 2: alternative product-service architectures for idea 2

Building on the alternative product architectures, the most important requirements for development are considered. They describe which qualities should be reached in the way the different functions - profiling, matchmaking, facilitation of potential co-founders, guiding the interpersonal connections - are solved. For the inspiration platform requirements are drawn for collecting business ideas and challenges, the way these challenges are translated to the potential entrepreneurs, the communication, the way entrepreneurs can connect with the specific business cases, and the way the entrepreneurs can be supported with the further development of the business idea.

4.4 Product service solution

Previous phases have answered the question why a solutions is required and what the answer should be to the needs detected. In the solution phase, the question turns to 'how?'. Despite the fact that ideas have been generated and defined in a certain direction, the actual result evolves to a new integrated solution. Expert interviews with potential users of the service (Table1) favour certain requirements and specifications but do reject others. As a first step to the actual solution, the product service idea is altered in favour of a combined solution, providing both possibilities to connect with potential co-founders but also, in course of this process, take a firm step forward in the actual development of the business idea.

An essential element, however, in the development of business ideas is the fact that the starting point of business ideas differs to a great extent between cases. Some business ideas are defined as an observed need, some business ideas are defined as a dedicated opportunity and some are defined as a real solution. Starting from a different entrance point, the process for further development requires an adapted approach to those different needs. As such, an essential element of the concept is to differentiate between business idea level, taking into consideration to which extent the idea is actually defined.

A second essential element to the solution is the fact that participants have a different time frame in mind. The expert interviews show that some potential entrepreneurs start slowly. They are only interested to take the step towards entrepreneurship if they find the business idea and the potential co-founder that suits their interest. They are exploring the option but there is no strong urge to take the step. The second group of potential entrepreneurs is beyond this point. They have taken a decision and feel a strong urge to develop their business idea and to find the additional competences needed for their start-up. The product-service solution should take into account these requirements.

4.4.1 Concept description

The final product service concept is a service in which potential entrepreneurs are brought together to connect with potential co-founders. Throughout this process they are encouraged to get known each other and, at the same time, further develop the new business idea one of the co-founders brought into the potential partnership.

The service provides a platform in which potential entrepreneurs can complete their profile. Based on these profiles and potential matches, co-founder nights are organized in which the participants meet with potential partners based on both profile matching and individual choice. The co-founder nights are organized in a way that an innovative mind-set is created towards the business ideas by providing tools and knowledge that can be used to enrich emerging business ideas.

When the co-founder nights lead to specific matches, the potential co-founders have the option to start a stand-alone co-founder process programme focussing on 4 targets:

- Developing and enriching the business idea, broadening the solution space and looking into alternative solutions for the same need or opportunity.
- Developing the business design and business plan
- Considering and deciding on the formal aspects of the partnership
- Learning about the values and drivers of the potential partners.

The programme is supported by a co-founder kit providing the approaches and tools for attaining the above mentioned targets. The co-founder kits have different content for both partners in order to reduce the possibility that they wouldn't work together on the issues. The kit includes both adapted and existing tools and even consultancy options from specific Flemish organizations providing a specific value in this process. Other tools are adapted to suit the specific needs of the co-founder challenge. Figure 3 gives an overview of the entire product-service.

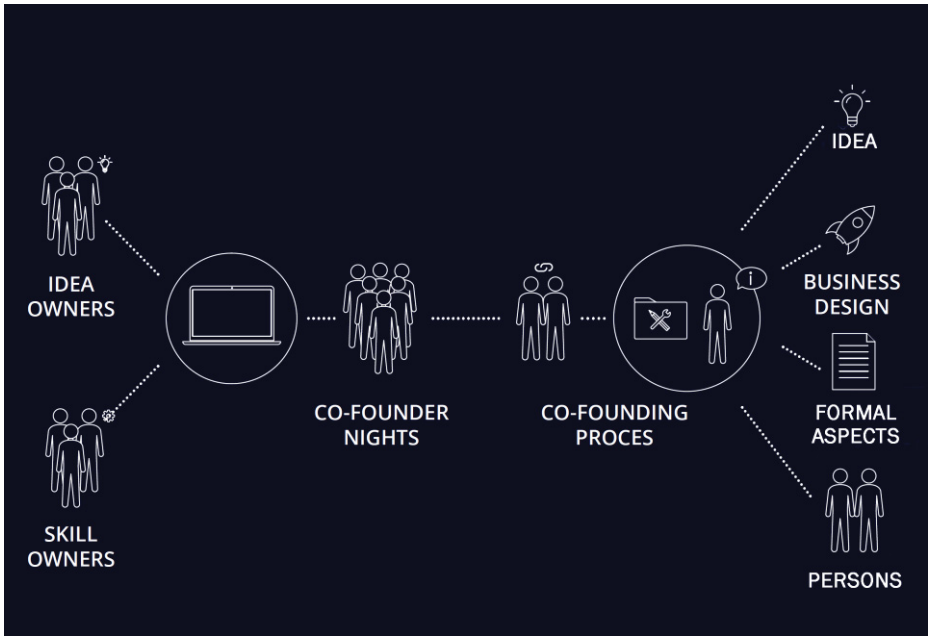

Figure 3: Product-service concept

4.4.2 Business Model

During the definition phase of the design trajectory, a business model is set-up simultaneously in order to define the viability of the product-service. Compliant with a design approach including divergent and convergent thinking, multiple options for viability have been compared in order to define a final viable model.

The proposed business model includes both a basic and a premium membership. The basic membership model targets latent entrepreneurs exploring the possibilities for entrepreneurship without having a concrete

deadline in mind. Linking to the platform is free but a limited fee is paid for every co-founder night they attend. The revenues are related to the active participation during the events. The premium membership targets potential entrepreneurs with an urgent need for co-founders. They pay a high fee as from the start of the programme but can fully access the database, attend all co-founder events and additional supporting events during a certain period of time.

5. Pilot event

In order to validate the first part of the product-service solution a pilot event was organized for co-founders to attend. Through the network of the chambers of commerce of Antwerp, potential entrepreneurs were addressed to join this co-founder event. 48 persons answered positively to this call and filled in the online questionnaire to provide full information regarding their personal offer and needs. 18 profiles were selected to actually join the pilot event. Profiles were selected based on the potential matches between participants and the potential market segments they intend to work in.
The pilot event was organized as follows:

1. Welcome and possibility to look into profile cards attached to the wall
2. Short speed dating with 5 potential co-founders
3. Short break - preparing connections for the next step
4. Joined exercise between two participants
5. Free networking

The different tools for the joined exercise were tested in a preliminary test setting with 12 participants. Six pairs of people, related to each other by the fact that they work for the same employer without knowing each other, were asked to test 2 of the exercises each and to provide feedback on the process of the exercise and the way it serves its purpose: obtaining better insights on potential collaboration with the other party.

The feedback was used to refine the specific exercises.

5.1 Profile cards

During the welcome drink, participants could walk around and look into detail into the profile cards of all other participants which were linked to the personal LinkedIn profiles online. This way, participants could gather extra information regarding the careers of the other participants.

5.2 Speed dating

Based on their potential profile matches, every participant could have a short conversation with 5 other participants. The short speed dates took 5 minutes each. The participants could use a card set with generic but atypical questions in order to dig deeper into the values and characteristics of the conversation partners. After the sessions, candidates could mark their potential matches.

5.3 Short break

The short break was meant for the organizers to actually match potential co-founders for the next step. Meanwhile participants could have a drink, get informed and have informal chats.

5.4 Joined exercise

All participants were matched to a potential co-founder. Every pair received an assignment to work on for half an hour. The assignment combined existing tools used in business definition and innovation workshops but were adapted in order to learn about the tools but also about each other. The tools triggered intense collaboration providing insights on the way the other deals with creative challenges.

5.5 Free networking

The evening was closed with a free networking moment where participants could informally meet and talk. All participants were asked to assess the co-founder event in detail.

The results of the assessment provide no validation of the fact that co-founders events actually work but do provide valuable insights regarding the way this co-founder event was designed. Overall, most of the participants were happy with the event and indicated their willingness to participate once again if the possibility would occur.

The specific programme was perceived positively by most participants although a difference could be seen between the participants seeking a very supported approach for meeting potential co-founders and those, seeking a very open, unstructured approach for meeting people, without the supporting tools to actually connect with others.

6. Conclusions and recommendations

Our research contributes in two ways. The design inclusive research reveals a new product-service system that supports both the first steps into entrepreneurship and the development of new business ideas along the way.

Secondly, it shows that the design inclusive research approach is a valuable approach in order to formulate novel solutions for existing needs. The design itself, but mainly the verification of the underlying principles of the design solution, provides better insights in the way potential entrepreneurs want to be supported in their journey towards entrepreneurship. Although the number of respondents related to the exploration and validation research actions is limited, their feedback provides valuable insights in the way an eventual solution could add value to the process of lowering the barriers to potential entrepreneurship.

The research by design approach follows a path that gradually defines a product-service idea and convert it in a validated product-service concept. Although the way to the solution is not rectilinear, every step taken leads to the right direction and creates a better understanding of the actual problem and narrows down the potential fields of solutions.

Our research definitely points to the need for supporting the process of finding complementary competences in co-founders and, along the way, develop business ideas and decide and agree on formal aspects of future partnerships. The novelty of this concept is to be found in the way partial solutions for several barriers are integrated into one integrated product-service and the way the solution takes into consideration a differentiated entrance point for both skill owners and idea owners.

Our research pointed out that the actual status of the business ideas, together with the diverse intentions and characters of potential entrepreneurs are the most important aspects to anticipate on. A one-size-fits-all solution provides no answer for the diversity of the needs.

It is our recommendation for future research to actually roll-out this product-service concept on a larger scale and to detect in which way this solution enables potential entrepreneurs to overcome existing or perceived barriers. Due to the fact that the service part of the product-service is highly adaptable, real-life testing provides the best opportunities for improvement.

References

Adánez, A. M. (2005) 'Does Quantity Generate Quality? Testing the Fundamental Principle of Brainstorming', The Spanish Journal of Psychology, Vol. 8, No. 2, 215-220

Ashcroft, B., Holden, D. And Low, K. (2009) 'Entrepreneurial Interest, Vision and the Self-employment Choice Decision in UK Regions', Regional Studies, Vol. 43.8, pp. 1075–1090.

Braet, J., and Verhaert, P. (2007) The practice of new products and new business, Acco, Belgium.

Brown, T. (2009) Change by Design, Harper Collins, New York.

Dams, F., and Segers, J. (2018). Entrepreneurial Capability Versus Entrepreneurial Propensity: Why to Take the Non-Actors Even More Seriously? Paper presented at the Proceedings of The 13th European Conference on Innovation and Entrepreneurship: 20-21 September, 2018, Aveiro, Portugal.

Horváth, I. (2008) 'Differences between 'research in design context' and 'design inclusive research' in the domain of industrial design engineering', Journal of Design Research, Vol. 7, N°1, 61-83.

Jacoby, A. (2015) 'A research framework for adapting the innovation process to its context', Proceedings of the 11th European Conference on Innovation and Entrepreneurship, 15-16 September 2016, The JAMK University of Applied Science, Jyväskylä, Finland.

Sanders, E. B. N., and Stappers, P. J. (2012) Convivial toolbox. Generative Research for the Front end of Design. BIS publishers, Amsterdam.

Stickdorn, M., and Schneider, J. (2012) This is Service Design Thinking: Basics, Tools, Cases. BIS publishers, Amsterdam.

Ulrich, K. T., and S. D. Eppinger. (2008) Product Design and Development, McGraw-Hill, New York.

Van Praag, C. M., and Versloot, P. (2007) 'What is the value of entrepreneurship? A review of recent research', Small Business Economics 29 (4), 351–382.

Horváth, I. (2008) 'Differences between 'research in design context' and 'design inclusive research' in the domain of industrial design engineering', Journal of Design Research, Vol. 7, N°1, 61-83.

Coaching, advies en begeleiding, n.d., VLAIO Vlaams Agentschap voor Innovatie en Ondernemen, viewed June 2018, https://www.vlaio.be/nl/begeleiding-advies/coaching-en-advies

The Role of Family Firm on the Relationship between KMP and Innovation

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Abstract: Given the central role of knowledge management practices (KMP) in fostering innovation, besides the distinctive characteristics of family firms (FF) regarding their innovative behaviour and results, this paper addresses two main objectives. Firstly, it deepens in the study of the relationship between five KMP -acquisition, creation, storage, transfer and application- and innovation. Secondly, we explore whether being a FF moderates the KMP- innovation relationship, a question that, to our knowledge, has not been explored to date. The empirical study to test these relationships uses data from 238 Spanish SMEs and is based on a linear regression by OLS over the dependent variable. Our results show that, consistent with the extant research, creation and storage KMP have a positive and significant effect on firm innovation whereas, contrary to previous research, no significant effect of acquisition, application and transfer KMP on firm innovation has been found. This study also finds the effect of investing in the creation and storage of new knowledge on innovation is less positive, or even negative, among FF, a result coherent with the lower level on R&D investment among FF reported by previous literature. We also found that being a FF positively moderates the negative, non-significant, link between transfer KMP and innovation, pointing to a higher efficiency of family firms in transforming knowledge transfer in innovation.

Keywords: Knowledge management practices, innovation, family firm, knowledge management, innovation performance

1. Introduction

At present time, knowledge management is considered as a strategic tool in order to obtain competitive advantages in enterprises (Oliva, 2014). Following Del Giudicce & Maggioni (2014) globalization supposes a challenge, and the creation of new knowledge and learning promotion are essential to organization´s success. Within this general context, family firms (FF) are widely recognized as important contributors to both employment and wealth creation for economies around the world (IEF, 2015; Botero, Cruz, De Massis & Nordqvist, 2015; Memili, Fang, Chrisman & De Massis, 2015).

In this scenario, this paper provides evidences about knowledge management practices (KMP) and their influence on the innovation activity in enterprises. Regarding this objective, the main research question is:

How do KMP –acquisition, creation, storage, transfer and application- influence the innovation activity in enterprises?

In addition, related to the FF highlights, the moderating influence of this characteristic in the KMP-innovation link is analysed. In this sense, considering FF´s particularities as the relationships among their members facilitate knowledge sharing, the following question is considered:

Do FF moderate the relationship between KMP and innovation?

This paper is structured as follows: first, a literature review section about KMP, innovation and FF is presented. Then, in the third section, the theoretical model is proposed. Fourth section includes the methodology used. Later the results and the discussion are presented, where the main findings and implications are identified.

2. Literature review

2.1 Knowledge Management Practices and innovation

According to the knowledge-based view of the firm (Leonard-Barton, 1992), knowledge is the most important resource for organizations to develop sustainable competitive advantages (Grant, 1996; Mustafa et al., 2016)

and obtain superior organisational performance and success (Spender, 1996; Andreeva & Kianto, 2012; Oliva, 2014). Thus, knowledge management (KM), defined as the processes and practices that enable firms to manage their intellectual assets and to achieve knowledge-based competitive advantages (Nonaka & Takeuchi, 1995) has become a key organizational activity.

Knowledge management (KM), and specifically knowledge management practices (KMP) defined as the set of management activities aiming to improve the effectiveness and efficiency of organisational knowledge resources (Lee & Choi, 2003; Andreeva & Kianto, 2012), are very relevant in fostering innovation (Lee et al., 2013; Yusr et al., 2017). This is because innovation consists of the successful exploitation of new ideas (Amabile et al., 1996) and is therefore associated with the creation and use of knowledge. Owing to knowledge, companies can innovate, create organisational routines, be sustainable and obtain competitive advantages (Chen & Huang, 2009). Innovation is usually considered a direct outcome of KM effectiveness (Du Plessis, 2007), for this reason managers aiming to improve firms´ innovative activity and results should establish the ideal contextual conditions to propel and optimize the organization's use of KMP (Donate & Sanchez de Pablo 2015). However, KMP design and implementation is a difficult task for managers conditioned by the characteristics of the firm and the members involved in it (Bojica et al., 2017).

The literature that analyses the KMP-innovation relationship has explored the direct effect of one (Li et al., 2009), two (Chen et al., 2010, Alegre et al, 2013, Stanovcic et al., 2015, Donate & Guadamillas, 2015), three (Lee et al., 2013), four (Andreeva & Kianto, 2011, Donate & Sanchez de Pablo, 2015, Yusr et al., 2017) seven (Kianto et al., 2014) or even ten (Inkinen et al., 2015) KMPs on innovation, finding a positive relationship. Despite this general result, several important issues have been under-researched in the literature, such as: (1) with very few exceptions, most of previous KM studies -especially in research exploring KM in FF- have either considered only one or a few KMP. For this reason, we aim to provide additional empirical evidence by proposing, in line with the existing research, a direct and positive relationship between five KMP -acquisition, creation, storage, transfer and application- and innovation; 2) with very few exceptions (Serrano-Bedia, Lopez-Fernandez & Garcia-Piqueres, 2016; Kallmuenzer & Scholl-Grissemann, 2017) none of the studies exploring KM in FF analyse their effects on firm innovation.

2.2 Family businesses

Research on innovation management in family firms (FF) shows that these firms have peculiar features and different innovation behaviours based on their risk preferences, wealth concentration, resource endowments, and family objectives (Chrisman & Patel, 2012; Kellermanns, Eddleston, Sarathy & Murphy, 2012; Chrisman, Chua, Pearson, & Barnett, 2012; De Massis, Frattini & Lichtenhaler, 2013; Classen, Carrée, Van Gils & Peters, 2014; Patel & Chrisman, 2014; De Massis, Frattini, Pizzurno & Cassia, 2015; De Massis, Frattini, Kotlar, Messeni & Wright, 2016). All of these create both advantages and disadvantages in certain dimensions of the innovation process (Konig, Kammerlander & Enders, 2013; Lichtenhaler & Muethel, 2012). More specifically, FF exhibit specific innovation behaviours and results -e.g., they invest less in innovation but have an increased conversion rate of investment into innovation and actually a higher innovation output than non-FF (Duran et al., 2016)-. They also share certain characteristics, such as the close relationships among their members that facilitates knowledge sharing (Zahra et al., 2007), but their homogeneity and preference for cohesion may prevent a deep learning (Zahra, 2012), a circumstance that could influence their innovation behaviour and/or results differently from non-family firms.

Considering the unique innovative behaviours of FF, and following the call for further research by Duran et al. (2016), this paper tries to extend our knowledge of the mechanisms that lead to/hinder superior conversion rate and higher innovation output in FF different of the internal and institutional factors these authors explored in their meta-analysis, such as KM. Research exploring KM in family firms (FF) is still scarce and partial. We are aware of works that explore some KM processes such as knowledge sharing (Zahra et al., 2007; Cunningham et al., 2016) knowledge integration/combination (Chirico & Salvato, 2008; Patel & Fiet, 2011), or knowledge transfer and its effects on the successor's Innovativeness (Letonja and Duh, 2016); but none of them explore their effects on firm innovation. Our literature review has revealed only one paper reporting a negative moderating effect of family characteristics –namely CEO tenure, CEO-founder duality and family involvement- on the positive relationship between the use of various types of knowledge sources and innovation performance (Serrano-Bedia, Lopez_Fernandez and Garcia-Piqueres, 2016). Another second study investigates the effect of knowledge internalization and external knowledge on technological and management innovation of family businesses (Kallmuenzer & Scholl-Grissemann, 2017). For this reason, this

paper aims to contribute to the FF literature by analysing the moderating role of FF on the relationships between KMP and innovation, a question that, to our knowledge, is practically absent in the literature to date.

3. Methods

3.1 Data Source

We surveyed 238 Spanish SMEs in December 2017. We developed a questionnaire based upon an extensive literature review, exploring a wide range of issues relating to family characteristics, KMP and innovation. CEOs were used as key informants (Kumar, Stern, & Anderson, 1993), since they receive information from a wide range of departments and, therefore, are a very valuable source for evaluating the different variables of the organization.

3.2 Measurement and variables

The scales used for the construction of multi-item variables were subjected to validity and reliability by using principal component analysis and by calculating the Cronbach's alpha for each scale. The results supported the validity of these scales, as indicated by the amount of variance explained and loading factors of all items within each scale -exceeding 0.5 in both cases (Hair et al., 1998)- and the Cronbach's alpha for the scales -surpassing the threshold point of 0.7 or quite close to it (Nunnally, 1978)-. The existence of multicollinearity was analysed by using the Variance Inflation Factor together with the condition indexes. The resulting variance inflation factors (all smaller than 2.927) and highest condition index (4.039) suggested multicollinearity was not a concern.

All constructs were measured using Likert-type scale with a five-point response ranging from "totally disagree" to "totally agree". The description of the variables is as follows:

Dependent variable: innovation is based upon two different innovation types: product and process innovation, in line with the Oslo Manual's definition of innovation.

Independent variables: We employ the measure of four KMP (creation, storage, transfer and application) employed by Donate & Sánchez de Pablo (2015). We introduce an additional KMP: acquisition, following Kianto et al. (2016).

Moderator variable: The family nature of the firm is taken as a moderator variable. We identified family firms through a subjective criterion: we asked the SMEs' CEOs whether or not they perceived their firm as a family business (e.g., Cooper et al., 2005), which allowed us to capture the essence of the family firm (Chua et al., 1999). Following this criterion, 181 firms in our sample were identified as FF and 58 as non-FF.

Control variables: Past performance, Size, CEO tenure, Environmental dynamism, Industry dummies (manufacturers and construction), International orientation of the firms, and Cooperation with universities and other firms.

3.3 Methodology

In order to estimate the effect of different KMP on innovation as well as the moderator effect of family nature of the firm on this relationship, we carry out linear regression by OLS over the dependent variable. Four models were developed: Model 1 (includes the control variables); Model 2 (includes also the independent variables –KMP-); Model 3 (also the moderator variables –family firm-); Model 4 (also the interaction variables between family and the five KMP).

4. Results

The results of the empirical analysis (see table) show that, in Model 1, three of the control variables were significant: Environmental dynamism, International and Cooperation with universities. In model 2, a significant increase in R2 can be observed and two of the independent variables have also a significant and positive effect on innovation: creation and application. In Model 3 not significant change regarding R2 is observed, with the same variables remaining significant compared to model 2. In Model 4 a significant increase in R2 is observed and the same control variables remain significant as in previous models. However, in this case the KMP that exert a significant effect on innovation are creation and storage.

Table 1: Results of OLS regression for innovation

	Model 1	Model 2	Model 3	Model 4
Control variables				
Past performance	0.023 (0.080)	-0.014 (0.076)	-0.014 (0.076)	0.025 (0.076)
Size	-0.009 (0.064)	-0.020 (0.061)	-0.020 (0.061)	-0.010 (0.060)
CEO Tenure	-0.043 (0.061)	-0.071 (0.058)	-0.071 (0.058)	-0.050 (0.058)
Environmental dynamism	0.301 (0.062)***	0.195 (0.061)***	0.195 (0.061)***	0.181 (0.061)***
Manufacturers	0.055 (0.062)	0.033 (0.059)	0.032 (0.059)	0.046 (0.059)
Construction	0.098 (0.06)	0.088 (0.059)	0.088 (0.060)	0.094 (0.059)
International	0.228 (0.064)***	0.142 (0.062)**	0.142 (0.062)**	0.141 (0.062)**
Cooperation with universities	0.183 (0.064)***	0.112 (0.062)**	0.112 (0.062)**	0.134 (0.062)**
Cooperation with firms	0.050 (0.062)	0.004 (0.059)	0.005 (0.060)	0.023 (0.060)
Independent variables				
Creation		0.149 (0.073)**	0.149 (0.073)**	0.323 (0.137)**
Storage		0.030 (0.076)	0.030 (0.076)	0.313 (0.147)**
Transfer		0.096 (0.096)	0.096 (0.096)	-0.281 (0.195)
Application		0.167 (0.086)**	0.167 (0.086)**	0.230 (0.180)
Acquisition		0.066 (0.064)	0.066 (0.065)	0.025 (0.119)
Moderator				
Family			0.001 (0.058)	0.051 (0.260)
Interaction Effects				
Creation x Family				-0.349 (0.220)*
Storage x Family				-0.712 (0.311)**
Transfer x Family				0.958 (0.424)**
Application x Family				-0.092 (0.391)
Acquisition x Family				0.078 (0.198)
R^2	0.275	0.384	0.383	0.418
Adjusted R^2	0.244	0.342	0.339	0.360
F	8.808	9.085	0.438	7.123***

Levels of significance: *** p<0.001; ** p<0.01; * p<0.05; t p<0.1

Finally, regarding the moderating effects, the results show a negative moderating effect of FF on creation and storage-innovation relationship, and a positive moderation for transfer (see Figures 1, 2, 3).

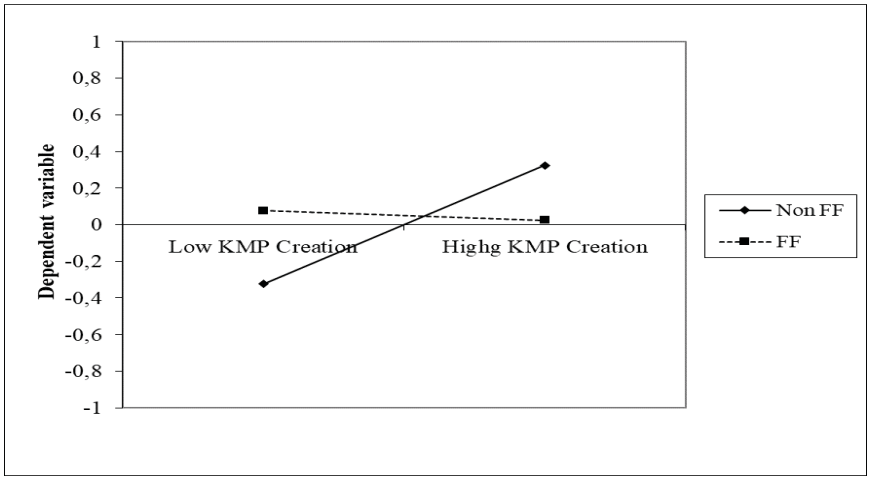

Figure 1: Moderating effects of FF on knowledge creation practice-innovation relationship

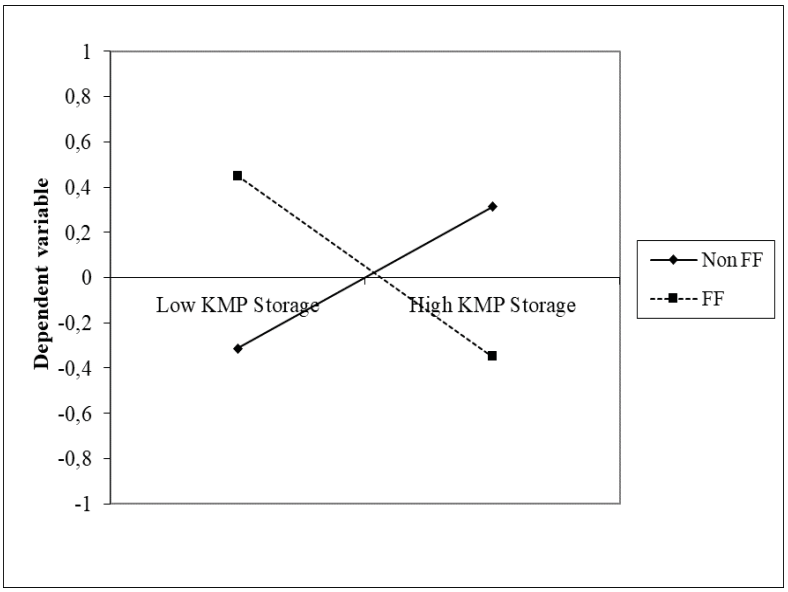

Figure 2: Moderating effects of FF on knowledge storage practice-innovation relationship

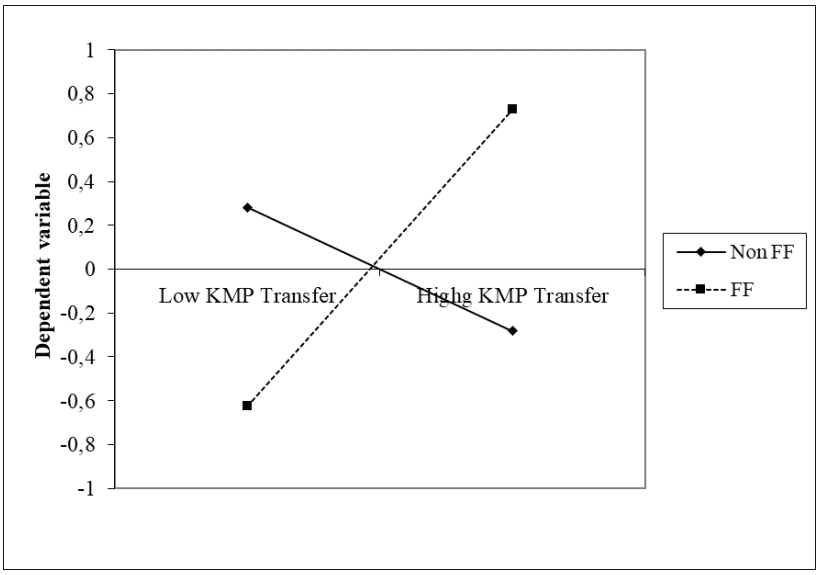

Figure 3: Moderating effects of FF on knowledge transfer practice-innovation relationship

5. Discussion, implications and research limitations.

This research contributes to the knowledge-based view of the firm and the innovation management literatures by demonstrating the impact of KMP as a managerial tool for advancing innovation. More precisely our results show that, on the one hand, and consistent with the extant research (Alegre et al, 2013; Lee et al, 2013; Andreeva & Kianto, 2011; Chen et al, 2010; Donate & Sanchez de Pablo, 2015), creation and storage KMP have a positive and significant effect on firm innovation. On the other hand, and contrary to the previous research mentioned, no significant effect of acquisition, application and transfer KMP on firm innovation has been found.

In this sense, this paper confirms that those enterprises interested on innovation activity should focus their efforts on creation and storage KMP. On the one hand, knowledge management creation is related to the new knowledge development inside the organizations, tacit as well as explicit knowledge. This creation is linked to the new ideas and with the workers in the organizations. On the other hand, storage like a KMP includes all activities dedicated to the storage knowledge inside the enterprises, like structures, documentation, database or procedures, between others. Therefore, as previous studies note, those enterprises keen on innovation activity should focus their efforts on create new knowledge and storage tools.

However, the results related to the acquisition, application and transfer KMP contrast to previous studies because they show these practices haven´t influence on innovation. KM transfer is linked to the activities carried out to knowledge sharing like, for example, mediation rooms. KM application includes all activities connected to the practical knowledge and knowledge implementation. And, finally, KM acquisition is about enterprise´s capacity to identify and acquire external knowledge (knowledge in the market).

Nevertheless, following previous publications like Jian et al. (2016) “knowledge acquisition is a precursor to knowledge creation, which helps to uncover the relationships between different types of knowledge management practices” (2016, p. 112). This statement seems conflicting with the result, thus in this way a new future research possibility could be analysed: what about these practices and the innovation process?

This study also contributes to the FF literature by providing, for the first time, empirical evidence on the moderating influence that being a FF exert on the KMP-innovation relationship, finding relevant results. Namely, we found that being a family firm negatively moderates the positive link between creation and storage of new knowledge and innovation. Put differently, in family firms the increase in these two KMP do not generate more innovation. These results are coherent with the lower level on R&D investment among FF reported by previous literature. Besides, we also found that being a family firm positively moderates the negative (but non-significant) link between transfer KMP and innovation. This result points to a higher efficiency of family firms in transforming knowledge transfer in innovation, opening the door for further exploration of the causes and size of this effect.

These findings have also valuable managerial implications because, by adding to a better understanding of the most effective KM practices that are likely to have an effect on firm innovation, this study serves as a guideline for the managers aiming to reinforce innovative behaviour and results. The study's potential limitations are its cross-sectional design and the use of subjective measures. In addition, this research is limited to one country under investigation (Spain), and in a context of internationalization and globalization as we are today, organizations can offer different answers to the same problem depending on the cultural factors that surround them. Hence, to extend our research to other countries and cultural contexts would enrich our results. Finally, the generalizability of our findings is also limited by the nature of sample used in this study, and it remains for future studies to determine whether these results will hold for larger companies.

References

Alegre, J., Sengupta, K. and Lapiedra, R. (2013) “Knowledge management and innovation performance in a high-tech SMEs industry”, International Small Business Journal, Vol 31, No. 4, pp 454-470.

Amabile, T.M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996) “Assessing the work environment for creativity”, Academy of Management Journal, Vol 39, No. 5, pp 1154-1184.

Andreeva, T. and Kianto, A. (2011) “Knowledge processes, knowledge-intensity and innovation: a moderated mediation analysis”, Journal of Knowledge Management, Vol 15, No. 6, pp 1016-1034.

Andreeva, T. and Kianto, A. (2012) “Does knowledge management really matter? Linking knowledge management practices, competitiveness and economic performance”, Journal of Knowledge Management, Vol 16, pp 617–636.

Bojica, A.M., Fuentes-Fuentes, M. and Fernández Pérez, V. (2017) "Corporate entrepreneurship and codification of the knowledge acquired from strategic partners in SMEs", Journal of Small Business Management, Vol 55, No. S1, pp 205-230.

Botero, I. C., Cruz, C., De Massis, A., and Nordqvist, M. (2015) "Family business research in the European context", European Journal of International Management, Vol. 9, No 2, pp. 139–159.

Chen, C.-J. and Huang, J.-W. (2009) "Strategic human resource practices and innovation performance: The mediating role of knowledge management capacity", Journal of Business Research, Vol 62, No. 1, pp 104-114.

Chen, C.-J., Huang, J.-W. and Hsiao, Y.-C. (2010) "Knowledge management and innovativeness: the role of organizational climate and structure", International Journal of Manpower, Vol 31, No. 8, pp 848-870.

Chirico F. and Salvato C. (2008) "Knowledge integration and dynamic organizational adaptation in family firms", Family Business Review, Vol 21, pp 169–181.

Chrisman, J.J., Chua, J.H. Pearson, A.W. and Barnett, T. (2012) "Family involvement, family influence, and family centred non-economic goals in small firms", Entrepreneurship Theory & Practice, Vol 36, No. 2, pp 267–93.

Chrisman, J. J. and Patel, P. C. (2012) "Variations in R&D investments of family and nonfamily firms: behavioural agency and myopic loss aversion perspectives", Academy of Management Journal, Vol. 55, No 4, pp. 976-997.

Chua, J.H., Chrisman, J.J. and Sharma, P. (1999) "Defining the family business by behaviour", Entrepreneurship Theory & Practice, Vol 23, No. 4, pp 19-19.

Classen, N., Carree, M., van Gils, A. and Peters, B. (2014) "Innovation in family and nonfamily SMEs: an exploratory analysi"s, Small Business Economics, Vol. 42, pp. 595-609.

Cooper, M. J., Upton, N., and Seaman, S. (2005) "Customer relationship management: A comparative analysis of family and nonfamily business practices", Journal of Small Business Management, Vol. 43, No 3, pp. 242-256.

Cunningham, J., Seaman, C. and McGuire, D. (2016) "Knowledge sharing in small family firms", Journal of Family Business Strategy, Vol 7, No. 1, pp 34-46.

De Massis, A., Frattini, F., and Lichtenthaler, U. (2013) "Research on Technological Innovation in Family Firms: Present Debates and Future Directions", Family Business Review, Vol. 26, No 1, pp. 10–31.

De Massis, A., Frattini, F., Pizzurno, E., and Cassia, L. (2015) "Product innovation in family versus nonfamily firms: an exploratory analysis" Journal of Small Business Management, Vol. 53, No 1, pp. 1-36

De Massis, A., Frattini, F., Kotlar, J., Messeni Petruzzelli, A. and Wright, M. (2016) "Innovation through tradition: lessons from innovative family businesses and directions for future research", Academy of Management Perspectives, Vol. 30, No 1, pp. 93-116.

Del GIudicce, M. and Maggioni, V. (2014) "Managerial practices and operative directions of knowledge management within inter-firm networks: a global view", Journal of Knowledge Management, Vol 18, No. 5, pp 841-846.

Donate, M.J. and Guadamillas, F. (2015) "An empirical study on the relationship between knowledge management, knowledge-oriented human resource practices and innovation", Knowledge Management Research & Practices, Vol 13, pp 134-148.

Donate, M.J. and Sánchez de Pablo, J.D. (2015) "The role of knowledge-oriented leadership in knowledge management practices and innovation", Journal of Business Research, Vol 68, pp 360-370.

Du Plessis, M. (2007) "The role of knowledge management in innovation", Journal of Knowledge Management, Vol 11, No. 4, pp 20–29.

Duran, P., Kammerlander, N., Van Essen, M. and Zellweger, T. (2016) "Doing more with less: innovation input and output in family firms", Academy of Management Journal, Vol 59, No. 4, pp 1224– 1264.

Grant, R.M. (1996) "Toward a knowledge-based theory of the firm", Strategic management journal, Vol 17, No. S2, pp 109-122.

Hair, J.F., Anderson, R.E., Tathamand, R.L. and Black, W.C. (1998) Multivariate Data Analysis, Prentice-Hall, Upper Saddle River.

IEF (2015). La empresa familiar en España. Instituto de la Empresa Familiar, Madrid.Inkinen, H.T., Kianto, A. and Vanhala, M. (2015) "Knowledge management practices and innovation performance in Finland", Baltic Journal of Management, Vol 10, No. 4, pp 432-455.

Jiang, X., Yang, Y., Pei, Y-L. and Wang, G. (2016) "Entrepreneurial Orientation, Strategic Alliances, and Firm Performance: Inside the Black Box", Long Range Planning, Vol 49, pp 110-116.

Kallmuenzer, A. & Scholl-Grissemann, U. (2017), "Disentangling antecedents and performance effects of family SME innovation: A knowledge-based perspective" International Entrepreneurship Management Journal, Vol. 13, pp. 1117–1138

Kellermanns, F. W., Eddeston, K. A., Sarathy, R and Murphy, F. (2012) "Innovativeness in family firms: a family influence perspective", Small Business Economics, Vol. 38, No 1, pp. 85-101.

Kianto, A., Ritala, P., Spender, J.-C. and Vanhala, M. (2014) "The interaction of intellectual capital assets and knowledge management practices in organizational value creation", Journal of Intellectual Capital, Vol 15, No. 3, pp 362-375.

Kianto, A., Vanhala, M. and Heilmann, P. (2016) "The impact of knowledge management on job satisfaction", Journal of Knowledge management, Vol 20, No. 4, pp 621-636.

Konig, a., Kammerlander, N., and Enders, A. (2013) "The family innovator´s dilemma: how family influence affects the adoption of discontinuous technologies by incumbent firms" Academy of Management Review, Vol. 38, pp. 418-441.

Kumar, N., Stern, L.W. and Anderson, J.C. (1993) "Conducting Interorganizational Research Using Key Informants", Academy of Management Journal, Vol 36, No. 6, pp 1633–1651.

Lee, V-H., Leong, L-Y., Hew, T-S. and Ooi, K-B. (2013) "Knowledge management: a key determinant in advancing technological innovation?", Journal of Knowledge management, Vol 17, No. 6, pp 848-872.

Lee, H. and Choi, B. (2003) "Knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination", Journal of Management Information Systems, Vol 20, No. 1, pp 179-228.

Leonard-Barton, D. (1992) "Core capabilities and core rigidities: A paradox in managing new product development", Strategic Management Journal, Vol. 13, SI, pp. 111-125.

Letonja, M. and Duh, M. (2016), "Knowledge trasnfer in family businesses and its effects on the innovativeness of the next family generation", Knowledge Management Research & Practice, vol. 14, pp. 213-224.

Li, Y., Liu, X., Wang, L., Li, M. and Guo, H. (2009), "How entrepreneurial orientation moderates the effects of knowledge management on innovation", Systems Research and Behavioral Science, Vol 26, pp 645-660.

Lichtenhaler, U., and Muethel, M. (2012) "The impact of family involvement on dynamic innovation capabilities: evidence from German manufacturing firms", Entrepreneurship Theory and Practice, Vol. 36, pp. 1235-1253.

Memili, E., Fang, H., Chrisman, J. J., and De Massis, A. (2015) "The impact of small-and medium-sized family firms on economic growth", Small Business Economics, Vol 45, No. 4, pp. 771–785.

Mustafa, M., Lundmark, E. and Ramos, H.M. (2016) "Untangling the relationship between human resource management and corporate entrepreneurship: The mediating effect of middle managers' knowledge sharing", Entrepreneurship Research Journal, Vol 6, No. 3, pp 273-295.

Naldi, L., Nordqvist, M., Sjöberg, K., and Wiklund, J. (2007), "Entrepreneurial orientation, risk taking, and performance in family firms", Family Business Review, Vol 20, No. 1, pp. 33-47.

Nonaka, I. and Takeuchi, H. (1995) The Knowledge-Creating Company. How Japanese Companies Create The Dynamics of Innovation, Oxford University Press, Oxford.

Nunally, J.C. (1978) Psychometric Theory, McGraw-Hill, New York, NY.

Oliva, F.L. (2014) "Knowledge management barriers, practices and maturity model", Journal of Knowledge management, Vol 18, No. 6, pp 1053-1074.

Patel, P. C. and Chrisman, J. J. (2014) "Risk abatement as a strategy for R&D investments in family firms", Strategic Management Journal, Vol. 35, pp. 617-627.

Patel, P.C. and Fiet, J.O. (2011) "Knowledge Combination and the Potential Advantages of Family Firms in Searching for Opportunities", Entrepreneurship Theory and Practice, Vol 35, No. 6, pp 1179–1197.

Serrano-Bedia, AM ; Lopez-Fernandez, MC; Garcia-Piqueres, G (2016) "Analysis of the relationship between sources of knowledge and innovation performance in family firms", Innovation-Management Policy & Practice, 2016, Vol.18, No. 4, pp: 489-512

Spender, J. (1996) "Making knowledge the basis of a dynamic theory of the firm", Strategic Management Journal, Vol 17, pp 45–62.

Stanovcic, T., Pekovic, S. and Bouziri, A. (2015), "The effect of knowledge management on environmental innovation. The empirical evidence from France", Baltic Journal of Management, Vol 10, No. 4, pp 413-431.

Yusr, M.M., Mokhtar, S.S.M., Othman, A.R. and Sulaiman, Y. (2017) "Does interaction between TQM practices and knowledge management processes enhance the innovation performance?", International Journal of Quality & Reliability Management, Vol 34, No. 7, pp 955-974

Zahra, S.A. (2012). "Organizational learning and entrepreneurship in family firms: Exploring the moderating effect of ownership and cohesion", Small Business Economics, Vol 38, No. 1, pp 51-65.

Zahra, S., Neubaum, D. and Larrañeta, B. (2007) "Knowledge sharing and technological capabilities: The moderating role of family involvement", Journal of Business Research, Vol 60, pp 1070–1979.

Capturing of Entrepreneurial Opportunities Deriving from Crowdsourcing Practices and Additive Manufacturing Technologies

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Abstract: Our research explore entrepreneurs' willingness and readiness to utilize advancements in additive manufacturing/prototyping technologies (AT) in combination with managerial advancements in crowdsourcing practices for the purpose to extend application of agile management practices in their business processes. Growing number of online market places like Amazon Mechanical Turk, CloudFactory, Odesk, InnoCentive, Treadless, etc. allow entrepreneurs to apply crowdsourcing management practices for more and more type of tasks leading to a more like market type of a firm that contract services and production by on-line calls to crowd-labor communities. This strategy of business processes arrangement gives entrepreneurs more flexibility and improves implementation of agile and lean startup management approaches. At the same time development of technologies for additive manufacturing/prototyping makes agile project management methodologies more relevant for "hard" engineering projects and manufacturing beyond just design input/requirements and development planning. Both crowdsourcing managerial technologies and additive technologies are developing steadily from small scale (laboratory) emerging ones to those that already effect and will radically affect business practices in multiple industries. Combination of rapid developments in these fields, uncertainties related sometimes even to hypes boosted by media around these technologies, lack of application statistics, and promises of these technologies to improve agile and lean management practices create an interesting mix for researchers in entrepreneurial management. In the research through interviews and questionnaires we explore how currently entrepreneurs and business men/women perceive utilization of these managerial and technical innovations for their business development strategies, how discrepancies in perception of these technologies and these technologies capabilities generate entrepreneurial opportunities. The research results are done for Eurasian Customs Union region so far. They show steadily growing communities that possess additive technology equipment and master its utilization. This is regarded as strong basis for development of online market places (IT platforms for crowdsourcing of additive technology product/services). At the same time research results show barriers for these technologies application in business practices. The findings are of interest for practitioners.

Keywords entrepreneurial management, agile management, additive manufacturing, crowdsourcing, crowd-labor

1. Conceptual foundations for the research identification

The idea of the research was ignited by curiosity how entrepreneurs can transform business process by utilizing technological advancements at additive manufacturing/prototyping technologies (AT) in combination with utilization of managerial advancements at crowdsourcing practices.

For better understanding of issues of the article we would like to introduce concepts describing entrepreneurship and agile management, additive technologies, and crowdsourcing.

1.1 Entrepreneurship, lean-startup, and agile management.

Conceptualizations of entrepreneurship refer to concepts of "value" and "opportunity". For example, according to (Timmons, 1994): "Entrepreneurship is creating and building value from practically nothing. . . . Entrepreneurship involves the definition, creation, and distribution of value and benefits to individuals, groups, organizations and society"; according to (Stevenson, 1983) entrepreneurship defined as: "The pursuit of opportunity beyond the tangible resources that you currently control."

The significant breakthrough in conceptualizing entrepreneur activities was done by Steve Blank (Blank, 2012) and Eric Rice's (Rice, 2011) by introducing the startup concept, and its stages, tasks and objectives. S. Blank concept "startup is a laboratory" very distinctly differentiated startup management practices from small business ones.

The "startup is a laboratory" concepts have several stage concepts inside (Blank, 2012): "customer discovery", "customer validation", "customer creation", and "customer building". The former two relates to company growth: execution and business development.

The "lean startup concept" (Rice, 2011) states that lean management is a must to follow in entrepreneurial management especially for the "customer discovery" and "customer validation" stages of a startup. Moreover in entrepreneurial management there is high correlation between lean management strategy and agile methodologies of management.

Agile management approach refers to iterative and incremental types of managing design and product building in software development, consulting services and other business areas that allow acting in a highly flexible and interactive manner, following the principles of the Manifesto for Agile Software Development (Williams, 2012). Availability of technologies and other market factors can facilitate implementation of agile methods in particular project management, business area, or become a barrier in agile methods application. If these factors allow implementing agile methodology than the value for a company could be a product or service that higher valued in the eye of a client but without the company over commitment of resources to its development and production – higher value with more flexibility. However, agile practices can be inefficient in vast number of business activities (Larman, 2009). If agile software development methodologies are too extreme in particular case than it is possible to implement Hybrid approaches that blend elements of agile management and plan-driven approaches (Barlow, 2011).

The agile came from the process of development of managerial solution addressing problems in software engineering in 1970s. In software development projects there are standardization practices and compatibility of technological platforms that allow to use iterative and incremental steps in building software products enabling technically to move development along application (software) layers, vertical and horizontal slices back and forth, that is to say, minimizing risks of starting "new building" from the new basement constriction and favoring reduction of burdens of hard planning and perfect documents development. In contrast when ones try to build new building in the hard ware world than agile implementation in the areas beyond planning and prototyping is questionable. Issues of relative impossibility to modify "physical" product design in manufacturing process with an ease of software new feature release scare away managers from using agile approach. Perfect planning and documentation are still essential in most engineering projects. However, Agile is "welcome" in those cases where it could be applied.

1.2 Additive technologies, manufacturing, and prototyping

Advancements in additive manufacturing technologies expand cases of agile management application in engineering projects. Additive technologies allow direct manufacturing from CAD models without use of cutting tools, injection molds, and etc ones used in materials treatment. These bring modification of prototypes and manufacturing products or its components closer to how software new features can be released. However, what is important, this doesn't mean that additive technologies exclude or not compatible with those technologies in manufacturing or prototyping technological process.

Additive manufacturing is not just making close technological connection of virtual CAD models to its manufactured physical analogues but also transforming management of engineering projects and manufacturing business process. Affected by values of direct printing from CAD models this transformation is rapid in aerospace, medical implants, dentistry, jewelry and a few other industrial applications sensitive to AM values like geometry freedom and its change with minimal additional costs, materials scrap reduction. The other industrial applications more sensitive to additive manufacturing disadvantages of AM equipment cost, materials cost for AM and their limited variety, speed of manufacturing including AM equipment preparation for the next production cycle, required quality of surface and internal structure. Some industrial applications hedge disadvantages by combining additive manufacturing technologies with casting and cutting, for example, by using additive manufacturing for tools like molds for casting, or combining ultrasonic additive manufacturing technology with CNC milling in one hybrid machine. The additive technology in these cases is not direct CAD model printing of the final product but just one dependent technique in the manufacturing technology process.

The above examples show the constant additive technology developments towards extension of areas of its business applications by the AM technology improvements, or by improving efficiency of its integration with "traditional" technologies, or by business process reengineering. This tendency of extending areas of AM business applications leads to extension of business areas where agile project management approach can be implemented. Areas of engineering and manufacturing of hard-ware components/products get the enabling technology to follow Agile manifest principals.

However, there are several impeding factors in additive manufacturing application beside AM equipment cost, materials costs for AM and their limited variety, speed of manufacturing including AM equipment preparation for the next production cycle, required quality of surface and internal structure. They refer to lack of industrial standards in AM, and lack of skilled additive technologists for employment.

The solution for diminishing these impeding factors could be found in a field of utilizing crowd and outsourcing capacities available on the market.

1.3 Crowdsourcing and crowd-labor

New practices that outsource functions, performed before inside organizations, to network of people (crowd) by open calls for proposals are relatively new phenomena of business process arrangement or even new business-models creation. Those cases of managerial innovations could be called crowdsourcing systems, and provide opportunities for entrepreneurs to reduce classical way of business process arrangement in the form of a firm by hiring employees.

"Crowdsourcing" is a modern concept that covers many activities among communities and companies where community can even be defined, for example, as the company employees, and some company as a political party that outsource micro-tasks from volunteers or its members.

The name crowdsourcing is formed from two words, crowd, making reference to the people who participate in the initiatives, and the word sourcing, which refers to a number of procurement practices aimed at finding, evaluating, and engaging suppliers of goods and services.

While there is an evidence that crowdsourcing was utilized as an activity long ago in civilization history, for example, cathedral building in the 15th century (Boudreau & Lakhani, 2011) the term "crowdsourcing" was originally coined by (Howe, 2006) "...a sourcing model in which organizations use predominantly advanced internet technologies to harness the efforts of a virtual crowd to perform specific organizational tasks".

The crowdsourcing as an outsourcing market capacity developed slowly through history from an amateur type of freelancing to a serious, widely distributed workforce of professionals (Brabham, 2012, Leimeister, 2009).

ITC technologies are platforms that boosted e-markets formation and commoditization of outsourcing services. Crowd-labor, also known as cloud labor, is the e-market that can be used by companies for services outsourcing. The available ICT platforms allow to build cost effective management structures with decentralization of decisions and labor, and the same time in combination with automation software reduce gaps between professionals and amateurs. For example, automation in photo and video editing, graphical design services perfectly illustrate this transformation.

Analyzing these examples we found that businesses can increase their flexibility and "agilability" in sectors where crowd-labor e-markets are formed through enabling amateurs and hobbyists by automated digitalized means of production. In its turn additive technologies could be also regarded as enabling mean of production for armatures and hobbyists that are foundation for AM crowd-labor e-market emergence.

2. Research methodology

Our research goal was to analyze is there an entrepreneurial opportunity mix in Eurasian Customs Union (ECU) region from:

1. Crowd-labor pool of amateurs/hobbyists empowered with additive technologies means of production that could be a basis for the e-market platform building;
2. Contractors pool of entrepreneurs and small enterprises that regard AM as a way for business process transformation to get more flexibility, and sustainability through lean and agile approaches implementation.

Systematic literature analysis identifying the research topic didn't provide evidence of any research that examine possibility of transforming business processes by launching or utilizing existing crowd/cloud-labor e-markets in additive manufacturing or prototyping in Eurasian Custom Union region. Why we make this geographical boundary or attribute scale for the sample? According to (Roland, 1937) beside price there are

transactional costs while obtaining goods or services on a market like search and supporting information obtaining costs, bargaining costs, enforcement costs, transaction costs, and etc. He suggested that: "firms will arise when they can arrange to produce what they need internally and somehow avoid these costs". As business practice show there are legal barriers related to Custom Service and financial transaction costs that lead to blocking costs for benefits of crowdsourcing AM services beyond Eurasian Customs Union.

1. The crowd-labor of 362 respondents was formed from social networks and databases from event management companies. The selection criteria were ownership or free access to the additive technology equipment (for example, public universities laboratories or body shops). Segmentation inside the research pool sample for potential freelancers at the e-market as amateurs or professionals was made on nominal values of attributes of respondent education background, special knowledge/skills in understanding additive technology physics, chemistry, and mechanics. These attributes assume respondents' capabilities to provide quality services regardless of the level or automated features of the equipment or software enabling amateurs to act as professionals. This reference research pool sample has knowledge, skills, and enabling equipment to become part of the AM crowd-labor e-market.
2. The contractors-pool sample of 354 respondents was formed from client databases of design and engineering studios that provide services in 3D scanning, 3D modeling, 3D printing. The professional design and engineering companies were interested in the research results to estimate threats and compulsory transformation in case of crowd-labor e-markets emergence in AM industry and distributed questionnaires. This type of respondents was selected to eliminate survey errors in exposing extempore/unprepared respondents to questions about specific technical and business areas. Answers of entrepreneurs and managers that didn't have previous experience in additive technologies utilization could be regarded as invalid and survey result unreliable. Also this research pool sample are definitely first contract-pool of users or potential beneficiaries of exploiting a new crowd-labor e-market advantages.

In the survey we used pre-coded data of ordinal values for the attributes 4 = Strongly Agree; 3 = Agree; 2 = Disagree; 1 = Strongly Disagree and "not applicable" variant if the question is irrelevant to measure perception of:

- willingness in the both pools to be the part of the AM crowd-labor e-market,
- readiness to contract and provide services at the e-market,

Also for the contractors-pool sample we measured sense of agency in using agile management approach in business process incorporating AM and the e-market contracting. Sense of agency refers to the feeling of control over actions and their consequences (Synofzik, 2008).

1. The crowd-labor pool sample is regarded as representation of core basis/foundation for the potential formation of the AM crowd-labor e-market on the freelance/supplier side.

Their willingness to serve the potential demand at the e-market was measured through correlation with job satisfaction according to (Kalleberg, 1977; and Brayfield, 1951). Job satisfaction is regarded of being affected by the level of income and its change, and by non-income factors. According to Minnesota Satisfaction questionnaire (2011) these non-income factors could be: "I meet very good friends in my job, it gives me a high level of satisfaction as it is socially important, I spend my time very pleasantly during working hours, and it is a pleasure to work with our team". For the crowdsourcing e-platforms no-income variables are the most important motivations to be present there, and it is integral part of a member self-identity (Fedorenko, 2017).

These four non-income variables addressing level of satisfaction were presented in the survey as:

- "AM crowd-labor is a good community/crowd for me to be/work with",
- "be part of the AM crowd-labor community is socially important for me",
- "it is a pleasant time for me to work on orders via the AM crowd-sourcing platform".

The income satisfaction from the crowd-labor e-market platform can be measured as:

- "freelance work is important for me to reach required or desired (please, underline here only one the most correct definition for you) income level".

The readiness to provide services was measured through assessment of their ability to design and to print: "I can take order for 3D printing today" (with variations of using additive manufacturing technology FDM, SL, MJP, SLS, or binder jetting), "I have more than one year of experience in 3d printing", "I serve orders in 3D printing as freelancer".

1. The contractors-pool sample represents the core basis for the potential formation of the AM crowd-labor e-market on the companies/demand side.

Their willingness and readiness to make orders through the AM crowd-labor e-market platform were assessed through common practices, values, risks, and sense of agency associated with required managerial decisions to be made. Typical questions with the pre-coded data scale were:

- Group 1. "I used crowd-labor e-market platforms like www.freelance.ru, www.www.upwork.com or any similar one at least once", "I was fully satisfied with this experience";
- Group 2. "I regard those and alike platforms as a good alternative to employ people/specialists; I regard those and alike platforms as a good alternative to direct contracting from suppliers; I regard those and alike platforms as a good supplementary alternative to direct contracting from suppliers.
- Group3. "I regularly outsource through crowd-sourcing e-market micro-tasks; I regularly outsource through crowd-sourcing e-market macro-tasks; I regularly outsource through crowd-sourcing e-market simple projects; I regularly outsource through crowd-sourcing e-market complex projects". Definitions were provided to respondents what were regarded as micro-tasks, macro-tasks, simple projects, and complex projects, please, see below.
- Group 4. "The crowd-sourcing is a high value solution for the current business process optimization in terms of direct costs per each item; same question for the overhead costs".
- Group 5. "The crowd-sourcing is a high value potential solution for the transformation of business process optimization in terms of reduction of direct costs per each item produced; same question for the overhead costs".
- Group 6. "The crowd-sourcing is a high value potential solution to hedge market risks influence on my business (the business I represent) contributing to quick adaptation or flexibility".
- Group 7. "I know what is Agile; I use Agile management practices in my (the business I represent) business process; Agile management approach is highly valuable and I want to expand its application, I feel unsatisfied with the current status of hybridization of Agile with Plan-driven approach".
- Group 8. "I outsource AM technologies to produce components for the product; I outsource AM technologies to produce components for prototypes only, I'm ready to outsource AM operations through crowd-sourcing platforms like freelancer.ru if there will be that opportunity".
- Group 9. "If I place an order at a AM crowd-labor platform there is no feeling of uncertainty or danger"; I will definitely feel confident to order through AM crowd-sourcing platform if there are track records of freelances metrics of orders/contracts served before, I will definitely make orders at the platform if there are commoditization of product/services, like the Uber e-market"
- Group 10. "AM technologies are of value to benefit from Agile management application extension in my business (the business I represent), AM crowd-labor market development is a great chance/opportunity for integration of AM technologies into business process of my business (the business I represent)".

Micro-tasks are regarded as small tasks that could be provided by any contractor and have a minimal level of complexity. The average time to accomplish a micro-task is up-to one hour. Macro-tasks are regarded as medium size tasks that could be provided by contractors with specialization and have a low level of complexity. The average time to accomplish a macro-task is up-to one working day (~ 8 hours). Simple projects – are regarded as projects that could be provided by contractors with specialization and have a medium level of complexity. The average time to accomplish a simple project is up-to one week. Complex projects are regarded as projects that could be provided by contractors with deep expertise and experience and are complex. The average time to accomplish a complex project is more than a week.

There was a simple survey data structure with the data from a single-round survey. Some questions were overlapping to highlight anomalies in responses and follow-up by phone for clarification. Any unqualified inconsistencies were exempt from the collected data.

The measured perception of the statements of the ordinary scale from strong positive 2 to strong negative -2 were multiplied by weights. This made presentation of the research data more accessible/usable in this paper and also the research data interpretation for entrepreneurial opportunities recognition derived from blending crowdsourcing practices and additive manufacturing technologies.

3. The research results

Results of the research analysis are presented on Table 1 below.

Table 1

Type or category of the research sample	Willingness to be part of AM crowd-labor e-market	Readiness to be part of AM crowd-labor e-market
Crowd-labor pool	11.8 (moderate and close to extra)	5.6 (moderate)
Contractors pool	41.4 (moderate and close to negative)	13.8 (negative)
Contractors' pool segment of direct printing of products/components	34.5 (negative and close to moderate)	11.2 (negative)
Contractors' pool segment of tools printing	48.3 (moderate and close to extra)	16.4 (moderate and close to extra)

1. The crowd-labor research sample willingness to provide services has the following measurement criteria:
- Extra willingness score from 12 to 16;
- Moderate willingness score from 9 up-to 12;
- Negative willingness score below 9;

2. The crowd-labor research sample readiness to provide services has the following measurement criteria:
- Extra readiness score from 6 to 8;
- Moderate readiness score from 5 and below 6;
- Negative readiness score below 5;

3. The contract-pool research sample willingness to contract AM services has the following measurement criteria:
- Extra willingness score from 50 to 60;
- Moderate willingness score from 40 and below 50;
- Negative willingness score below 40;

4. The contract-pool research sample readiness to provide services has the following measurement criteria:
- Extra readiness score from 17 to 20;
- Moderate readiness score from 14 and below 17;
- Negative readiness score below 14;

The average numbers of the research results show that there are moderate but close to extra willingness and readiness of armatures and hobbyists to serve orders through a hypothetical AM crowd-labor e-platform. They perceive themselves as skilled enough to meet requirements of contractors and possess necessary AT means of production.

On the other side of the potential AM crowd-labor e-market there are two segments of contractors.
One segment of those that print directly end products/components has negative willingness but not exclude trials to investigate the opportunity.
The other segment that use AT as a mean for tools using them in final products manufacturing process is more open and perceive values from the crowd-labor market. Their willingness and readiness are moderate but close to the extra scale range.

4. Conclusions

The conceptual foundations of the research identification show that there is a firm relation among level of automation of means of production, level of their adoption by amateurs/hobbyists, and transformation of labor markets towards crowd based (freelance) type of relations. At the industry of additive technology means of production we see the same trends as exits before in photo, video and graphic design industries where automation and the wide adoption of this means by amateurs transformed labor and structure of supply.

The empirical part of the research reviled disproportions in today's situation between supply and demand sides of the potential additive manufacturing labor-cloud e-market.

The supply side has foundation pool of the enabled amateurs and freelance professionals that are willing and ready to form additive manufacturing labor-cloud e-market.

The demand side for the crowdsourcing (crowd-labor) is represented by two major segments. One use additive technologies to produce tools for manufacturing (non direct production of products and components by AM) and the other segment use additive technologies for the direct production. The former segment is willing to develop supply side on the market by labor-cloud platforms for their benefits as they have sense and methods of the factory gate product quality control. This segment has already opportunity to benefit from extension of agile management application in manufacturing with less commitment into in-house infrastructure, employment, contracting, and keep risks acceptable at the same time in compare with the other demand side segment.

We think that the segment of "direct printing of products or their components" will become more open overtime for outsourcing at AM crowd-labor e-markets along with this markets development by automation of AT means of production and establishment of the mature AM crowdsourcing market with customer reviews and ratings as it happened in digital product industries. Follow-on research is planned to verify this preliminary inference.

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References

Barlow, J., Giboney, J., Keith, M., Wilson, D., Schuetzler, R., Lowry, P., Vance, A. (2011) Overview and Guidance on Agile Development in Large Organizations", Communications of the Association for Information Systems. 29 (1), pp.25–44.

Blank, S. and Dorf, B. (2012) The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company.

Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Crown Business, New York.

Boudreau, K. and Lakhani, K. (2011) Incentives and problem uncertainty in innovation contests: An empirical analysis, Management Science, 57(5), pp. 843–863.

Brabham, D. (2012) The Myth of Amateur Crowds, Inform Commun Soc, vol. 15, no. 3, pp. 394–410.

Brayfield, A. and Rothe, H. (1951) An index of job satisfaction, Journal of Applied Psychology, 35, 5, pp. 307–311.

Coase, R. (1937), The Nature of the Firm,

Fedorenko, I., Berthon, P., Rabinovich, T. (2017) Crowded identity: Managing crowdsourcing initiatives to maximize value for participants through identity creation, Business Horizons 60, pp. 155—165.

Howe, J. (2006) The Rise of Crowdsourcing, Wired Magazine, June.

Kalleberg, A. (1977) Work Values and Job Rewards: A Theory of Job Satisfaction.

Larman, C. and Bas, V. (2009) Top Ten Organizational Impediments to Large-Scale Agile Adoption, InformIT.

Leimeister, J., Huber, M., Bretschneider, U., Krcmar,H. (2009) Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition, JMIS, vol. 26, no. 1, pp. 197–224.

Synofzik, M., Vosgerau, G., Newen, A. (2008) Beyond the comparator model: a multifactorial two-step account of agency, Conscious Cogn, March, 17(1), pp.219-39.

Timmons, J. (1994) New Venture Creation (4th ed), Irwin.

Williams, L. (2012) What agile teams think of agile principles, Magazine Communications of the ACM, vol. 55, issue 4, April, pp. 71-76.

Group Reflection Paths: A Case Study on Entrepreneurs' Peer-to Peer Meetings. Method Description

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Abstract: This paper describes the development process and the pilot use of an ethnography-inspired analysis method to investigate group reflection in group discussions. Reflection is the process of thinking, acting, experiencing, evaluating and analyzing alone or together tied to the surrounding social reality or context. Social relationships are an inherent feature of a group; these relationships refer to group dynamics, i.e. interpersonal processes in and between groups over time. The method is piloted on three lightly moderated microentrepreneur network meetings in Finland. The meetings provide microentrepreneurs with a forum where they get into social interaction with other entrepreneurs. Each meeting provides a single case with a different starting topic. The method development was an inductive and data-driven process. We adapted the double stimulation tool by Vygotsky to the situated event of this study by adding two further steps: analysis of the group reflection and finally the symbolic visualization of the group reflection path. Each case discussions provided a unique road related visualization that symbolizes the discussion flow, directions and process. The main finding of this study is that each case meeting formed a unique group reflection path. The analysis of what, how and why entrepreneurs are talking about topics related to business creates an understanding of how they construct the meaning of entrepreneurship and related factors as part of their culture.

Keywords: group reflection; group dynamics; method development; micro-entrepreneurship; network

1. Introduction

Entrepreneurs are deeply embedded in the society in which they operate (Granovetter, 1985), and the social structure is an intrinsic part of the entrepreneurial process (Dodd & Anderson, 2007). We adopt a practice-based research framework towards the social processes which help entrepreneurs to produce and reproduce the entrepreneurial action (Goss, 2005). The aim of this study is to describe the development process for a novel analysis method to investigate features of group reflection in network group meetings among microentrepreneurs. We do this through an ethnography-inspired analysis of the structure of entrepreneur-centered network meetings, group dynamics in the meetings, and symbolic visualization of the group reflection paths.

The promise of ethnography is increasingly recognized in entrepreneurship studies (Jack & Anderson, 2002; Johnstone, 2007). Ethnography is well suited to capture the ways in which micro-level behavior—including entrepreneurial behaviour—is embedded in the context. We regard networking as an entrepreneurial action (Engel et al, 2017) that can provide a significant source of social support and increase the likelihood of business success (Brüderl & Preisendörfer, 1998). To investigate the everydayness of entrepreneurship action (Steyaert, 2004) in the context of network meetings, the focus of this study is on an ethnographic analysis of the communicative habits of entrepreneurs. The communicative events analyzed are micro entrepreneurs' network meetings in Northern Finland, and these meetings constitute a particular situated event in the macro-context of microentrepreneurship (Figure 1.).

Ethnographic research is aimed at finding out things that are often not seen as important but belong to the implicit structures of people's life. The priorities of the ethnographic research strategy vary (Genzuk, 2003).

The ontology of ethnography implies that language is context itself, and thus part of social structure and social relations. In ethnographic research, language is approached as something that has a certain relevance to humans, and humans' existence is tightly linked, conditioned or determined by society, community, the group and culture (Blommaert & Jie, 2010). Of the several possible factors to be identified in an analysis of communicative events according to the famous ethnographic methodologist Hymes (1964), we chose to focus on the topics and comments that a message may be about, and the events and their characters as wholes. In this study, we followed the ethnographic view of data-driven approach and chose to follow the data that

suggested us a particular theoretical framework, namely the Vygotsky's double stimulation (1978) to be used as an analysis tool.

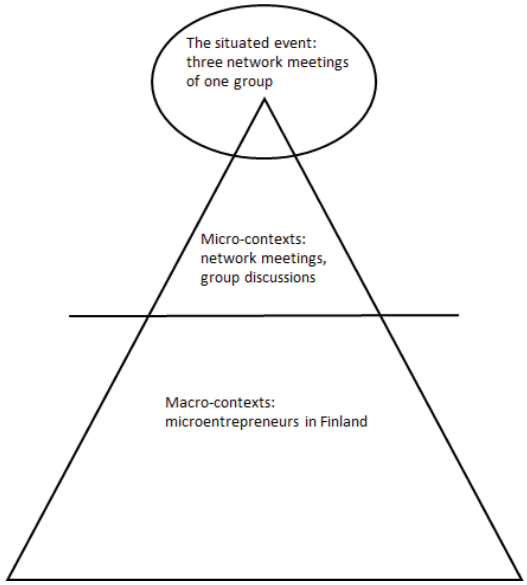

Figure 1: The contextual layers of the present study (modified after Blommaert & Jie, 2010, p. 18)

2. Theoretical framework

The basis of our theoretical framework is related to group reflection and group dynamics. Reflection is the process of thinking, acting, experiencing, evaluating and analyzing alone or together tied to the surrounding social reality or context (Fernandez et al., 2012), and so-called meta-competency (Cheetham & Chivers, 1998) which enables one to reflect and evaluate one's own activities. Seibert (1996) stated that self-evaluation, critical review, analyzing, and learning through experiences are the significant considerations of genuine and realistic self-reflection. In addition, self-reflection helps to increase awareness, understanding, and renewal of various phenomena (Argyris & Schön, 1996; Boud et al., 2006). Kemmis (1985) refers to the communality of reflective action, which is conditioned by the use of language, social interaction and cultural affiliation. In addition, the surrounding environment or context has to be taken into account during reflection (Fernandez et al., 2012).

Moon (2002) argues that reflection is like a mental activity, which creates distance from different tasks, situations and events, and it offers a view to be more objective. Thus, reflection can be seen and utilized as a process, which enables an individual to use his/her, experiences and determine competencies. Further, it is possible to detect new activities and features to promote better and useful decision-making. Reflection can be seen as the opposite to authority-guided and routine activities, which are like barriers to development. Thus, reflection offers a way to observe experiences and to look at them from a removed perspective (Slotte, 2003).

In addition, reflection can be considered as a tool for creating new knowledge, which combines information, emotions and action (Ståhle & Grönroos, 2000).

To understand group reflection, one needs to be aware of group dynamics and group as a social unit. As Forsyth (2018) explains, to capture the many nuances of the word 'group' is not possible with one definition. Even so, he describes the group as "two or more individuals who are connected by and within social relationships". This is in line with what Levi (2014) says of people in groups having a connection of some kind with each other. He also states that there is a reason and a goal for a group to exist.

Forsyth (2018) provides a categorization of different varieties of groups ranging from primary groups to social groups and collectives. However, the one that seems most applicable in this study is a social category, i.e. a grouping of people assumed to be similar in some ways but different in one or more ways. The formation of groups can be either planned or emergent (Forsyth, 2018). In addition to this feature, the group formation

model by Arrow et al. (2000) also includes the dimension of external vs. internal forces as the initiators of the group.

By definition, social relationships are an inherent feature of a group; these relationships refer to group dynamics, i.e. interpersonal processes in and between groups over time (Forsyth, 2018). Forsyth (2018) reviews the processes by naming five different interpersonal processes possible in the context of groups: 1) formative, i.e. interpersonal and personal processes making a group of strangers into a true group, 2) influence, i.e. interpersonally effective forces aiming at transforming individuals into a socially coordinated collective, 3) performance, i.e. achieving the goal of the group by uniting members' efforts, 4) conflict, a natural feature of a group, and 5) contextual, i.e. influences of the social and environmental contexts on groups.

3. Data and method

3.1 Microentrepreneurs' peer-to-peer network meetings

The analysis is based on audiotaped group discussions of a microentrepreneur peer-to-peer network with regular meetings in northern Finland. The network provides microentrepreneurs with a forum where they get into social interaction with other entrepreneurs, and find new solutions to the development challenges of their businesses. The implementation of the network events takes place as follows: the network is coordinated, and the research team at the host company's premises facilitates the meetings (Hänninen, Jokela, Kotavaara, Saarela, & Muhos, 2017). The host entrepreneur chooses the starting topic of the event. In addition, representatives from public business advisory services are invited to the meetings. Free discussion and exchange of experiences around the selected topic is the most important part of the event. The main goal of the concept is to provide the entrepreneurs with new ideas and help them find new ways to develop their own businesses. From the viewpoint of research, these entrepreneur-centric and lightly moderated entrepreneur meetings provide a unique access to naturally occurring data on the discursive practices of entrepreneurial processes, which is hard to access as a researcher.

A total of 23 individual entrepreneurs, six business advisors, four researchers and one journalist participated in three different meetings over a three-month period (Table 1). Only one entrepreneur participated in all three meetings.

Table 1: Individual participants in each meeting

Participant role	**Participant code**	**Meeting dates**			**Activity level**
		Dec, 2015	Jan, 2016	March, 2016	
Entrepreneur	E1	X			1
	E2	X			1
	E3	X	X		2
	E4	X		X	2
	E5	X			1
	E6	X	X	X	3
	E7		X		1
	E8	X		X	2
	E9	X			1
	E10	X			1
	E11	X			1
	E12	X		X	2
	E13		X		1
	E14		X		1
	E15		X	X	2
	E16		X		1
	E17			X	1
	E18			X	1
	E19			X	1
	E20			X	1
	E21			X	1
	E22			X	1
	E23			X	1
Business advisor	B1	X			1
	B2	X			1
	B3		X	X	2
	B4		X	X	2
	B5		X	X	2

Participant role	Participant code	Meeting dates			Activity level
	B6			X	1
Researcher	R1	X	X	X	3
	R2	X	X	X	3
	R3	X			1
	R4	X	X	X	3
Other (journalist)	O1			X	1
Total number		**17**	**13**	**20**	

3.2 Method development process

The number of scientific methods has increased and at the same time their boundaries have been blurred. Blurring is related to cultural research that has brought looseness to empirical research and interpretations of various data (Matikainen 2008). Thus, Feyerabend (1978) and Eskola (2003) emphasize the openness to various ways of obtaining data, developing methods and doing research. We approached group reflection with an open mind and from a fresh perspective. In line with the ethnographic approach, the analysis was initiated inductively without any fixed preconceptions about theoretical frames.

The authors re-read the transcribed group discussions several times. We started the analysis by identifying the main topic of the meeting. Then we followed the path of discussion by identifying the consequential topics.

Quite soon, we noticed that the paths could be visualized as symbols such as different kinds of roads. At this stage, we found that double stimulation, an analytical tool developed by Vygotsky (1978) appeared to be applicable to this context. The tool has previously been applied to learning, management and organizational development. The original tool is based on two interrelated stimuli. The task (or learning challenge) acts as the first stimulus and solving it is the second stimulus. In the context of the present study, the first stimulus (Step 1) is the topic of the meeting that the participants reflect individually prior to the meeting based on their personal experiences and expectations (see Figure 2). The host entrepreneur has chosen the starting topic and the participants are informed of the topic beforehand. Thus, the participants do not necessarily have any personal experience related to the topic and they start reflecting it first by themselves prior to the meeting and deepen the reflection while discussing in the group. The second stimulus (Step 2) is the reflective group discussion where new topics are introduced and the discussion flows from the starting topic onwards depending on the group dynamics, preconceptions of the participants, and introduction of new topics. The double stimulation tool is based on interaction between the first and second stimulation. Participant may have ideas and images on the topic beforehand. During the discussion and group reflection topics may remain unchanged or change; the participant continues invisible dialogue with him/herself and with the group.

The two first steps are regarded as the reflection stage where the reflection path remains invisible (latent) to the participants. To progress towards the manifest presentation of group reflection path, we adapted the tool to the situated event of this study by adding two further steps: analysis of the group reflection (Step 3) and symbolic visualization of the group reflection path (Step 4). In Step 3, the researcher analytically follows the discussion and observes whether the discussion proceeds with the starting topic or whether the flow moves to other topics, or if the discussion is glued around (a) certain topic(s). The symbolic visualizations of three group discussions are presented in the Findings section.

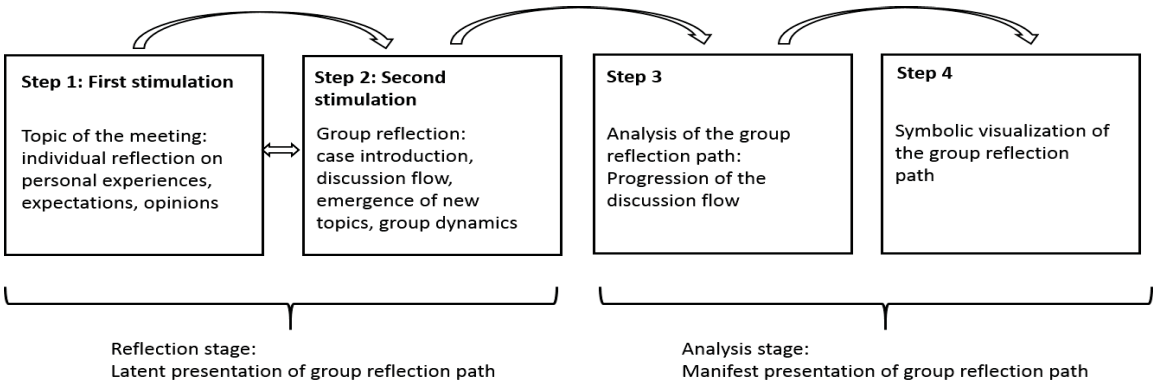

Figure 2: Four steps of the group reflection path analysis inspired by Vygotsk's (1978) double stimulation

4. Findings

4.1 Case 1: Active sales and staff commitment

First stimulation: Case meeting 1 took place in December 2015. Eleven entrepreneurs, two business advisors and four researchers (facilitators) participated in the meeting. The topic chosen by the host entrepreneur was "Active sales and staff commitment". The group had gathered to their first meeting approximately half a year earlier, so at least some of the participants had met each other before.

Second stimulation: The meeting was started by introducing the topic of the evening. As can be expected, there were two principal topics in the evening; active sales and staff commitment. For the most part, these were discussed from the perspective of the host company. Numerous dimensions came up in relation to the topic of sales such as sellers, means of making the company known, methods of marketing and ways to simplify the sales process. Additionally, the host company has an unconventional company structure, as the employees jointly own the company. This was discussed at length, and it was seen as one way to enhance the employees' commitment to the company. Apart from these two topics, a couple of others were briefly covered. These include for instance projects from the viewpoint of companies, entrepreneurs' well-being and products of the host company.

Analysis of the group reflection path: The discussion began with the host company presentation and proceeded to three major topics. The flow was not straightforward but the path zigzagged between a couple of topics several times. Later the discussion returned back to the host company, and at the end of the meeting, the discussion flew more freely in a small talk manner.

Symbolic visualization: The form of the discussion in Case 1 is symbolized as "a main road". There are a limited number of minor crossing roads where the discussion from time to time turns but returns back to the main road of sales and employee commitment. The width of the road is moderate as crossings to the side roads prevents a very deep reflection process.

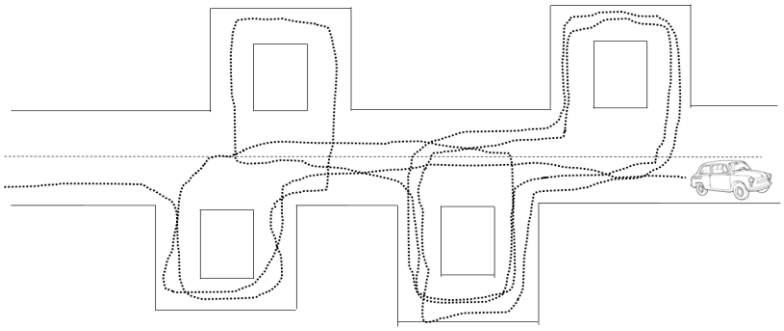

Figure 3: Symbolic presentation of the group reflection path in case 1: Main road

4.2 Case 2: How to find professional workforce?

First stimulus: Case 2 took place in January 2016. Seven entrepreneurs, three business advisors and three researchers participated in the meeting. Two of the entrepreneurs also participated in case 1. The topic was "How to find professional workforce?"

Second stimulus: The discussion was tightly focused on the host company's needs. Participants tried to solve the host company's problems together. The approach was problem-based and it led to a discussion that circulated around the host company. The host company was given many advice and anecdotal examples of participants' personal experiences.

Analysis of the group reflection path: The form of the discussion could be symbolized as urban streets. The discussion circulated around the host company during the whole meeting and the discussion never actually reached a deeper conversation level. During the discussion, many short openings were made to lead the discussion towards a new track but very soon the focus was back on the host company.

Symbolic visualization: The symbol of the group reflection is “urban streets”. The discussion rotated several times around the same topic and the host company. The reflection paths form a zigzag-like pattern that follows the same streets several times and does not really proceed far from the starting point. The streets are narrower than in case 1, because the reflection remains rather case-specific.

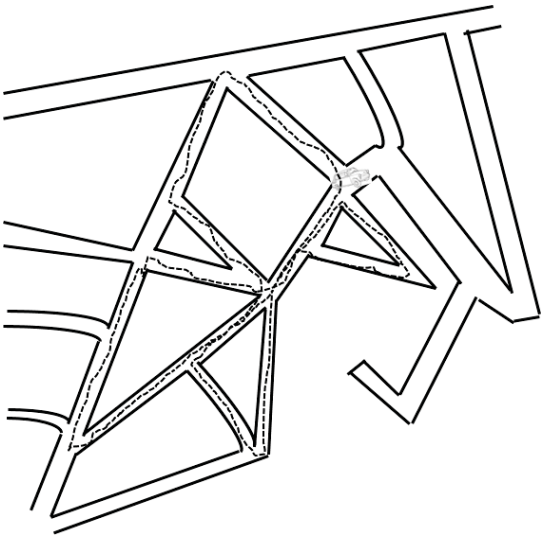

Figure 4: Symbolic presentation of the group reflection path in case 2: Urban streets

4.3 Case 3: Co-operating with media

First stimulus: The topic of the group meeting was ´cooperating with media´ (meaning mainly cooperation with newspapers and journalists). Besides the host entrepreneur, there were eleven other entrepreneurs, four business advisors, three researchers and one journalist. The meeting took time two hours and the location was the host entrepreneur´s company.

Second stimulus: Firstly, the conversation spins on company affairs and its media visibility. The company had previously been involved in a TV format and the participants wanted to know how the role played on the TV had affected the company's business. The next phase of group discussion can be described like reading a yellow press in highway´s service station; the conversation was like small talk with humor overwhelmed. The topic of evening was not posted at all. The third and last phase followed a smooth process.

Analysis of the group reflection path: The group had a multidimensional and profound discussion, and it proceeded fluently like a process from one topic to another, but they profoundly covered the theme of the evening.

Symbolic visualization: The symbol is a highway where the route is straight with very few crossing streets. The symbol refers to a long road, giving a relatively fast connection between two places. The road is wide symbolizing the depth of reflection.

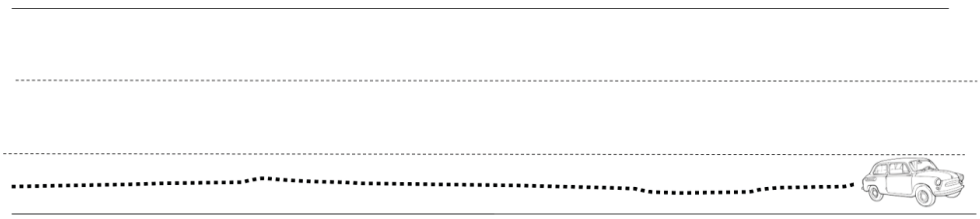

Figure 5: Symbolic presentation of group reflection path in case 3: Highway

5. Discussion

Developing a novel research method is challenging and takes time. However, it is justified if the methods developed earlier do not provide enough scientific answers to the phenomenon to study. In our case, we recognized the need for an analysis tool that could be used to analyze and visualize the process of reflection in

group meetings. After the ethnography inspired inductive data-driven analysis phase, the double stimulation tool of Vygotsky (1978) felt applicable as the theoretical framework for the development of a novel approach to analysis.

The symbolic visualization shows that the group reflection paths in the three case meetings were different. Case 3 was quite straightforward and processual from the starting topic towards a deeper reflection ("highway"). The majority of the participants were active in the discussion and our impression is that the discussion helped entrepreneurs to reflect the topic more thoroughly. On the other hand, cases 1 and 2 were more meandering and the conversation zigzagged between the main topic, host company, and other topics.

The discussion never really proceeded from the starting topic and the host company, but returned or rotated around it throughout the meeting. As opposed to the original purpose of the meeting concept, the discussion was not raised to a more generalizable level, which the majority of the participants could relate to and use it as part their business development. Our impression is that the general depth of reflection remained lower in cases 2 and 3 than in the "highway" structured case 1 where the discussion progressed from the starting topic towards a deepened reflection.

This study indicates that although the meeting concept and its principles are the same in all meetings, the group reflection can be very different in various occasions. As Cheetham & Chivers (1998) point out, reflection is working when individual has ability to reflect his/her thoughts and actions as well as to combine them to the context and the surrounding environment (see also Fernandez el al., 2012). For example, in case 3 the meeting flows like a planned process and as Kemmis (1985) argues, the social interaction and cultural affiliation play a significant role in the group reflection and the sense of community. On the other hand, the two other cases straggle and flow back and forth without any clear process. This could partly depend on the first stimulus, namely the topic of the meeting. In particular, the starting topic in Case 3 is very limited and clear. Since the reflection was visualized as a highway, the participants got further from their preconceptions during the discussion. In case 1, the starting topic was a mix of two loosely linked topics. The reflection did not really proceed but rotated around the starting topics and other topics back and forth. To summarize the findings, the group reflection was richest in case 3 because the discussion was very deep and it offered a way to learn (Moon, 2002; Ruohotie, 2002). If the discussion only circulates around the case company and its operations, the group reflection remains vaguer than if the topic is common and recognizable to everyone.

The group in this study is the same but the individuals in each meeting vary. The number of entrepreneurs in meetings varied from seven to twelve. Only one entrepreneur participated in all meetings. Our analysis is purely based on the transcribed discussions and not on entrepreneurs' own perceptions so we can only speculate about the reasons. In all likelihood, one explanation is the long distances which can be up to almost 100 km between the meeting locations. Still, the chosen topic is also important. As an individual's work and work-related topics are guided by a person's interests, activity, understanding, and professionalism (Cheetham & Chivers, 1998) as well as opinions and principles (Rampersad, 2004), personal interest towards the starting topic is likely to play a role in how engaged entrepreneurs are in each meeting.

In any group, there are interpersonal forces, which influence the members' actions. The group dynamic polarized clearly in the case meetings: in the course of discussions, there were noticeable followings of other participants when participants concentrated on a certain topic for a longer time. Although agreeing comments dominated the discussions, occasionally some participants even challenged other entrepreneurs' views. The tendency for conflict processes is a natural feature of a group (Forsyth, 2018). Although the concept of the case group can be regarded as a mutually supportive group (Forsyth, 2018), the questions posed to others were mainly technical and company-specific and did not relate to emotions or more general views on entrepreneurship. It seems that the group was still on the forming stage: the participants did not know each other very well and thus the trust had not yet reached a level where they would raise matters that are more personal.

6. Implications

6.1 Practical implications

According to Blommaert and Jie (2010), most cultural and social behavior is performed without active reflection or awareness; consequently, people cannot necessarily put it in words if being asked about it. The

analysis of what, how and why entrepreneurs are talking about creates an understanding of how they construct the meaning of entrepreneurship and related factors as part of their culture (Selden & Fletcher, 2015). We argue that this language-based analysis method is useful in gaining an understanding on how entrepreneurs internalize topics related to business. The main finding of this study is that each case meeting formed a unique group reflection path. Group facilitators cannot assume that each evening follows a certain structure although the concept and principles are the same. Setting the topic starts the individual reflection process, but ideally, the reflection is deepened in the group during the discussion. Meeting facilitators should be trained beforehand in order to consider this and ensure that all participants are involved in the reflection. In addition, from the perspective of group dynamics and trust formation, discussion about other issues than strictly the topic of the event can be important in a new group.

6.2 Research implications

In ethnographic research, theory is the outcome of theorization of the data. The three cases presented in this pilot study are a part of a large database. After analyzing more cases, we will be able to state whether it is possible to identify some recurring symbolic representations in the reflection paths or whether they are all unique. We will also combine the group reflection paths with more content-focused analysis to investigate how entrepreneurs reflect various topics, how microentrepreneurs identify themselves in relation to larger companies, and what entrepreneurs perceive as the special characteristics of microenterprises. We are also curious to see how group reflection and group dynamics change over time when the participants learn to trust each other.

7. Conclusions

The process of method development led to the preliminary adoption of the tool in three cases of microentrepreneurs' group discussions. The group reflection visualization method is a useful tool to analyze how entrepreneurs reflect selected topics in a regularly meeting peer-to-peer network group. The symbolic visualization can later be combined with a more content-focused analysis of how entrepreneurs reflect these topics.

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References

Argyris, C. & Schön, D. (1996). Organizational Learning II: Theory, Method and Practice. Reading, MA, USA: Addison-Wessley.

Arrow, H., McGrath, J.E., & Berdahl, J.L. (2000). Small Groups as Complex Systems. Formation, Coordination, Development, and Adaptation. Thousand Oaks, California: Sage Publications, Inc.

Blommaert, J. & Jin, D. (2010) Ethnographic fieldwork. A beginner's guide. Multilingual matters. Bristol, UK.

Boud, D., Cressy, P. & Docherty, D. (2006). Setting the scene for productive reflection. In D., Cressy, P. & Docherty, D. (eds.), Productive Reflection at Work: Learning for changing work. Routledge, London, pp. 3-10.

Brüderl, J., & Preisendörfer, P. (1998). Network support and the success of newly founded businesses. Small Business Economics, 10(3), 213-225.

Cheetham, G. & Chivers, G. (1998). The reflective (and competent) practitioner: A model of professional competence which seeks to harmonize the reflective practitioner and competency-based approaches. Journal of European Industrial Training, 22(7), 267 – 276.

Dodd, S. D., & Anderson, A. R. (2007). Mumpsimus and the mything of the individualistic entrepreneur. International Small Business Journal, 25(4), 341-360.

Engel, Y., Kaandorp, M., & Elfring, T. (2017). Toward a dynamic process model of entrepreneurial networking under uncertainty. *Journal of Business Venturing, 32*(1), 35-51.

Eskola, A. (2003). I know and I believe. Helsinki: Otava.

Fernandez, N., Dory, V., SteMarie, L-G., Chaput, M., Charlin, B. & Boucher, A. 2012. Varying conceptions of competence: An analysis of how health sciences educators define competence. Medical Education, 46, 357 - 365.

Feyerabend, P. (1978). Against Method (3. ed.). London: Verso.

Forsyth, D. R. (2018). Group Dynamics. United States: Cengage Learning Inc.

Genzuk, M. (2003). A Synthesis of Ethnographic Research. Center for Multilingual, Multicultural Research Digital Papers Series. Center for Multilingual, Multicultural Research, University of Southern California.

Goss, D. (2005). Schumpeter's legacy? Interaction and emotions in the sociology of entrepreneurship. Entrepreneurship Theory and Practice, 29(2), 205-218. doi:10.1111/j.1540-6520.2005.00077.x

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. American Journal of Sociology, 91(3), 481-510. doi:10.1086/228311

Hymes, D. (1964). Towards ethnographies of communication: The analysis of communicative events. In: Giglioli, P. (1972). Language and Social Context. Penguin Books. pp. 21-45.

Hänninen, K., Jokela, H., Kotavaara, O., Saarela, M., & Muhos, M. (2017). Building a knowledge-sharing network for micro-entrepreneurs in sparsely populated areas. European Academy of Management (EURAM) 2017 Conference

Jack, S. & Anderson, A. (2002). The effects of embeddedness on the entrepreneurial process. Journal of Business Venturing, 17(5), 467-487.

Johnstone , B. A. (2007). Ethnographic methods in entrepreneurship research. In H. Neergaard & J. P. Ulhøi (Eds.), Handbook of qualitative research methods in entrepreneurship (pp. 97-121). Cheltenham and Northampton: Edward Elgar.

Kemmis, S. Action Research and the Politics of Reflection. In D. Boyd, D. Keogh & D. Walber (Eds.) Reflection: Turning Experience into Learning. London: Kogan Page, 1985, pages 139-164.

Levi, D. (2014). Group Dynamics for Teams. Thousand Oaks, California: Sage Publications Inc.

Matikainen, J. (2008). Social media - what kind of socialism? Information Research. 31(4), 24–42.

Moon, J. (2002). The academic rationale for reflection on and learning from work experience. In P. Watton, J. Collings, & J. Moon (Eds.), Independent work experience: An evolving picture. (SEDA paper No. 114, pp. 57-61). Birmingham, UK: Staff and Educational Development Association.

Rampersad, H.K. (2004). Total Performance Scorecard: Lead the individuals, measure the results. Laatukeskus. Tampere: Tammer-paino.

Seibert, K. W. (1996). Experience is the best teacher, if you can learn from it. Real-time reflection and development. In D. T. Hall & Associates, The Career is Dead – Long Live the Career, 246–264. San Francisco: Jossey-Bass Publishers.

Selden, P.D., & Fletcher, D.E. (2015). The entrepreneurial journey as an emergent hierarchical system of artifact-creating processes. Journal of Business Venturing, 30(4), 603-615. doi://doi.org/10.1016/j.jbusvent.2014.09.002

Slotte S. (2003). Dialogue as a system intelligence - what is systemic intelligence? In: Bäckström,T.; Brummer, V.; Kling,T. and Siitonen, P. (ed.). Systemic Intelligence! Helsinki University of Technology, Systems Analysis Laboratory Research Reports B23, 125–146.

Ståhle P. & Grönroos M. (2000). Dynamic Intellectual Capital. Knowledge Management in Theory and Practice. Porvoo, WSOY.

Steyaert, C. (2004). The prosaics of entrepreneurship. In D. Hjorth, & C. Steyaert (Eds.), Narrative and discursive approaches in entrepreneurship. A second movements in entrepreneurship book (pp. 8-21). Cheltenham, UK: Edward Elgar.

Vygotsky, L. S. (1978). Mind in Society. Cambridge, MA: Harvard University Press.

What Happens when Kids Become Part of the Design Process? Kidz Design Lab Makes Products by Kids for Kids

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Abstract: The Kidz Design Lab (KDL) offers a unique way of enabling customers to take part in the design process. It is a lab, a methodology and a brand where kids develop products for kids, which illustrates the inclusion of end users as designers. As the customers themselves develop the product, the methodology emphasizes embedding the customer into the particular setting of the product rather than emphatizing, as emphasized by design thinking. Additionally, the methodology of the KDL extends the scope of the design process and incorporates the development of a business case, packaging design and marketing as well as negotiation with producers and distributors. In particular, the products are sold based on a presentation of the prototypes to distributors, rather than the final product. This enables KDL to severely reduce risk for the owner of the product as well as shorten the process from an initial idea until the product is in the store. Based on the documentation of the design process using a television crew, KDL enables storytelling and personification. The holistic thinking of the KDL has important implications for practitioners in that it shows the benefit of integrating different stakeholders related to product development. It also illustrates the benefit of product developers to develop their process facilitation skills in order to enable involvement of customers. As the product is sold before production, KDL allows for extensive risk reduction compared to traditional product development processes.

Keywords: Design education, Creativity, Children design education, Innovation, Unikia.com

1. Introduction

As cost advantages are being eroded, innovation stands out as a key source of competitive advantage for most companies and industries. In service industries, customers are often active co-creators, while for physical products they have mostly played a passive role as participants in focus groups. Customers have largely been central in defining needs and problems, which form a basis for new products and services, and in testing. This paper explores how customers can be co-creators in the entire development and launch process related to a physical product. In particular, Kidzdesignlab.com takes a fresh perspective on the involvement of kids in the development of real products. It is a lab, a methodology and a brand where kids develop products for kids.

Thus, this paper presents the methodology and a case analysis of what happens when the end user becomes the designer.

The purpose of this paper is to present the lab and explore its design methodology. In particular, documentary material is analyzed, the case described and the KDL methodology distilled. The paper presents an overview of the concept of the Kidzdesignlab.com, relates the concept to design thinking, and aims to show how the design methodology used in the lab adds to our current understanding and conceptualization of design practice from a design thinking point of view.

2. Theoretical background

Design thinking came out the design company IDEO (Brown, 2008, 2009) and has over the last 10 years developed into a key perspective in innovation and management theory – and gained interest in education (Johansson-Sköldberg, Woodilla, and Çetinkaya, 2013; Benson and Dresdow, 2014). Design thinking takes a human centered design ethos, which includes "a thorough understanding, through direct observation, of what people want and need in their lives and what they like or dislike about the way particular products are made, packaged, marketed, sold, and supported [Brown, 2008: p. 87]. It assumes that design should be involved in the big picture of society, that the design process is a collaborative effort spread among diverse participating stakeholders, and that ideas need to be "prototyped," and tried out early in the design process. Design thinking typically involves 3 main stages: inspiration, where information is collected, ideation where ideas are developed and implementation where solutions are tested and evaluated.

Design thinking forms an important basis for the education at Stanford University (Johansson-Sköldberg et al., 2013)[i], where they have developed the methodology into 5 steps to detail the process: Emphatize, define, ideate, prototype and test. In emphatizing it is about doing interviews, shadowing and developing a non-judgemental understanding of the problem, product or service at hand. In working on the defining phase, personas – typical persons from the understanding of interviews and shadowing - is developed. Key issues that are treated are role objectives, decisions, challenges and pain points. As a last stage of ideation, priorities and selections are made. As the ideas have been prioritized, mock-ups and storyboards are developed. The point is to fail and iterate fast. Finally, testing is done to see what works and not, and adjust. These steps are not linear and might take an iterative form depending on the insights gained as one moves along the path of the design process.

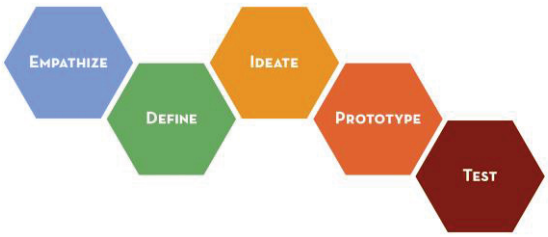

Figure 1: Overview of Design Thinking process, Stanford University Design School.

The key assumption in design thinking is that the designer owns the process, collects the data and is in charge. Limited research has been done to integrate the customers further and let them be in charge of the process, with the support of the designers. This paper takes such a position and develops a complementary perspective on design thinking. In particular, the paper asks: *What does the design process look like and what is the role of the customer under conditions of high customer involvement?*

3. Methodology

To develop an understanding of a case of high customer involvement in a design process, an inductive, qualitative research approach was used (Glaser and Strauss, 1967; Langley, 1999). In particular, a single extreme exemplar case study was used (Eisenhardt, 2007; Yin, 2017). The research was done based on the case of the Kidz Design Lab (www.kidzdesignlab.com) in Norway. The Kidz Design Lab (KDL) is a concept where kids between the ages 8 til 13 years old develop products for kids with the help of professional product designers (PPDs). The concept was developed in 2016 by a serial entrepreneur[1]. The main idea of the KDL is to involve kids in the whole product design process – from a decision to target a product category - until the product is present in the shelves of a distributor. The concept has been run for three different product segments during 2016 and 2017: kitchen, school and cleaning. In each of these segments, 6-7 product categories have been reinvented based on the perspective of the kids. For example, within the kitchen segment, the following products were targeted: frying pan, casserole, mixing bowl, knives, stool and heat gloves[2]. The process through which the products were made was filmed in full and an edited version is available online at https://www.facebook.com/kidzdesignlab/.

Each round of the KDL starts with the establishment of a co-operative partner, and the invitation of 50-60 kids to register for an audition. 6-7 kids are then selected to be part of the product development process. The remaining kids are included as test pilots that test prototypes and the final products. The kids selected for the lab find or are given a problem or product to work on. In turn - with extensive support from the PPDs that are part of the lab – the kids come up with ideas and prototypes. The prototypes are in turn developed into products that are sold to distributors, and launched to end customers within 40 weeks of the first audition.

Kidzdesignlab.com is now in its third season and more than 15 products have been developed, of which 10+ products have been launched into the market.

[1] The second author on this paper.
[2] Details on the products can be found here: https://kidzdesignlab.com/collections/all

All the work that has been done in KDL has been documented by Monster, a reputable and well known production and television company in Norway[3]. For each of the three series, Monster had a total of approximately 100 hours of footage. This documentation has been edited and made into a series of short films (5-10 minutes) that has been used as data. This data has been used to map out the design process and the role of the kids in each stage of the process. Additionally, interviews have been done with 3 of the kids, the entrepreneur and the key product designer involved in the series. The interviews were transcribed in full.

The data was analyzed in three phases, following the process of Gioa, Corley, and Hamilton (2013). In particular, in the first phase, all the films were seen through for familization by the first author. Secondly, an informant-centric approach was taken to understand the process and the role of the kids across the different phases of the process based on the participants descriptions. The outcome of this work was the write-up of a process description. As a final phase, a research-centric approach was taken, where the process was compared to the process described in design thinking to look for similarities and differences. The initial analysis was done by the first author, and this process was in turn reviewed and validated by the second author, which has first-hand knowledge of the case.

4. Findings

The design method of the KDL can be described in 9 main phases. Each of these phases are described below and summarized in Table 1. While not part of the design process as such, KDL is initiated based on an audition. During the audition, the kids test the products and try to understand what the limitations are for them as kids, when they are using products typically designed for adults. Thus, all the kids functioned as a focus group, and the insights from all the kids were leveraged to develop ideas for new products.

In the ideation phase, the kids primarily developed prototypes as a way to capture their thoughts. A traditional ideation phase did not seem suitable for the kids. Rather, going straight to the physical material and building prototypes seemed much more effective. Thus, the kids were testing and ideating at the same time. The prototypes were developed by the kids with the support from the professional product developers (PPDs).

After the prototypes were developed, the kids that came for the audition and wanted to were brought in as test pilots, offering their reactions and advice related to the products. In this stage, the kids took center stage and revised the products based on the comments that they got. In turn, the PPDs developed final prototypes in co-operation with potential factories. The kids were not involved in this more technical process.

After this technical process, the business developers related to the KDL developed a business case for each of the products, in some cases in discussion with the kids. In turn, the kids had to present their product and key numbers related to the business case to the board. The board then decided if the product would be accepted. All products were accepted, and this was more of a learning experience for the kids, than a real decision gate. Still, the kids did not know this, were nervous and prepared hard for the presentation.

After getting their products accepted by the board, the kids had to negotiate and discuss each product with the selected factory. This was also for the major part a learning experience and facilitated by the business developer at Kidz Design Lab.

Having done the presentation to the factories, the process was taken back to an ideation stage to work on the packaging of the product. This was done through a workshop facilitated by PPDs. The kids developed their own packaging solution in practice with the support of the professional. In turn, the packaging was prototyped and tested by the professional.

Before putting the product into production, the kids had to sell the products to the distributers, which was an important to enable distribution and for marketing. The business developer had arranged the meetings, but the kids themselves were presenting each of their products for the distributor to evaluate. Again, this was done more as a learning experience, but the meeting was realistic, and the kids worked hard to get their product into the assortment of the distributor.

[3] www.monster.as

Table 1: Overview of the design process of Kidz Design Lab

Quote	Phase name	Description	Role of kids	Phase in design thinking	Added insight
"My arm was hurting – I think I can make something better that make it easier for kids to do it." Selma, 9 years old	1) Testing of existing products	Understanding strengths and weaknesses	Primary actor	(Emp-hatize)	Actual kids as personas. No shadowing needed. Embedding over emphatizing.
"If you see that plasticine – It is to make the edges smoother and to make it easier to get into the frying pan." Emma, 10 years old	2) Proto-typing	Developing ideas; Prototyping and doing 3D design	Primary actor; 3D modelling done by professionals	Ideation, Proto-typing and testing	The kids easily developed crude prototypes. That was their way of ideating.
"You need some rubber on the handle of the knife so it does not fall down." Camilla, Test-pilot, 9 years old.	3) Testing	Testing of prototypes by a panel of kids	Primary actors	Testing	The kids on the test panel had massive amounts of insights that enabled further development of the products.
"Now, we will work with the producers and develop the product somewhat more so it can be presented to the board." Tom, Designer	4) Final prototyping	Final prototypes and 3D models developed by professional product designer (PPD).	Kids help summarize results from testing.	Proto-typing	There is no need to involve the customers in the technicalities of the product.
"The board has decided to invest in this product – we believe in you and the product". Sverre, Chairman of the Board, Kidz Design Lab	5) Business case	Business case for the product developed by professional business developer (PBD)	Kids present the product to a board	Imple-men-tation	The kids as enthusiastic promoters of the products.
"We think the price for the products is a little high. How can we reduce that?" June, 11 years old.	6) Negotiation	Negotiation with factories	Telephone call to factories; facilitated by PBD		Kids as protector of ethics in factories. Strong negotiators.
"…here there is a hole for the egg-cracker so it does not hurt the packaging." Hellek, 13 years old.	7) Packaging design	Developing a great packaging design.	Participation in workshop. Co-creation with a PPD	Ideation	Packaging expert as facilitator. Packaging as separate design process.
"If we are to take in your product something else that we has in our store needs to be taken out." Representative, distributor.	8) Marketing	Developing a PR and marketing strategy/sell product to distributors	Kids presented to distributors; facilitated by PBD	Imple-mentaton	The kids as primary persons representing the products.
"*The answer to what we [Norway] are to live off after the Oil is just what you have been part of right now."* Thorbjørn Røe Isaksen, Norwegian Minister of Knowledge at Launch.	9) Launch and post introduction initiatives	Formal launch of the product; Visit shops that sell the products/ communicate with end users	Primary actor; Facilitated by all stakeholders of the Kids Design Lab		Kids as owners of ideas and products.

The final part of the process was the launch of the product into the market, which included a launch party as well as a presentation of the products to end users in store of the distributers selling the products. In this phase, the kids were shown as the designers of the product.

5. Discussion

Kidz Design Lab (KDL) offers a new perspective on design, which is more comprehensive compared to existing conceptualizations following a design thinking perspective on design theory. Figure 2 gives an overview of the identified process. Building on this process, The KDL offers 5 key additions and insights compared to existing design thinking:

1. The scope of the process is broader than what is assumed in existing design thinking;
2. the involvement of the customer is more extensive then proposed by existing processes;
3. a separate ideation phase is offered for packaging;
4. products are sold before they are produced; and

5. the documentation and communication of the process represents a key part of the marketing – which is also part of the process.

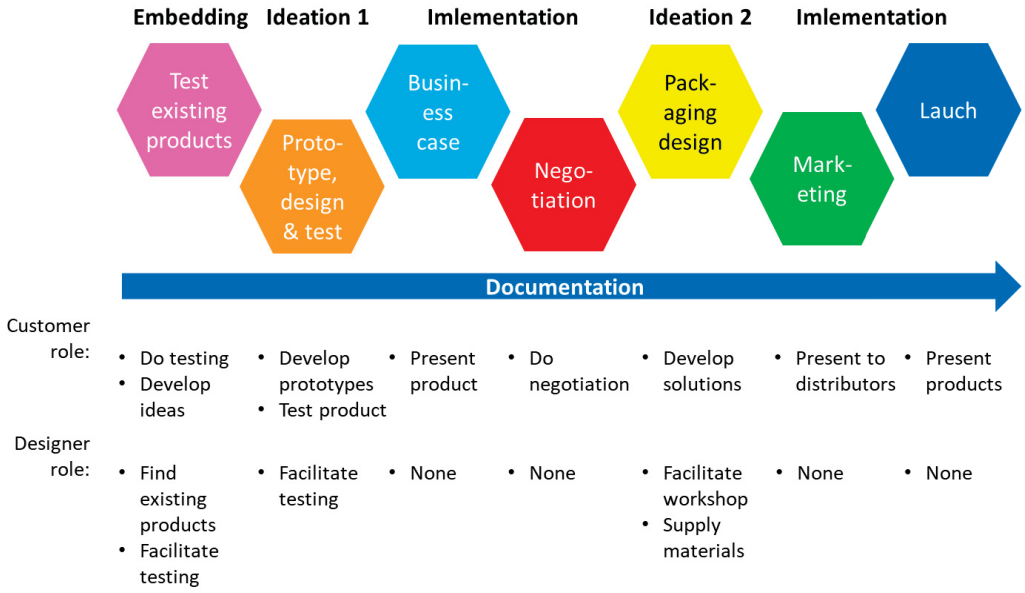

Figure 2: Kids Design Lab Process Overview

Design thinking involves a relatively narrow design process in which the key focus has been on development of a product or service [1], and much less emphasis has been put on the related initiatives that needs to be put in place to enable a product to be used and valued by customers. KDL offers such a broader perspective – including a number of activities that integrates the customer perspective more in depth. An overview of these additional process steps are shown in Figure 3 on the next page as adjacent bubbles beyond the traditional process of design thinking.

The KDL Methodology involves potential customers into the whole design process. While design thinking emphasizes developing empathy for the user to understand their problems (Brown, 2008), the KDL moves the customer to the centre of the product development process. As shown in figure 2 the customer in fact does more of the job related to the product compared to the designers. In every step of the process, the safety and wellbeing of the kids were however a top priority. The kids only worked with materials and methods appropriate for their age, and under strict supervision by the professional product designers.

The relevance, importance and functionality of packaging is recognized in the methodology and given special attention after a prototype of the product has been developed. In particular, the process reverts to the ideation phase for packaging after prototyping.

An interesting insight from the process is that the products are sold before they are actually produced. In particular, the products are sold based on a presentation of the prototypes rather than the final product. This enables KDL to reduce product risk and the need for financing during the product development process. Additionally, it enables a shorter time span from a product development initiative is initiated until a product is in the store.

Finally, the KDL enabled the development of the story related to every developer. Through documenting the process through film, the story becomes a key feature of the product. Thus, it enables storytelling and personification, which is often difficult to achieve for physical products. This story forms the foundation for the marketing of the product.

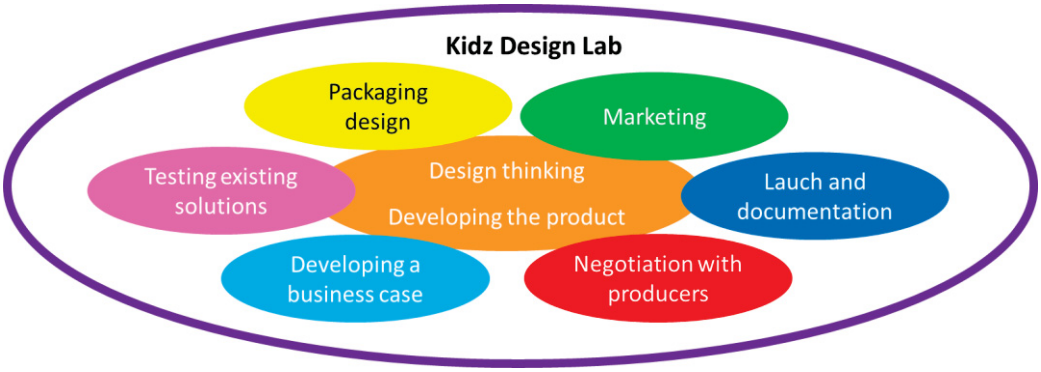

Figure 3: The scope of Kidz Design Lab

6. Conclusion

The KDL methodology represents a new perspective on user oriented product development. Key characteristics of the process concerns the cross-disciplinary approach, the extended scope, the pre-mature product sales and the integration of the design and marketing in the documentation and use of social media.

The holistic thinking of KDL has important implications for practitioners in that it shows the benefit of integrating different initiatives and stakeholders related to any product initiative. It also illustrates the potential for product developers to develop their process facilitation skills in order to enable true involvement of customers. Based on the sales of the product before production, the methodology offers potential for extensive risk reduction and cost cutting. Further, KDL offers interesting opportunities in developing education within product design, innovation and entrepreneurship.

References

Benson, J. and S. Dresdow, Design thinking: A fresh approach for transformative assessment practice. Journal of Management Education, 2014. 38(3): p. 436-461.

Brown, T., Design Thinking. Harvard Business Review, 2008. 86: p. 84–92.

Brown, T., Change by design: How design thinking creates new alternatives for business and society. 2009, New York: HarperCollins Business.

Eisenhardt, K. and M. Graebner, Theory building from cases: Opportunities and challenges. Academy of Management Journal, 2007. 50(1): p. 25-32.

Gioia, D.A., K.G. Corley, and A.L. Hamilton, Seeking qualitative rigor in inductive research notes on the gioia methodology. Organizational Research Methods, 2013. 16(1): p. 15-31.

Glaser, B.G. and A.L. Strauss, The discovery of grounded theory: Strategies for qualitative research. 1967, Chicago: Aldine.

Johansson-Sköldberg, U., J. Woodilla, and M. Çetinkaya, Design thinking: past, present and possible futures. Creativity and innovation management, 2013. 22(2): p. 121-145.

Langley, A., Strategies for theorizing from process data. Academy of Management review, 1999. 24(4): p. 691-710.

Yin, R.K., Case study research and applications: Design and methods. 2017: Sage publications.

[i] https://dschoolold.stanford.edu/sandbox/groups/designresources/wiki/36873/attachments/74b3d/ModeGuideBOOTCAMP2010L.pdf

Human Capital, Knowledge and Innovation in the European Union: A Cross-Country Analysis

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Abstract: Innovation is a subject of great importance for economic growth in developed countries. Researchers throughout the world are studying innovation in great detail, trying to determine the different parameters that influence its levels. Institutions, industry, academia, and governments, along with factors such as R&D, funding, infrastructure, markets, and businesses, have all been identified as crucial to innovation. However, it is human capital that is the most important source of innovation. Not only is human capital the carrier of knowledge but, what is more, it promotes the creation of new knowledge, as well as the adoption of new knowledge. The purpose of this paper is to examine relationships between human capital, the stock of knowledge, and the level of innovation in the EU countries. Research into this kind of dependencies is extremely difficult since the phenomena involved in them are intangible and requires advanced methods from the field of multidimensional analysis. The first part of the paper presents theoretical assumptions about human capital, knowledge and innovative processes. Then, empirical studies are conducted into the construction and estimation of a model describing the relationships between human capital, knowledge, and the level of innovation. The research uses the method of soft modelling developed by Herman Wold. Soft modelling allows users to examine links between variables which are not directly observable (latent variables). The conducted research has demonstrated that human capital and knowledge were important factors of innovation of the EU countries. The obtained results also made it possible to create rankings of the examined countries according to the stock of human capital, the stock of knowledge, and the level of innovation.

Keywords: human capital, knowledge, innovation, soft modelling, European Union

1. Introduction

Innovation is a subject of great importance for economic growth in developed countries. Researchers across the world are studying innovation in great detail, trying to determine the different parameters that influence its levels. Institutions, industry, academia and government, along with factors such as R&D, funding, infrastructure, markets, and businesses, have all been identified as crucial to innovation. However, the most important sources of innovation include human capital and the stock of knowledge available in a given country. The significance of human capital and knowledge for economic growth and development, including innovation-based growth, has been widely discussed by such authors as: Nelson and Phelps (1966), Lucas (1988), Romer (1989), Mankiw, Romer and Weil (1992), Benhabib and Spiegel (1994), Grossman and Helpman (1994), Jones (1995), Benhabib and Spiegel (2005).

The impact of human capital on economic growth is interpreted in two different ways. Firstly, human capital can be introduced as an additional input in an otherwise standard production function, linking aggregate output to the stocks of productive inputs (employment and physical capital) and to an index of total factor productivity. Secondly, human capital can be seen as a determinant of the rate of technological progress, through its interaction with the stock of technological knowledge. This involves specifying a total factor productivity function, which includes both variables related to human capital and R&D stock and an interaction term for these two variables (Teixeira and Fortuna, 2004).

In the Nelson and Phelps' model (Nelson and Phelps, 1966), where human capital and technology frontier analysis was introduced, economic growth is based on the level of human capital as well as on the level of technology improvisation. Countries that are far from technological frontiers could sustain their growth by adapting innovations. However, the speed of adaptation depends on the level of human capital in these countries. Countries that are close to technological frontiers could grow only by introducing innovations and this process is related to the level of human capital. In this model, human capital acts indirectly by increasing the level of technology used, thereby raising productivity (Aleknavičiūtė, Skvarciany and Survilaitė, 2016). More recent studies (in relation to Nelson's and Phel's research) claim that the closer a country is to the technological frontier, the greater the importance of innovation processes for their economic growth and that investment in human capital is more significant for the development of domestic innovations (Vandenbussche, Aghion and Meghir, 2006; Aghion and Darlauf 2009).

The purpose of this paper is to examine the relationships between human capital, the stock of knowledge and the level of innovation in the EU countries. Since the phenomena involved in this kind of dependencies are intangible, research into them is extremely difficult and requires advanced methods from the field of multidimensional analysis. Among such methods is Herman Wold's soft modelling. The method makes it possible to investigate those relationships between variables which are not directly observable (latent variables). The values of such variables cannot be gauged in a straightforward manner because of the lack of a widely accepted definition or a uniform method of their measurement.

This paper proposes the following research hypotheses:

H1a: Human capital is positively associated with the level of innovation in the EU countries.
H1b: The stock of knowledge is positively associated with the level of innovation in the EU countries.
H1c: Human capital is positively associated with the level of knowledge in the EU countries.

The obtained results allowed the author to realise the research objective and verify the proposed research hypotheses.

2. Research method

The soft modelling method (in the literature also referred to as PLS Structural Equation Modelling, PLS-SEM) was developed by Herman Wold (1980). The soft model consists of two sub-models: an internal one (structural model) and an external one (measurement model). The internal sub-model depicts the relationships between the latent variables on the basis of the assumed theoretical description. The external sub-model defines latent variables by means of observable variables (indicators). Indicators permit direct observation of latent variables and are selected according to the assumed theory or the intuition of the researcher. A latent variable can either be defined inductively (with the use of indicators): this approach is based on the assumption that the indicators make up latent variables (formative indicators), or deductively: when it is assumed that indicators reflect the respective theoretical notions (reflective indicators). Under the deductive approach, the latent variable, as a theoretical notion, is a starting point for a search of empirical data (the variable is primary to a given indicator). In the inductive approach, it is the indicators that are primary to the latent variable which they comprise. Both the approaches use latent variables that are estimated as the weighted sums of their indicators. However, depending on the definition, indicators should be characterized by different statistical properties – no correlation in the case of inductive definition and high correlation in the deductive one (Rogowski, 1990).

Estimation of the parameters of the soft model is performed by means of the partial least squares method (PLS). The description of the method can be found in: Boardman, Hui and Wold (1981), Lohmöller (1988), Westland (2005).

The quality of the model is assessed with the use of determination coefficients (R^2), established for each equation of the internal sub-model. The significance of the parameters is verified by means of standard deviations calculated with the Tukey's cut method ('2s' rule: a parameter significantly differs from zero if double standard deviation does not exceed the value of the estimator of this parameter). Also, in the case of the external sub-model, the estimators of factor loadings can be treated as the degree in which the indicators match the latent variable that they define. The prognostic property of the model can be evaluated by means of the Stone-Geisser test, which measures the accuracy of the forecast obtained as a result of the model's application as compared with a trivial forecast. The test statistics take values from the range $<-\infty,1>$. In the ideal model, the value of the test equals 1 (the forecasts are perfectly accurate in comparison with trivial forecasts). When the value of the test equals zero, the quality of the model's forecast and the trivial forecast tend to be identical.

Negative values indicate a low quality of the model – its weak predictive usefulness compared with a trivial forecast (Rogowski 1990).

Using the partial least squares method, it is possible to obtain the estimated values of latent variables, which can be regarded as the values of synthetic measures. They can be employed for linear ordering of the examined objects. These values depend not only on the external relationships, but also on the relationships be-

tween the latent variables which are assumed for the internal model. This means that the cognitive process hinges not merely on the definition of a given notion, but also on its theoretical description.

3. Specification of soft model

The model consisted of the following two equations:

$$INN = \alpha_{11} \cdot HC + \alpha_{12} \cdot KNOW + \alpha_{10} + \xi_1, \quad (1)$$

$$KNOW = \alpha_{21} \cdot HC + \alpha_{20} + \xi_2, \quad (2)$$

where *INN* – level of innovation, *HC* – human capital, *KNOW* – stock of knowledge, α_{ij} – structural parameters of the model (i = 1,2 and j = 0 ,1, ,2), ξ_i – random component.

The latent variables were defined by means of observable variables on the basis of the deductive approach, i.e. the latent variable, as a theoretical concept, serves as a starting point to identify empirical data. The statistical data come from the Eurostat, OECD, and European Innovation Scoreboard (EIS) databases. The indicators for the model were selected based on criteria of substantive and statistical nature. Using the available domestic and international literature, primary sets of indicators were developed. The methodologies used included, among others, "Knowledge Assessment Methodology" (Chen and Dahlman, 2005) and "European Innovation Scoreboard Methodology" (European Commission, 2017). Selection of the research period (2015) was determined by the availability of statistical data. The developed database was checked in terms of missing data. Data shortages were overcome by using naive prognosis, consisting in replacing lacking values with the values for the previous year.

From the statistical point of view, the following considerations were taken into account: variability of indicator values (coefficient of variation above 10 %) and analysis of the quality of the estimated model (ex post analysis). The indicators which passed substantive and statistical verification are presented in Table 1.

The latent variable *HC* is defined by seven indicators. Five of them regard education among population (potential human capital) and the education of employees (effective human capital), and in particular its level (*HC*1, *HC*2, *HC*3, *HC*4) and quality (*HC*5). The indicator *HC*7 refers to health, while *HC*6 reflects the problem of underutilization/wasting of human capital. The latent variable *KNOW* is defined by four indicators. The first one (*KNOW*1) reflects specialist knowledge embodied in the employed population. The second (*KNOW*2) indicates assessment of knowledge quality by external entities (high level of knowledge-based services proves that the assessment of the quality of these services is high, which also shows that the level of knowledge in a given country is assessed positively). The two remaining indicators (*KNOW*3 and *KNOW*4) reflect the quality and efficiency of the knowledge sector. The latent variable *INN* is defined by six indicators. Three of them (*INN*1, *INN*2, *INN*3) reflect the potential and efficiency of innovators, two (*INN*4 and *INN*6) concern cooperation among innovating entities. The indicator *INN5* reflects the inventive and technological achievements of a given country.

Three of the indicators which define the variable *HC* (*HC*5, *HC*6, *HC*7) are destimulants – the lower their values, the lower the level of the latent variable, i.e. the lower the stocks of human capital in a given country. All the other indicators of latent variables are stimulants – the higher their values, the higher the level of the latent variable.

Table 1: Indicators of latent variables

Symbol of latent variable	Symbol of indicator	Description of indicator	Type of indicator	Source of data
HC	*HC*1	Percentage of population aged 15-64 having completed tertiary education (%).	Stimulant	Eurostat
	*HC*2	Percentage of population aged 25-64 participating in education and training (%).	Stimulant	Eurostat
	*HC*3	Percentage of employees aged 15-64 having completed tertiary education (%).	Stimulant	Eurostat
	*HC*4	Percentage of employees aged 25-64 participating in education and training (%).	Stimulant	Eurostat
	*HC*5	Underachievement in reading, maths or science (% of 15-year-old students).	Destimulant	OECD

Symbol of latent variable	Symbol of indicator	Description of indicator	Type of indicator	Source of data
	*HC*6	Young people neither in employment nor in education and training (% of population aged 15 to 29).	Destimulant	Eurostat
	*HC*7	Death rate due to chronic diseases (number per 100 000 persons aged less than 65).	Destimulant	Eurostat
KNOW	*KNOW*1	Employment in knowledge-intensive activities (% of total employment).	Stimulant	EIS
	*KNOW*2	Knowledge-intensive services exports (% of total services exports).	Stimulant	EIS
	*KNOW*3	Scientific publications among the top 10% most cited publications worldwide (percentage of total scientific publications of the country).	Stimulant	EIS
	*KNOW*4	International scientific co-publications (per million population).	Stimulant	EIS
INN	*INN*1	SMEs introducing product or process innovations (% of SMEs).	Stimulant	EIS
	*INN*2	SMEs introducing marketing or organisational innovations (% of SMEs).	Stimulant	EIS
	*INN*3	SMEs innovating in-house (% of SMEs).	Stimulant	EIS
	*INN*4	Innovative SMEs collaborating with others (% of SMEs).	Stimulant	EIS
	*INN*5	PCT patent applications (per billion GDP in PPS).	Stimulant	EIS
	*INN*6	Public-private co-publications (per million population).	Stimulant	EIS

The model was estimated using the PLS method, which enables simultaneous estimation of the external model parameters (weights and factor loadings) and the internal model parameters (structural parameters). The estimation was conducted with the help of PLS software. The software was developed by Prof. J. Rogowski from the Faculty of Economics and Management, University of Białystok and is free of charge.

4. Results of soft model estimation

The results of the estimation of the external model are presented in Table 2. Each weight represents the relative share of a given indicator's value in the estimated value of a latent variable. Factor loadings are coefficients of correlation between indicators and latent variables, thus indicating the degree and direction in which the variability of an indicator reflects the variability of a latent variable. The ordering of indicators according to weights is performed when a latent variable is defined inductively. In the deductive approach, which was applied in this research, it is the factor loadings that are interpreted. The following interpretation of the r_{ij} factor loading was assumed (: $|\pi_{ij}| < 0.2$ – no correlation, $0.2 \leq |\pi_{ij}| < 0.4$ – weak correlation, $0.4 \leq |\pi_{ij}| < 0.7$ – moderate correlation, $0.7 \leq |\pi_{ij}| < 0.9$ – strong correlation, $|\pi_{ij}| \geq 0.9$ – very strong correlation.

In terms of the signs of the estimated parameters, the results are consistent with the expectations. Stimulants have positive estimations of weights and factor loadings and destimulants have negative ones. Moreover, all the parameters are statistically significant, in accordance with the "2s" rule (see table 2, column "Standard deviation").

Table 2: Estimations of external relationships of soft model

Symbol of latent variable	Symbol of indicator	Weight	Standard deviation	Factor loading	Standard deviation
HC	*HC*1	0.1872	0.0032	0.7589	0.0038
	*HC*2	0.2270	0.0020	0.9036	0.0009
	*HC*3	0.1330	0.0037	0.5740	0.0045
	*HC*4	0.2219	0.0017	0.9004	0.0008
	*HC*5	-0.1443	0.0012	-0.6535	0.0011
	*HC*6	-0.1680	0.0023	-0.7077	0.0005
	*HC*7	-0.2382	0.0072	-0.6866	0.0042
KNOW	*KNOW*1	0.2580	0.0007	0.8989	0.0004
	*KNOW*2	0.2351	0.0026	0.8657	0.0012
	*KNOW*3	0.2981	0.0029	0.9376	0.0005
	*KNOW*4	0.3161	0.0058	0.9018	0.0015
INN	*INN*1	0.2043	0.0223	0.9285	0.0470
	*INN*2	0.2083	0.0236	0.8408	0.0252
	*INN*3	0.1922	0.0232	0.9001	0.0381
	*INN*4	0.1735	0.0142	0.7914	0.0164
	*INN*5	0.2026	0.0130	0.7747	0.0237
	*INN*6	0.2074	0.0153	0.8099	0.0204

The latent variable *HC* proved to be very strongly associated with two indicators related to population (*HC*2: 0.9036) and employees (*HC*4: 0.9004) participating in education and training. Apart from this, the variable was strongly reflected by the indicators: "Percentage of population aged 15-64 having completed tertiary education" (*HC*1: 0.7589) and "Young people neither in employment nor in education and training" (*HC*6: -0.7077). Three indicators were moderately correlated with the variable *HC*. The latent variable *KNOW* was very strongly correlated with two indicators reflecting the efficiency of the knowledge sector (*KNOW*3: 0.9376, *KNOW*4: 0.9018). Two remaining indicators were strongly associated with the variable. The latent variable *INN* was at least strongly reflected by its defining indicators.

The outcomes of the internal model estimation are illustrated by the following equation:

$$\hat{INN} = 0{,}2403 \cdot HC + 0.6284 \cdot KNOW + 0.2191 \qquad R^2 = 0.71 \qquad (3) \text{ and}$$
$$(0.0826) \quad (0.0710) \qquad (0.1422)$$

$$\hat{KNOW} = 0.8546 \cdot HC + 2.6909 \qquad R^2 = 0.73 \qquad (4).$$
$$(0.0008) \quad (0.0521)$$

The brackets contain standard deviations calculated by means of the Tukey's test. The structural parameters are statistically significant ("2s" rule). The values of the coefficients of determination R^2 justify the conclusion that, to a high extent, the independent variables determine the variability of the dependent variables. The values of the Stone-Geisser test, which verifies the soft model in terms of its predictive usefulness (see Table 3) are positive, which proves the model's high prognostic quality.

Table 3: Values of the Stone-Geisser test

Symbol of indicator	Value of S-G test
*INN*1	0.4628
*INN*2	0.4478
*INN*3	0.3894
*INN*4	0.3317
*INN*5	0.4138
*INN*6	0.4399
General value	0.4178

The equation (3) indicates a positive and statistically significant impact of both human capital and the stock of knowledge on the level of innovation in the EU countries in 2015. This means that those countries which reported higher stocks of human capital also had higher levels of innovation. Moreover, countries with higher stocks of knowledge had higher levels of innovation in that year. The impact of knowledge was more than 2.5 times stronger than the impact of human capital. The equation (4) shows that human capital had a positive, statistically significant impact on the stock of knowledge in the EU countries in 2015. This means that those countries which reported higher stocks of human capital also had higher stocks of knowledge in that year.

Basing on the synthetic measures of the variables *HC*, *KNOW*, and *INN* which were obtained during modelling, three rankings of the studied countries were created. The results are shown in Table 4.

Table 4: Rankings of EU countries according to the stock of human capital, the stock of knowledge, and the level o innovation in 2015

Country	*HC*	*KNOW*	*INN*
Austria	8	11	5
Belgium	13	7	1
Bulgaria	27	26	25
Croatia	25	25	20
Cyprus	14	9	16
Czech Republic	19	20	18
Denmark	2	2	4
Estonia	9	16	22
Finland	3	8	3
France	7	12	10
Germany	15	10	7
Greece	22	19	13
Hungary	24	21	24
Ireland	10	5	8

Country	*HC*	*KNOW*	*INN*
Italy	23	13	14
Latvia	21	22	26
Lithuania	17	28	17
Luxembourg	4	1	11
Malta	18	14	19
Netherlands	5	4	6
Poland	20	24	27
Portugal	16	18	15
Romania	28	27	28
Slovakia	26	23	23
Slovenia	11	15	12
Spain	12	17	21
Sweden	1	3	2
United Kingdom	6	6	9

The next step consisted in dividing the countries into typological groups according to the stock of human capital, the stock of knowledge, and the level of innovation. Countries classified into a given typological group were characterized by a similar level of the studied phenomenon. The results of the grouping are presented in Figures 2, 3, and 4. The boundaries between the groups were established on the basis of the arithmetic mean and standard deviation of the synthetic measure z_i (equal to 0 and 1, respectively, for each of the latent variables). The groups are as follows: group I (very high level of latent variable): $z_i \geq 1$, group II (high level of latent variable): $0 < z_i \leq 1$, group III (medium and low level of latent variable): $-1 < z_i \leq 0$, group IV (very low level of latent variable): $z_i \leq -1$.

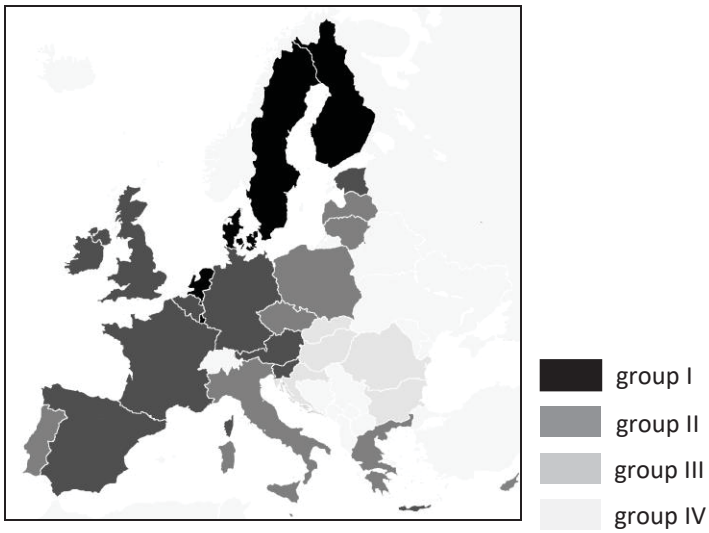

Figure 2: The EU countries according to stock of human capital in 2015

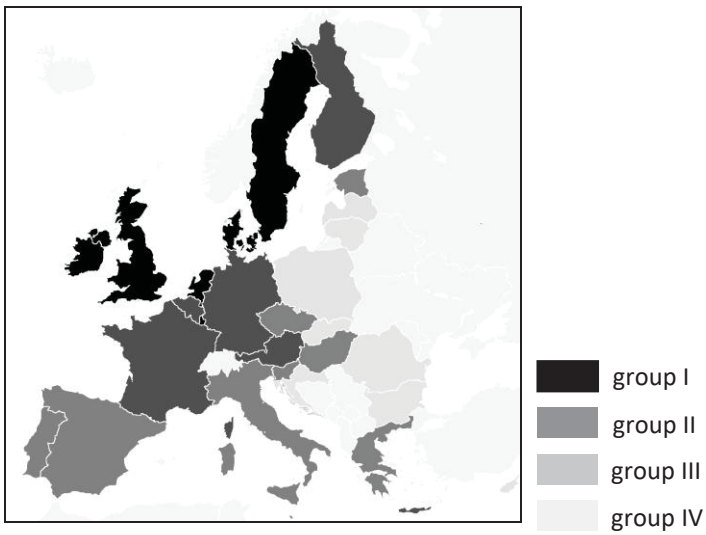

Figure 3: EU countries according to stock of knowledge in 2015

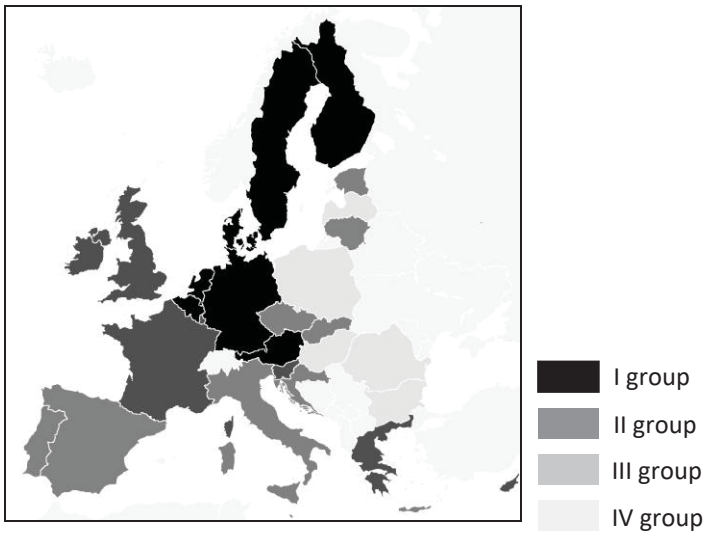

Figure 4: EU countries according to level of innovation in 2015

5. Conclusion

The conducted research leads to the following conclusions. Both human capital and the stocks of knowledge had a positive, statistically significant influence on the level of innovation in the EU countries. Although knowledge was the more important factor, human capital was a very strong determinant of the size of the stock of knowledge. Therefore, human capital also had an indirect impact on the innovativeness of the EU countries as a vehicle of knowledge and an indispensable link in creation and absorption of new knowledge.

This conclustions are consistent with the results of other empirical studies: Dakhli and De Clercq (2007), Aleknavičiūtė, Skvarciany and Survilaitė (2016).

The results of external sub-model showed that education and training were the most important components of human capital. The quality and efficiency of the knowledge sector turned out to be the factor that the most strongly determined the stock of knowledge in a given country. The level of innovation was strongly related to the potential and efficiency of innovators, cooperation among innovating entities and the inventive and technological achievements of a given country. The conclusions formulated above can be used in practice by governmental institutions, for example for planning the economy policy as well as innovation policy of countries.

The obtained results also made it possible to create rankings of the examined countries according to the stock of human capital, the stock of knowledge, as well as the level of innovation. In all of them, the highest ranked countries included: Sweden (*HC*: 1st position, *KNOW*: 3rd position, *INN*: 2nd position) and Denmark (*HC*: 2nd position, *KNOW*: 2nd position, *INN*: 4th position). The countries with the lowest rankings were Romania (*HC*: 28th position, *KNOW*: 27th position, *INN*: 28th position) and Bulgaria (*HC*: 27th position, *KNOW*: 26th position, *INN*: 25th position). The leading position of Belgium in the ranking of innovativeness stemmed from the fact that all the indicators which defined the latent variable *INN* had high values in that country (e.g. *INN*1 and *INN*4 – the highest values, *INN*3 – 2nd value). The results of the level of innovation ranking present very high compliance with the EIS ranking (European Commission, 2017) and high compliance with the Global Innovative Index ranking (Cornell University, INSEAD and WIPO, 2016). Spearman's rank correlation coefficients are 0.89 and 0.77 respectively.

Very high stocks of human capital were observed in the following countries: Sweden, Denmark, Finland, Luxembourg, and Netherlands. The group with high stocks of human capital comprised nine countries: United Kingdom, France, Austria, Estonia, Ireland, Slovenia, Spain, Belgium, and Cyprus. Nine countries were classified as economies with medium and low stocks of human capital: Germany, Portugal, Lithuania, Malta, Czech Republic, Poland, Latvia, Greece, and Italy. Five countries were characterised by very low stocks of human capital: Hungary, Croatia, Slovakia, Bulgaria, and Romania.

Six countries proved to be economies with very high stocks of knowledge: Luxembourg, Denmark, Sweden, Netherlands, Ireland, and United Kingdom. The group with high stocks of knowledge comprised: Belgium, Finland, Cyprus, Germany, Austria, and France. Group III – countries with medium and low stocks of knowledge – consisted of: Italy, Malta, Slovenia, Estonia, Spain, Portugal, Greece, Czech Republic, and Hungary. Low stocks of knowledge were reported by Latvia, Slovakia, Poland, Croatia, Bulgaria, Romania, and Lithuania.

Seven countries made up the group with a very high level of innovation: Belgium, Sweden, Finland, Denmark, Austria, Netherlands, and Germany. The group of countries with high levels of innovation included: Ireland, United Kingdom, France, Luxembourg, Slovenia, and Greece. The third group of medium- and low-level of innovation was comprised of: Italy, Portugal, Cyprus, Lithuania, Czech Republic, Malta, Croatia, Spain, Estonia, and Slovakia. Very low levels of smart growth were recorded in: Hungary, Bulgaria, Latvia, Poland, and Romania.

References

Aleknavičiūtė, R., Skvarciany, V. and Survilaitė, S. (2016) "The Role of Human Capital for National Innovation Capability in EU Countries", Economics and Culture, Vol. 13, No. 1, pp 114–125.

Aghion, P. and Durlauf, S. N. (2009) "From Growth Theory to Policy Design", Commission on Growth and Development, Working Paper, No. 57, World Bank Institute, Washington.

Benhabib, J. and Spiegel, M. M. (1994) "The role of human capital in economic development: Evidence from aggregate cross-country data", Journal of Monetary Economics, Vol. 34, No. 2, pp 143–173.

Benhabib, J. and Spiegel, M. M. (2005) Human Capital and Technology Diffusion, In: Aghion P. and Durlauf, S. (eds) Handbook of Economic Growth, Vol. 1, pp 935–966, Elsevier North-Holland, Amsterdam.

Boardman, A. E., Hui, B. S. and Wold, H. (1981) "The partial least squares-fix point method of estimating interdependent systems with latent variables", Communications in Statistics - Theory and Methods, Vol. 10, No. 7, pp 613–639.

Chen, D. H. C. and Dahlman, C. J. (2005) "The Knowledge Economy, the KAM Methodology and World Bank Operations", DC 20433, World Bank Institute, Washington.

Cornell University, INSEAD and WIPO (2016) The Global Innovation Index 2016: Winning with Global Innovation, Ithaca, Fontainebleau, and Geneva.

Dakhli, M. and De Clercq, D. (2007) "Human capital, social capital, and innovation: a multi-country study", Entrepreneurship & Regional Development, Vol. 16, No. 2, pp 107–128,

European Commission (2017) Innovation Union Scoreboard 2017.

Grossman, G. M. and Helpman, E. (1994) "Endogenous Innovation in the Theory of Growth, Journal of Economic Perspectives, Vol. 8, No. 1, pp 23–44.

Jones, C. I. (1995) "R&D-Based Models of Economic Growth", Journal of Political Economy, Vol. 103, No. 4, pp 759–84.

Lohmöller, J. B. (1988) "The PLS Program System: Latent Variables Path Analysis with Partial Least Squares Estimation", Multivariate Behavioral Research, Vol. 23, No. 1, pp 125–127.

Lucas, R. E. (1988) "On the Mechanics of Economic Development", Journal of Monetary Economics, Vol. 22, No. 1, pp 3–42.

Mankiw, N. G., Romer, D. and Weil, D. N. (1992) "A contribution to the empirics of economic growth", Quarterly Journal of Economics, Vol. 107, No. 21, pp 407–437.

Nelson, R. R. and Edmund S. P. (1966). "Investment in Humans, Technological Diffusion and Economic Growth" American Economic Review, Vol. 56, No. 2, pp 69–75.

OECD (2001) The Well-being of Nations: The Role of Human and Social Capital, Paris.

Rogowski, J. (1990) Modele miękkie. Teoria i zastosowanie w badaniach ekonomicznych, University of Bialystok Publishing House, Białystok.

Romer, P. M. (1989) "Human capital and growth: Theory and evidence", Carnegie-Rochester Conference Series on Public Policy 32, pp 251–286.

Teixeira, A.A.C. and Fortuna, N. (2004) "Human capital, innovation capability and economic growth in Portugal, 1960-2001", Portuguese Economic Journal, Vol. 3, No. 3, pp 205–225.

Westland, J. C. (2015) Partial Least Squares Path Analysis, In: Structural Equation Models. Studies in Systems, Decision and Control, Vol. 22, Springer, Cham, pp 23–46.

Wold, H. (1980) "Soft modelling: Intermediate between Traditional Model Building and Data Analysis", Mathematical Statistics, Vol. 6, No. 1, pp 333–346.

Vandenbussche, J., Aghion, P. and Meghir, C. (2006) "Growth, Distance to Frontier and Composition of Human Capital", Journal of Economic Growth, Vol. 11, No. 2, pp 97–127.

The Impact of Crowdfunding on Entrepreneurial Value Creation: Differences between Social, Cultural and Commercial-Oriented Projects

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Abstract: The aim of this study is to analyse the impact of crowdfunding in the development of innovative projects related to entrepreneurial value creation in Portugal. Although the literature on crowdfunding is growing, our knowledge in this area is still incipient regarding its impacts on the value creation and on the differences between projects of different nature, namely between social-oriented, cultural-oriented and business/commercial-oriented projects. In this analysis, the divide between social- cultural- and commercial-oriented projects is considered. The empirical research covered the identification and characterisation of the oldest crowdfunding platform operating in Portugal and an in-depth analysis of the entrepreneurial projects successfully funded from the creation of the platforms until 31th December 2016. The results from this study show that the concept of crowdfunding is still little explored in the country, specifically for entrepreneurial commercial-oriented value creation. They also highlight that commercial-oriented projects tend to exceed the target investment in a more marked way compared to the other types of projects.

Keywords: Crowdfunding, social-oriented projects, commercial-oriented projects, cultural oriented projects.

1. Introduction

The concept of crowdfunding has evolved from the broader idea of crowdsourcing, i.e. a decentralized problem-solving and production model, where the online crowd is used to obtain services, ideas, feedback and solutions to develop corporate activities (Howe 2008; Kleeman et al. 2008; Belleflamme et al. 2013).

In the particular case of crowdfunding, the objective is to obtain financing for a project or a venture without resorting to standard financial intermediaries by using online communities, where each individual can participate with a small contribution of the total funding amount (Belleflamme et al. 2013).

Although some authors consider crowdfunding as a relatively new concept (Banhatti 2016; Golić 2014), others recognize that the notion of crowdfunding is not new, going back, at least, to the 19th century (Attuel-Mendes 2014; Beck et al. 2016). Nonetheless this divide, scholars agree on the fact that its usage has intensified in the past ten years or so, namely after the signature of the JOBS Act (Jumpstart Our Business Startup), in 2012 in the USA, that regulates equity-based crowdfunding. Crowdfunding has become effective and available worldwide, and it is increasing rapidly in the last years (Banhatti 2016).

The literature on crowdfunding has also increased in the last years, both in terms of published academic papers and in reports by different types of agencies and associations.

Scholars show that this type of funding can fill the gap in accessing to capital in the early stage creation of an innovative project, when capital needs are higher and traditional funding sources are less receptive (Deffains-Crapsky & Sudolska 2014; Manchanda & Muralidharan 2014).

Despite the growth of knowledge on the process and types of crowdfunding, as well on its role in financing new ideas and projects, there is still a need to go deeper in the understanding of crowdfunding impact on the value creation and on the differences between projects of different nature, namely between social-oriented, cultural-oriented and business/commercial-oriented projects (Bruton et al. 2015; Moritz & Block 2016).

This paper targets this gap, by studying the use of a Portuguese crowdfunding platform – PPL. It analysis the successful campaigns until 2016 and assesses differences between social-oriented, cultural-oriented and commercial-oriented projects.

2. Conceptual background

2.1 Crowdfunding: concept and types

It is possible to find several definitions of crowdfunding in the literature. Golić (2014) considers that crowdfunding is a way of raising money from a quite large number of investors via the Internet and using an open call, so that the entrepreneurs can collect funds to sponsor their projects. Lehner (2013) defines crowdfunding as a procedure of supporting new and original projects. Hooghiemstra and De Buysere (2016: 136) consider that "crowdfunding can be defined as a collective effort from a large number of individuals, who support individual projects and businesses with small contributions initiated by entrepreneurs (SMEs) or organisations".

Medeiros (2015) calls our attention to the fact that the crowdfunding definition can change according to two different sides – the supporter and the promoter. Ordanini et al. (2011) focus on crowd side, by considering that crowdfunding can be described as a phenomenon, in which diverse consumers gather, often by the Internet, in order to finance other people and organisations' projects. By the other hand, Belleflame et al. (2014: 588) highlight the promoters' side, considering that "crowdfunding involves an open call, mostly through the Internet, for the provision of financial resources either in the form of donation or in exchange for the future product or some form of reward to support initiatives for specific purposes".

Regardless of these differences, scholars recognize the growing interest in this kind of financing, as an alternative to the more common sources of finance (Gierczak et al. 2016; Moritz & Block 2016). For example, Banhatti (2016) agrees that crowdfunding is growing as a powerful instrument used by common people to find a different way of sponsoring their new and original ventures outside standard systems. To Mollick and Robb (2016) crowdfunding enables access to financial resources to exploit and disseminate innovative projects to everyone.

Relatively to crowdfunding types, multiple contributions have emerged. Gierczak et al. (2016) consider that crowdfunding types rely on some kind of benefit provided for the sponsors' finance. In fact, some authors underline that one of the most important motivations in crowdfunding is the expected returns that crowdfunders get in exchange for their finance (Hemer 2011; Thürridl & Kamleitner 2016). These returns can be of different types. De Buyser et al. (2012) distinguish three types of returns: social, financial and material.

On the other hand, Hemer (2011) identifies seven types: donation, sponsoring, pre-ordering, membership fees, crediting, lending, and profit-sharing.

According to the type of return, it is possible to classify the type of crowdfunding. Lehner et al. (2015) stress that crowdfunding varies from a simple way of pre-financing to full grown debt or equity investments although they are usually small guarantees that can developed into exorbitant amount of money. Belleflamme et al. (2014) establish two poles: pre-ordering and profit-sharing. However, most authors tend to distinguish four type of crowdfunding: donation-based (crowddonation), reward-based (subsuming rewards and pre-ordering, usually the rewards are a tangible product related to the campaign), capital-based (equity crowdfunding or crowdinvesting) and credit-debt-based (crowdlending) (Belleflame et al., 2015; De Buyser et al., 2012; Gajda & Walton, 2013). Recently, Banhatti (2016) not only considers the existence of these four main models but also highlights the emergence of hybrid models, which combine basic models. In most cases, crowdfunding platforms tend to rely on a single model, but some platforms exploit several models. The most common combination is the reward and donation models on a single platform. Scholars tend to agree that reward-based crowdfunding is the most common, and the most famous platforms, like Kickstarter and IndieGogo, belong to this type.

2.2 Crowdfunding as an instrument to fund innovative projects

Business ideas with a particularly innovative nature have difficulties in access to funding, and therefore face a financing gap, which is due mainly to the existence of market failures. These failures are related to the existence of information asymmetry that complicates the measurement of risk, both for the projects promoters and for the project. Issues of adverse selection and moral hazard arise, which normally represent a greater difficulty in obtaining funding and/or the payment of higher interest rates (Hall & Lerner, 2010). This gap is particularly wide in the case of SMEs (Müller & Zimmermann 2006).

Crowdfunding is a possible solution for reducing this gap. Deffains-Crapsky and Sudolska (2014) found a positive relationship between innovation and crowdfunding. The authors put the emphasis on the funding of radical innovations, which, due to the high degree of uncertainty and the high costs of R&D, face difficulties in financing through traditional financial intermediaries. The authors suggest that the capital-based crowdfunding could be used in a consumer-investor perspective, where the "crowdfunders" analyse the project first in a consumer optics and then decide to invest or not, giving a prediction on the possibility of success of the project. This concept would help to reduce the risk of investment, due to the degree of acceptance that the project could get in the "crowd" and attract future investors.

Manchanda and Muralidharan (2014) argue that enterprises in the start-up phase, when the capital requirements are greater, can largely benefit from crowdfunding. They consider that venture capital institutions, which are very selective, cease to invest in many innovative ideas. Venture capitalist can also profit from the growth of crowdfunding, notably in terms of finding promising start-ups and of accessing all the information that the "crowd" might provide. These authors add that some venture capitalists already invest in crowdfunding platforms or create their own, concluding that the two forms of funding, in the future, will "go hand in hand".

Also Agrawal et al. (2013) claim that crowdfunding is causing a change in the way of raising capital and increases the total amount of funding available for new innovative ventures. As an example of success, they refer to the innovative design of the "Pebble" Watch, which through the crowdfunding managed to raise in just 2 hours 100,000 dollars and closed the campaign 37 days later with more than 10 million dollars, collected from almost 70 thousand people, being considered one of the major successes in the history of Kickstarter.

The difficulty of obtaining funding for innovative projects tends to be higher when the project has a social nature. As social projects prioritize social change above private wealth creation, this can create tension in the application of resources: being economically viable while in pursuit of a social mission can impose tension on the available resources (Doherty et al. 2014). Therefore, access to funding can be a higher challenge, when compared to business/commercial-oriented projects.

Projects targeting social innovation envisage “novel ideas that create value which are social in both their ends and their means” (Murray et al. 2010: 3). Social innovations can be defined as new products, services and models that have been developed to meet social needs (Mulgan et al. 2007). These projects can have a major impact to communities and societies, by adopting business models to offer creative solutions to complex and persistent social problems (Zahra et al. 2009).

Thus, social-oriented project are often related to social entrepreneurship or social enterprises. Even though there is no single agreed upon definition of social entrepreneurship, one key ingredient is present in all of the definitions: the striving for societal goals (Austin et al. 2006). Social entrepreneurs have an ambition that goes beyond pure economic reasoning. They look for societal value-added and combine societal goals with entrepreneurial attitude.

Still the benefits of crowdfunding go beyond the access to financial resources, and include aspects like: use the campaign as a marketing tool, attract attention to the project even after the campaign’s conclusion, obtain genuine feedback on the idea and improve it during the process, advertise "niche ideas", and turn investors into loyal clients (Manchanda & Muralidharan 2014).

2.3 Factors affecting the success of a crowdfunding campaign

Crowdfunding platforms are online sites linking project promoters/fundraisers and project supporters/funders. The promoters are those who, through a campaign, intend to obtain funding and the funders are those who invest financial resources in the project (Gerber & Hui 2013). The fact that any person or entity can easily become a funder but specially a promoter has allowed the rapid mediatisation and growing of this type of funding.

To obtain the necessary funding, and therefore to have a successful campaign, the promoters, through the platforms, publish the idea/project/experience, describing the objective, a short history, how the investment will be applied, among other information. In this sense, the campaigns made available by promoters are similar to products/services/experiences. In the case of reward-based crowdfunding, the campaign is

successful when it reaches the goal. Usually reward-based platforms use an "all-or-nothing" mechanism, meaning that the promoter must pay back all the money if the campaign fails, but the total funding can exceed the initial goal.

Mollick (2014) identifies some success factors of crowdfunding campaigns based on the analysis of donations and reward platforms. The results of the study indicate that the quality, the geography and meeting deadlines are decisive factors of success, as well as the social relations of the promoters. The author also considers that the project's innovative component of value creation will increase the interest of investors, to the extent that this represents a quality factor. In this way, innovative projects are most likely to be successful in attracting the interest of the crowd and in obtaining financing.

Previous studies have found mixed evidence regarding the relation between the number of supporters and the success of the project. While Kim et al. (2015) found no significant relation between the two variables, Robertson and Wooster (2015) found a negative impact of supporters in the first day of the campaign on its success. This last study also found a positive impact of the number of Facebook shares on the campaign success.

Medeiros (2015) identifies the success factors of crowdfunding campaigns in Portugal, stressing the role of campaign quality, platforms effort and supporters' encouragement as essential to achieve the success. Then, based on information available in platforms, the author lists the following factors as the means to guarantee a well-succeeded campaign: transparency, divulgation, presentation, enthusiasm, monitoring, personalization and counterparts.

3. Empirical setting and data

3.1 Crowdfunding in Portugal

Crowdfunding arrived to Portugal in 2011, through the creation of four different platforms: PPL, Massivemov, Redebiz and Zarpante. In 2012, three new platforms have appeared in the country: Novo Banco Crowdfunding, Olmo, and Crowdfunding Networks. The difficulty faced by firms in getting initial funding for projects (namely start-ups) and the financial crisis may have played a crucial role to crowdfunding market expansion (Medeiros, 2015; Brüntje & Gajda, 2016).

Notwithstanding the creation of several platforms in 2011 and 2012, crowdfunding did not grow in Portugal as fast as in other countries and some platforms cessed their activity. The PPL and Novo Banco platforms continue to operate (see Table 1) and its activity is similar to the large global platforms like Kickstarter or Indiegogo, based in the reward-type of crowdfunding. Novo Banco is only dedicated to social projects and covers reward and donation types.

More recently, other types of crowdfunding platforms have been created. One of these platforms is Raize that, despite the start of activity in 2014, only recently was noted by the amount raised in campaigns - more than 11 million euros. Based on Crowdinvesting, more specifically lending crowdfunding, Raize is dedicated to loan to SMEs and to start-ups. Companies request a financial loan of a specified amount and investors present proposals for partial or total loans with associated interest rates. Companies can accept or reject the investors' proposals.

Besides the Raize platform, the Housers platform is also active in Portugal, dedicated to the Crowdinvesting, but in the property (Equity) type. It has begun its activity in Spain and currently it is also present in Italy.

Housers is devoted to investing in real estate by means of lease, construction, reconstruction or works of art. In this case, the financiers acquire property titles corresponding to a part thereof and depending on the purpose of the project. The investor obtains the monthly income (lease), at the end of the period (in the sale of the property) or even for the sale of the titles.

Table 1: Active Crowdfunding platforms in Portugal

Platform	Starting year	Type	Amount raised (€)	Successful Campaigns	Success rate
PPL	2011	Reward	2 647 531	810	45%
Novo Banco	2012	Donation & Reward	433 000	104	59%

Platform	Starting year	Type	Amount raised (€)	Successful Campaigns	Success rate
Raize	2014	Loan	11 213 000	578	-
Housers a)	2016	Property	42 628 255	103	-

a) Housers ' data reflects the entire activity spanning the 3 countries where it operates (Portugal, Spain and Italy)

The crowdfunding activity (collaborative funding) only began to be regulated in Portugal in 2015 (Pereira, 2016). In 2013, the Socialist Party formulated the first project approving the juridical regime of crowdfunding in Portugal. Two years later, the Law No. 102/2015 (August 2015) was published regulating collaborative financing. However, crowdfunding based on capital or loan was only regulated in 2016 when, such as specified by Law No. 102/2015, the Portuguese Securities Market Commission (CMVM) approved the regulation of legal regime of crowdfunding (Regulation CMVM No. 1/2016, signed on 5th May 2016 and published in Diário da República on 25th May 2016).

Due to the growing activity in Portugal, the Portuguese Government felt the need to approve the new Law No. 3/2018 on collaborative financing, amending Law No. 102/2015. This new law, in addition to clearly dividing the Crowdsponsoring from the Crowdinvesting, adds a sanctioning regime to the activity of crowdfunding.

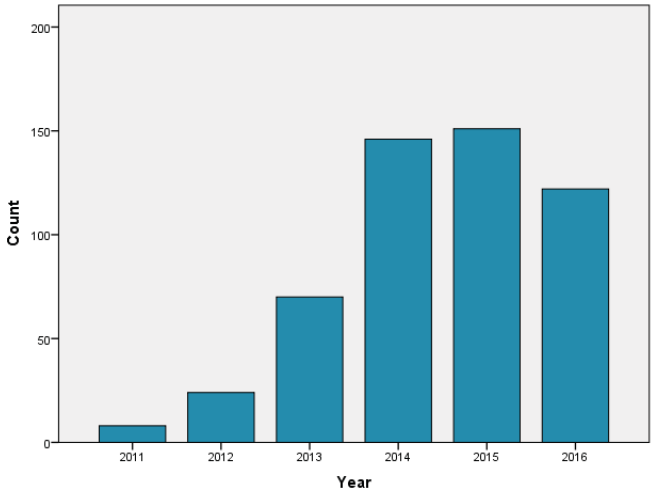
Previously, all crowdfunding activity was regulated and supervised by CMVM but with this new law, Crowdfunding's activities regarding donations and rewards become Regulated by the Food and Economic Security Authority (ASAE) and the activities associated with capital and loan continue to be regulated by the CMVM. The sanctioning regime strengthening the image of the Crowdfunding making it more regulated, more reliable and controlled. But, from the point of view of some experts and politicians, it removes the practical and simple image that characterized the Crowdfunding making it a more bureaucratic process.

3.2 Data

This research analyses the successful campaigns of the PPL platform that targets the reward-based type of crowdfunding. This platform was chosen because it encompasses both commercial, cultural and social projects, enabling to uncover differences between them. It is also the oldest and one of the most dynamic platforms in Portugal. Since 2011, the platform has raised more than 2.6 million euros, with a success rate of 45%. The platform uses the “all-or-nothing” mechanism.

The study uses data extracted from the PPL in 31th March 2017. At that time, since 2011, 1486 campaigns were launched and 623 were successfully completed. In the analysis, we only consider these successful campaigns, designated as projects hereafter. Figure 1 shows the evolution of the number of projects.

Figure 1: Evolution of the number of projects



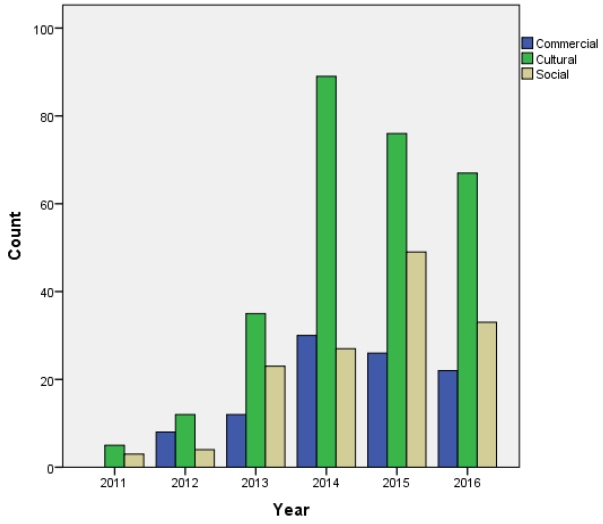
The projects were classified according to their nature. In order to perform this classification the full description of each project was analysed and three categories were created: social, commercial and cultural projects. In this process, 102 projects were excluded because they could not be considered in one of these three categories – they fit better in the donation category and were targeting support for an individual cause.

The classification of the projects obeyed the following criteria:

- Social projects – projects focusing on collective action and on the solution of social problems (poverty, social exclusion, citizenship, human rights, rehabilitation public spaces, education, health, animal protection); 139 projects were classified in this category.
- Commercial projects – projects focusing the launching of products or services, or raising investments for commercial activities (e.g. equipment modernization); 98 projects were classified in this category.
- Cultural projects – projects focusing the promotion of cultural events and products, including books, exhibitions and shows; 284 projects were classified in this category.

Figure 2 shows the evolution of the projects by type. It is possible to see that cultural projects predominate in every year. It is also possible to see that in 2014 commercial projects were more frequent than social ones.

Figure 2: Evolution of the projects by type



4. Results

As mention above, the paper sets out to analyse the successful crowdfunding campaigns and to assess differences between social-oriented, cultural-oriented and commercial oriented projects. In order to analyse the differences, several variables, related to the success of the campaign, were considered: the target investment in euros (goal), the raised investment in euros, the number of backers (investors), the average investment in euros (investment per investor), the target fulfilment (total raised divided by target times 100), the number of comments, the number of shared images and the number of views. Table 2 shows the descriptive statistics of these variables.

Table 2: Descriptive statistics

	Minimum	Maximum	Mean	Std. Deviation
Target	500	25000	2336,11	2264,96
Raised	500	25165	2669,14	2642,29
Backers	1	1122	67,26	76,21
Average Investment	4	1000	54,18	64,21
Target fulfilment	100,00	415,75	116,5969	32,59
Comments	0	73	2,01	5,15
Images	1	10	5,49	2,88
Views	934	45876	6404,67	5368,31

There is a positive and significant correlation (Table 3) between the number of views of the campaign and the investment (both target and raised) and the number of investors. This indicates that the most successful projects have more views in the platform, and therefore that promoters need to invest in the visibility of the campaign. Comments and images seem to have a lower correlation to those success variables.

Table 3: Pearson correlation coefficients

	Target	Raised	Backers	Average Investment	Target Fulfillment	Comments	Images	Views
Target	1	,942**	,437**	,228**	-,074	,076	,163**	,412**
Raised	,942**	1	,528**	,186**	,165**	,102*	,123**	,467**
Backers	,437**	,528**	1	-,200**	,292**	,208**	,040	,591**
Average invest	,228**	,186**	-,200**	1	-,127**	-,065	,102*	-,119**
Target fulfilment	-,074	,165**	,292**	-,127**	1	,098*	-,090*	,193**
Comments	,076	,102*	,208**	-,065	,098*	1	,036	,404**
Images	,163**	,123**	,040	,102*	-,090*	,036	1	,064
Views	,412**	,467**	,591**	-,119**	,193**	,404**	,064	1

**. Correlation is significant at the 0.01 level (2-tailed).

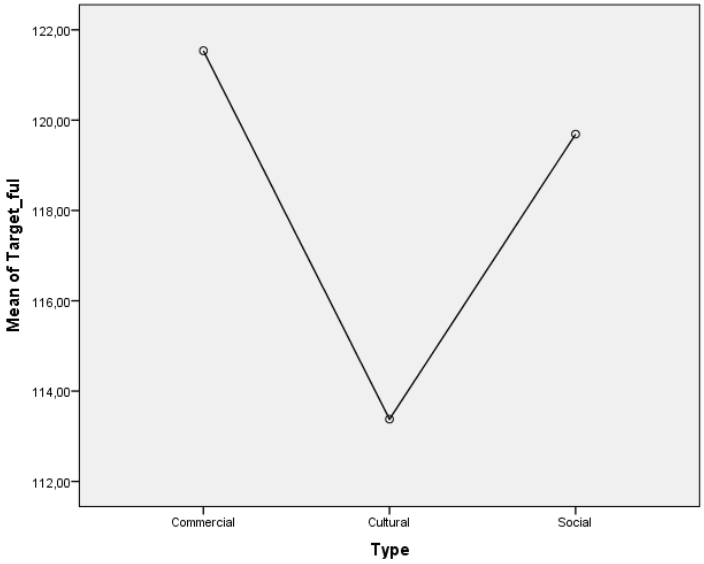
*. Correlation is significant at the 0.05 level (2-tailed).

In order to test the differences between the types of projects (social, cultural, commercial) we used the ANOVA analysis. The results of ANOVA are reported in Table 4. It is possible to conclude that significant differences between groups were only present in the variable target fulfilment. Commercial projects exhibit the higher investment fulfilment ratio, while cultural projects exhibit the lower (Figure 3).

Table 4: ANOVA analysis

		Sum of Squares	df	Mean Square	F	Sig.
Target	Between Groups	1020901,48	2	510450,74	,099	,906
	Within Groups	2666598891,00	518	5147874,30		
	Total	2667619792,00	520			
Raised	Between Groups	509633,39	2	254816,69	,036	,964
	Within Groups	3629971410,00	518	7007666,81		
	Total	3630481043,00	520			
Backers	Between Groups	3150,89	2	1575,44	,270	,763
	Within Groups	3017322,64	518	5824,94		
	Total	3020473,53	520			
Average Investment	Between Groups	15661,88	2	7830,94	1,906	,150
	Within Groups	2127909,68	518	4107,93		
	Total	2143571,57	520			
Target fulfilment	Between Groups	6663,57	2	3331,78	3,162	,043
	Within Groups	545779,92	518	1053,62		
	Total	552443,49	520			
Comments	Between Groups	17,21	2	8,60	,324	,724
	Within Groups	13779,77	518	26,60		
	Total	13796,98	520			
Images	Between Groups	10,97	2	5,48	,662	,516
	Within Groups	4241,69	512	8,28		
	Total	4252,66	514			
Views	Between Groups	70155601,04	2	35077800,52	1,218	,297
	Within Groups	14915566040,00	518	28794529,04		
	Total	14985721640,00	520			

Figure 3: ANOVA Mean Plot



5. Conclusion

Crowdfunding is a new and complementary form to finance innovative projects, particularly for project start-up, that otherwise would not be able to raise the necessary capital. The paper sets out to analyse the successful crowdfunding campaigns and to assess differences between social-oriented, cultural-oriented and commercial-oriented projects.

Results show that most successful projects have a cultural or a social oriented nature. This can be related with the fact that we are considering a reward-based type of crowdfunding and with the still incipient use of crowdfunding to finance commercial oriented innovations in Portugal (Medeiros, 2015).

Our results also show that the number of views achieved by a campaign is significantly and positively related to the success of the campaign, being the correlation stronger than the number of comments and the number of images. This suggests that is vital to spread the word to a vast public in order to have a successful campaign, regardless of the type of project.

Despite the different nature and challenges face by the three different type of projects – commercial, social and cultural – when it comes to the crowdfunding campaign success this research only found significant differences in terms of the investment fulfilment ratio: commercial-oriented tend to exceed the target investment in a more marked way compared to the other types of project, namely the cultural-oriented.

References:

Agrawal, A.K., Catalini, C. & Goldfarb, A. (2013). Some Simple Economics of Crowdfunding, NBER Working Paper Series No 19133.

Attuel-Mendes, L. (2014). Crowdfunding platforms for microfinance: A new way to eradicate poverty through the creation of a global hub? Cost Management, 28 (2), pp. 38-47.

Austin, J., Stevenson, H. & Wei-Skillern, J. (2006), "Social and commercial entrepreneurship: same, different, or both?", Entrepreneurship Theory & Practice, Vol. 30 No. 1, pp. 1-22.

Banhatti, R. (2016). Crowdfunding of a Social Enterprise: The GloW Project as a Case Study. In Dennis Brüntje and Oliver Gajda (Eds.), Crowdfunding in Europe: State of the Art in Theory and Practice (pp. 223-239). Springer.

Beck, R., Brüntje, D., Dardour, A., Gajda, O. and Marom, D. (2016). Introduction. In Dennis Brüntje and Oliver Gajda (Eds.), Crowdfunding in Europe: State of the Art in Theory and Practice (pp. 1-4). Springer.

Belleflamme, P., Lambert, T., & Schwienbacher, A. (2013). Individual crowdfunding practices. Venture Capital, 15(4), 313-333.

Belleflamme, P., Lambert, T. & Schwienbacher, A. (2014), Crowdfunding: Tapping the Right Crowd. Journal of Business Venturing, 29: 585-609.

Belleflamme, P., N. Omrani, and M. Peitz. 2015. "The Economics of Crowdfunding Platforms." Information Economics and Policy 33: 11–28.

Brüntje, D., & Gajda, O. (Eds.). (2016). Crowdfunding in Europe: State of the art in theory and practice. Springer.

Bruton, G., Khavul, S., Siegel, D., & Wright, M. (2015). New financial alternatives in seeding entrepreneurship: Microfinance, crowdfunding, and peer-to-peer innovations. Entrepreneurship Theory and Practice, 39(1), 9-26.

De Buysere, K., Gajda, O., Kleverlaan, R., Marom, D. & Klaes, M. (2012). A framework for European crowdfunding. European Crowdfunding Network.

Deffains-Crapsky, C. & Sudolska, A. (2014), Radical Innovation and early stage financing gaps: Equity-based crowdfunding challenges, Journal of Positive Management, 5 (2): 3-19.

Doherty, B., Haugh, H., & Lyon, F. (2014). Social enterprises as hybrid organizations: A review and research agenda. International Journal of Management Reviews, 16(4), 417-436.

Gajda, O. & Walton, J. (2013). Review of Crowdfunding for Development initiatives. IMC Worldwide for Evidence on Demand. UK Department for International Development, London.

Gerber, E.M., & Hui, J. (2013). Crowdfunding: Motivations and deterrents for participation. ACM Transactions on Computer-Human Interaction (TOCHI), 20(6), 34.

Gierczak, M., Bretschneider, U., Haas, P., Blohm, P. & Leimeister, J. (2016). Crowdfunding: Outlining the New Era of Fundraising. In Dennis Brüntje and Oliver Gajda (Eds.), Crowdfunding in Europe: State of the Art in Theory and Practice (pp. 7-24). Springer.

Golić, Z. (2014). Advantages of Crowdfunding as an Alternative Source of Financing of Small and Medium-Sized Enterprises. Zbornik radova Ekonomskog fakulteta u Istočnom Sarajevu, (8), 39-48.

Hemer, J. (2011). A snapshot on crowdfunding (Working Papers Firms and Region, No. R2/2011). Karlsruhe: Fraunhofer Institute for Systems and Innovation Research ISI.

Hooghiemstra, S. & De Buysere, K. (2016). The Perfect Regulation of Crowdfunding: What Should the European Regulator Do? In D. Brüntje and O. Gajda (Eds.), Crowdfunding in Europe: State of the Art in Theory and Practice (pp. 135-165). Springer.

Howe, J. (2008). Crowdsourcing: How the power of the crowd is driving the future of business. Random House.

Kim, J. H., Newberry, P., & Qiu, C. (2015). An empirical analysis of a crowdfunding platform. NET Institute Working Paper No. 15-12.

Kleemann, F., Vob, G. & Rieder, K. (2008). Un(der)paid Innovators: The commercial utilization of consumer work through crowdsourcing. Science, Technology & Innovation Studies, 4(1): 5-26.

Lehner, O.M. (2013). Crowdfunding social ventures: a model and research agenda. Venture Capital, 15(4), 289-311.

Lehner, O. M., Grabmann, E. & Ennsgraber, C. (2015). Entrepreneurial implications of crowdfunding as alternative funding source for innovations. Venture Capital, 17(1/2): 171-189.

Manchanda, K., & Muralidharan, P. (2014, January). Crowdfunding: a new paradigm in start-up financing. In Global Conference on Business & Finance Proceedings (Vol. 9, No. 1, p. 369). Institute for Business & Finance Research.

Medeiros, J. (2015). O papel do crowdfunding no desenvolvimento de projetos inovadores em Portugal. Master Dissertation. ISCTE-IUL, Lisbon, Portugal.

Mollick, E. (2014). The dynamics of crowdfunding: An exploratory study. Journal of Business Venturing, 29: 1-16.

Mollick, E. & Robb, A. (2016). Democratizing Innovation and Capital Access: the role of crowdfunding. California Management Review, 58(2): 72-87.

Moritz, A. & Block, J. (2016). Crowdfunding: A Literature Review and Research Directions. In Dennis Brüntje and Oliver Gajda (Eds.), Crowdfunding in Europe: State of the Art in Theory and Practice (pp. 25-54). Springer.

Mulgan, G., Tucker, S., Ali, R., & Sanders, B. (2007). Social innovation: what it is, why it matters and how it can be accelerated.

Müller, E., & Zimmermann, V. (2009). The importance of equity finance for R&D activity. Small Business Economics, 33(3), 303-318.

Murray, R., Caulier-Grice, J., & Mulgan, G. (2010). The open book of social innovation. London: National endowment for science, technology and the art.

Ordanini, A., Miceli, L., Pizzetti, M. & Parasuraman, A. (2011). Crowd-funding: transforming customers into investors through innovative service platforms. Journal of Service Management, 22 (4), pp. 443-470.

Robertson, E., & Wooster, R. B. (2015). Crowdfunding as a social movement: The determinants of success in Kickstarter campaigns. Available at SSRN: https://ssrn.com/abstract=2631320

Thürridl, C. & Kamleitner, B. (2016). What Goes Around Comes Around? Rewards as Strategic assets in Crowdfunding. California Management Review, 58(2): 88-110.

Zahra, S. A., Gedajlovic, E., Neubaum, D. O., & Shulman, J. M. (2009). A typology of social entrepreneurs: Motives, search processes and ethical challenges. Journal of business venturing, 24(5), 519-532.

Aligning Innovation Practices with Trajectories of Development of Leanness and Agility Capabilities

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Abstract: In times of smart businesses, digital factories and data-driven services, competitive enterprises are expected to be lean and agile. There is no consensus about how leanness and agility are achieved, but it is common to concentrate on four competitive priorities – quality, delivery, flexibility, and cost. Now, in facet of increasing dynamism of Industry 4.0, many authors express the need to include innovation into the discussion of leanness and agility too. In the paper, we propose an integrated theoretical framework that links together different innovation practices with low performing, lean and agile enterprises, including their transitional stances. In assessing changes towards leanness and agility performance dimensions, innovation practices play a major role. Moreover, according to a cumulative capabilities model, the transition from a low performer to a lean or agile one happens in a certain way. However, the traditional sequence of competitive capabilities development has been questioned by a number of authors who proved that a considerable number of enterprises did not follow this sequence. So, in the paper, alternative capabilities development trajectories are proposed. They are dependent on innovation practices onto which enterprises embark. Thus, the paper aligns innovation practices with enterprises' capabilities development trajectories towards leanness and agility and conceptualises an integrated theoretical framework of innovation-based capability development sequences. The major arguments are deducted from our previous research findings based on the analysis of Community Innovation Survey longitudinal data starting from 2006 and supplemented with the empirical evidence of other researchers who also performed statistical analyses: exploratory factor analysis, confirmatory factor analysis, cluster analysis, regression, and structural equation modelling predominantly. The paper contributes to better understanding of competitive capabilities development trajectories and performance of enterprises in dynamic environments, especially in the field of operations management which has insufficiently focused on such important elements of strategic management as innovation strategy.

Keywords: agile manufacturing, capabilities development trajectory, enterprise performance, innovation practice, lean manufacturing

1. Introduction

Both strategic management and operations strategy receive considerable attention in the scientific literature. However, the attention is rather individual. Whilst strategic management scholars aimed at innovation decades ago, in the field of operations strategy it had long remained in the shade of such competitive priorities as quality, delivery, flexibility and cost. In facet of increasing dynamism of Industry 4.0, authors attempt to include innovation into the discussion of leanness and agility too (Nair, Boulton 2008; Hallgren, Olhager 2009; Klingenberg et al 2013; Shin et al 2015; Edison et al 2018).

In the paper, we answer a question why innovation plays a key role in capabilities development and demonstrate that innovation is not only an additional competitive priority, but it is the springhead of any competitive priority. In addition, it is not clear which innovations lead to either leanness or agility, or both at a time, or which innovations dominate in low, lean or agile performers. Furthermore, new evidence shows that over 30% of enterprises do not follow the traditional sequence of developing competitive capabilities (Schroeder, Shah, Peng 2011). So, the paper proposes alternative trajectories towards leanness and agility. In doing so, the questions are: which innovation practices correlate with capabilities development trajectories towards leanness and agility; how do different innovation practices alter these trajectories? Hence, the paper aims to propose a theoretical framework aligning innovation practices with enterprises' capabilities development trajectories towards leanness and agility.

1.1 Main concepts and their relationships

Leanness and agility are two main concepts commonly applied in manufacturing (Narasimhan, Swink, Kim 2006; Hallgren, Olhagen, 2009; Soltan, Mostafa, 2015) with later application in supply chain management and its integration with manufacturing to the system of production (Naylor, Naim, Berry 1999; Goldsby, Griffis, Roath 2006; Lotfi, Saghiri 2018). They are applied variously, e.g. as supply chain strategies (Naylor, Naim, Berry 1999), thinking concepts (Eltawy, Gallear 2017), operations characteristics (Hallgren and Olhager, 2009),

manufacturing paradigms or performance capabilities (Narasimhan, Swink, Kim 2006; Lofti, Saghiri 2018). Both leanness and agility are recognized for going beyond a traditional application area and might be applied successfully in different industries and business conditions (Eltawy, Gallear 2017).

The concept of leanness describes the system that is used for eliminating any type of waste as a core feature (Narasimhan, Swink, Kim, 2006). Strategic intent of applying leanness is waste reduction or "less of everything" (Eltawy, Gallear 2017, p. 157), but ensuring product quality, delivery, flexibility and cost for meeting customer needs as market responsiveness. Based on the empirical research, Narasimhan, Swink and Kim (2006) characterise lean performers by cost efficiency followed by the quality of conformance and design. Hallgren and Olhagen (2009) indicate that lean performers operate in stable environment and are represented by repetitive production, daily schedule adherence, and flow oriented layout.

Agility reflects the same competitive priorities, but it emphasises different elements (Narasimhan, Swink, Kim 2006). In case of agility, market responsiveness comes as the first and main component that is supplemented by waste reduction (Soltan, Mostafa 2015). According to Narasimhan, Swink and Kim (2006), agile performers do not emphasise cost efficiency so much as lean performers. Agile performers are similar to them by the quality of conformance and design, but scored higher in flexibility (new product and process) and delivery (speed and reliability), representing the feature of rapid reconfiguration. According to Hallgren and Olhagen (2009), they have high customisation capability, handle efficiently variety, and have new product agility.

Another difference between leanness and agility is in competitive strategy. Hallgren and Olhager (2009) claim that agile manufacturing is related negatively with cost leadership strategy that corresponds to the findings of Narasimhan, Swink and Kim (2006). While leanness in operations fits well for implementing cost leadership strategy, agility fits well for differentiation strategy. Moreover, the results of Hallgren and Olhager (2009) contribute to previous description of leanness and agility by showing that they both affect significantly such operational outcomes as quality and delivery.

The integration of leanness and agility in one supply chain is based on the combination of waste efficiency and market responsiveness and called leagility. Naylor, Naim and Berry (1999) claim that the need for leagility as a combination of leanness and agility depends on the strategy of total supply chain. Although, leanness and agility complement each other if the correct supply chain strategy is applied. Agile manufacturing satisfies a fluctuating demand and lean manufacturing follows a level schedule (Naylor, Naim, Berry 1999). They can be applied into one supply chain according to demand direction at a decoupling point. If the demand is smooth and goes upstream, lean manufacturing can be applied. If the demand varies and goes downstream, agile manufacturing can be applied for product differentiation. Actually, leagility is an explanation how the integration of leanness and agility may serve to the market needs (Kisperska-Moron, de Haan 2011).

Discussed differences and similarities of leanness and agility turn back to three clusters of performers which have been analysed by Narasimhan, Swink and Kim (2006). The analysis of low, lean and agile performers reveals a considerable overlap between manufacturing concepts according to the perspective of practice, but from the perspective of performance leanness is a predecessor of agility. Narasimhan, Swink and Kim (2006) claim that the performance perspective ensures a strategic view for setting priorities what should be done.

1.2 Trajectories of operations capabilities

The discussion on how organisations should develop their capabilities for lean or agile manufacturing follows between two main models of trade-off and cumulative capabilities. Classical trade-off model is described by strategic choices in selecting a competitive dimension to emphasize at the expense of other dimensions (Rosenzweig, Easton 2010). Competitive dimensions reflect to operation capabilities by Narasimhan, Swink and Kim (2006) and consist of quality, delivery, flexibility and cost. Although, Rosenzweig and Easton (2010) claim that mentioned capabilities do not necessarily conflict with each other and emphasise the simultaneous outperformance on all four capabilities of Japanese manufacturers to North American and European counterparts.

Meanwhile, cumulative capabilities model is known as the sand cone model and describes the sequence how these capabilities are acquired. The quality is obtained first, followed by delivery, flexibility and finalised with cost. Empirical evidence on sand cone model is still lacking (Hallgren, Olhager, Schroeder 2011) or contradicting (Flynn, Flynn 2004). Although, the results of empirical testing by Narasimhan and Schoenherr

(2013) and Boon-itt and Wong (2016) confirm the sand cone sequence. However, Narasimhan and Schoenherr (2013) draw the attention to observed similar or better results on other sequences. Alternative trajectories reflect the split of sequence after delivery. Empirical results of Hallgren, Olhager and Schroeder (2011) research show that flexibility and cost are developed simultaneously, not sequentially. Moreover, they claim that there is no link between cost and flexibility. In linking cost and flexibility to leanness and agility, it might be hypothesised that the trajectory to cost reflects leanness and the trajectory to flexibility reflects agility.

Researchers reveal other models in addition to trade-off and sand cone ones. Schroeder, Shah and Peng (2011) have found a high variance of sequences instead of a single one of sand cone. As they claim, there might be many of alternative ways to the high performance and it depends on chosen strategies. Alternative models like 'threshold model', average model', 'non-competitive model', and 'multiple model' have been also tested by Singh et al (2015). Although they have not tested the sequence, empirical results have confirmed the threshold model when one capability is high and others are at the average levels as well as the average model with all average capabilities. The non-competitive model where all capabilities are low has been also confirmed by small but significant proportion of researched plants. The multiple models with various combinations of capabilities have got a strong support from empirical data, therefore calling for the further investigation of alternative trajectories of operational capabilities and their drivers.

1.3 Innovation practices

Narasimhan and Schoenherr (2013) provoke future researcher with additional capability that must be added to the common sequence of quality, delivery, flexibility and cost, i.e. innovation. In particular, they emphasise the impact of innovations in cost reduction by eliminating defects, in shortening manufacturing time, in contribution to quality and delivery performance. The stronger relationship has been identified between innovations and quality, delivery, flexibility, cost than the interrelation between these four capabilities (Singh et al 2015). Furthermore, Nair and Boulton (2008) argue that innovation should be included into general sequence of sand cone model with competitive priority for proactive adaptation of operation strategy to fulfil the requirements of changing environment.

However, in operations strategy literature, dimensions underlying the complex concept of innovation are more limited than those which authors from the field of strategic management analyse. Thus, Nair and Boulton (2008) characterize innovation according to three dimensions. Klingenberg et al (2013) focus on operational innovation (i.e. process innovation) only. Similarly, Shin et al (2015) analyse collaborative innovation as one of four pillars underlying agility, where collaborative innovation refers to all the relevant activities of process innovation. In practice, different innovations and innovation activities are usually implemented together and form bundles which therefore are referred to as innovation modes, innovation strategies, innovation regimes, innovation routines, or innovation practices (Stankevice 2015). It is the latter denotation to which the aforementioned innovation bundles are referred to in this paper.

2. Methodology for aligning innovation practices with leanness and agility profiles

What lets us to relate operations management literature on agility/leanness and strategic management literature on innovation is enterprise performance. In the field of operations management, it is common to measure performance of types or intensity of leanness and agility (Narasimhan, Swink, Kim 2006; Hallgren, Olhager 2009; Klingenberg et al 2013; Singh et al 2015). Likewise, in the field of strategic management, different innovation practices are also associated with different levels of performance (Frenz, Lambert 2012; Prajogo 2016). Hereby enterprise performance serves as a binding element between agility/leanness and innovation practices.

For certain performance levels and types of leanness/agility, we rely mostly on nearly classical differentiation between agile, lean and low performers (Narasimhan, Swink, Kim 2006). We also focus on the recent refinement of capabilities development model proposed by Singh et al (2015) where they analysed innovation as the fifth competitive priority along with quality, delivery, flexibility and cost. From the strategic management side, we use the previously analysed typology of innovation practices (Stankevice 2015) as it is much in line with others researchers' (Frenz, Lambert 2012; Prajogo 2016) findings and is based on solid Community Innovation Survey data. This typology includes six innovation practices emerged as the result of exploratory factor analysis (Table 1). One innovation practice was dismissed in this paper because it does not represent manufacturing sufficiently (see 3.1).

Table 1: General characteristics of innovation practices

	Marketing laggard	Process modernisation	Organisational support	Marketing leader	Networked value creation
Products new-to-market over new-to-firm	No	No	No	Yes	Yes
Performance	Low	Average		High	
Corresponding types of industrial enterprises	Low performers	Lean performers		Agile performers	

While some components of these practices represent quality, delivery, flexibility and cost, other components (e.g. sources of knowledge for innovation, etc.) can hardly be classified as competitive priorities typical of agility/leanness discussion, so these components were not analysed further in the paper. The rest of the components are presented in Table 2 together with competitive capabilities equivalent to the components which emerged as the elements of statistical factors.

Table 2: Elements of innovation practices as competitive priorities of leanness and agility

Competitive capabilities	Elements of innovation practices	Innovation practices to which elements belong
Cost	• Labour cost reduction	• Organisational support *(correlates significantly with networked value creation)*
Delivery	• New/improved logistic, delivery or distribution system (can also be classified as process innovation)	• Process modernisation
Flexibility	• To improve production capacity • To improve production flexibility	• Organisational support *(capacity correlates significantly with marketing leader)*
	• To increase range of goods and services	• Marketing laggard
	• To improve ability to develop new products or processes	• Process modernisation
Innovation	• Continuous engagement in intramural R&D • Improved communication and information sharing	• Networked value creation *(communication and information sharing correlates significantly with organisational support)*
	• New methods for product placement • New methods of pricing	• Marketing leader
	• New media techniques • Training for innovative activities	• Marketing laggard
	• New business practices	• Organisational support *(correlates significantly with process modernisation)*
	• Acquisition of external knowledge • Acquisition of machinery, equipment and software	• Process modernisation
Quality	• To improve quality	• Marketing laggard *(correlates significantly with organisational support)*

Based on the correlations of innovation practices with enterprise performance, and on the factor components, the innovation practices were aligned with agility/leanness profiles proposed by Narasimhan, Swink and Kim (2006) and Singh et al (2015). In doing so, trade-off model was not considered because none out of 1438 plants examined by Singh et al (2015) followed it. Ultimately, an integrated theoretical framework for reaching leanness and agility by means of innovation practices was conceptualised.

3. Innovation practices and capabilities development trajectories

If to compare agility/leanness profiles with the previously emerged innovation practices (Stankevice 2015) by enterprise performance, there is a parallel. As Narasimhan, Swink and Kim (2006) distinguished between three performance-based types of leanness and agility, so six innovation practices were also classified into three groups based on their contribution to better or worse firm performance.

3.1 Low performers: non-competitive operations strategy

Low performers (Narasimhan, Swink, Kim 2006) can be aligned with two innovation practices, namely, marketing laggards and service providers. However, service providers represent mostly financial, insurance, information and communication sectors and their auxiliary activities (Stankevice 2015), but not manufacturing. Thus, in manufacturing, it is marketing laggard practice that can help us to establish links between innovation practices and low performers.

The essence of the marketing laggard innovation practice is to introduce new techniques for product promotion (e.g. a new advertising media, a new brand image, or an introduction of loyalty cards) to replace outdated products and processes in the first instance. Innovations of marketing laggards are typically new at an enterprise level, but not in their markets. Since current innovation practices of marketing laggards help to keep up, but not to develop, other innovation practices are needed to vitalize competitive capabilities and bring them up to a higher performance level. Therefore, enterprises engage into training for innovative activities.

The major obstacles for the enterprises embarking onto this innovation practice to become leaders is that they lack a wider range and better quality of goods, and not always timely replace outdated products and processes. In this way, marketing laggards can be classified as low performers in terms of quality and flexibility (Narasimhan, Swink, Kim 2006). Other studies suggest also that enterprises which embark onto innovation practices similar to the said one are constrained financially (Stankevice 2015) to implement more advanced innovations. So, on the cost dimension marketing laggards are also concomitant with the cluster of low performers.

However, the aforementioned innovation practice has no implications for delivery, so there is no clear evidence that its level is low. Presumably, low performers are able to start their capability development sequence with satisfactory delivery. In leanness/agility typology presented by Singh et al (2015), such enterprises would correspond to non-competitive model of operations strategy with all low or four low (innovation, cost, quality, flexibility) and one average (delivery) capability.

3.2 Lean performers: average and threshold operations strategies

Two innovation practices are associated with average enterprise performance, namely, process modernisation and organisational support (Stankevice 2015). The essence of the first innovation practice is to improve the ability to develop new products or processes (i.e. to improve product flexibility in Narasimhan's et al (2006) words) through the acquisition of external knowledge, machinery, equipment and software. In fact, process modernisers are generally good at utilizing innovations originally developed by others and acquiring relevant knowledge disseminated by others, so their product flexibility is at an average level and corresponds to that of lean performers. More than a half of these enterprises have already introduced new logistic, delivery or distribution systems, thus indicating present process innovations and that delivery's as a competitive priority's level is average or high.

Interestingly, none of the internal components of this innovation practice has any implications for cost or quality. However, other studies indicated that process modernisation focuses on developing standardized products and reducing costs through routinizing process improvements (Zuniga, Crespi 2013), and this is how it limits the impact of its innovations to products which can be mass-produced within standardized routines. So, cost as a competitive priority is at a high level in this case and corresponds to that of lean performers. In Singh's et al (2015) typology process modernisers follow threshold operations strategy with two high (delivery, cost) and three average capabilities (innovation, flexibility, quality) or one high (cost) and four average capabilities (delivery, innovation, quality, flexibility). The only competitive priority which is not fully empirically verified by the process modernisation innovation practice is quality.

Another innovation practice with the average performance (i.e. organisational support) includes such objectives as reduction of labour costs, improvement of production flexibility and capacity, and improvement of quality. Information about delivery is lacking, but average performance and the wish to improve all the other capabilities aligns the said innovation practice to average operations strategy in Singh's et al (2015) typology, i.e. with all average capabilities (allows for four average and one low capability). Enterprises that embark onto the organisational support innovation practice do so to increase market share or, more rarely, enter new markets. To reach the set goals, the enterprises establish new business practices, such as knowledge management, supply chain management, business re-engineering, lean production, quality management, etc., and they also improve communication and information sharing (Stankevice 2015), i.e. they implement a number of well-sequenced organisational innovations.

3.3 Agile performers: cumulative operations strategy

Two innovation practices associated with the highest enterprise performance are based on marketing leadership and networked value creation, accordingly (Stankevice 2015). The latter innovation practice, due to the continuous intramural R&D, high value technological innovations and close collaboration with research institutes, demonstrates the greatest correlation with new product creation. Hereby, networked value creators can be characterized as having the highest product flexibility. So, from this perspective, networked value creation innovation practice falls under the category of agile performers. Another feature of agile enterprises is that cost is typically the only capability where agile performers yield to lean ones (Narasimhan, Swink, Kim 2006; Singh et al 2015). Precisely, about a half of networked value creators assume reduction of labour costs is important. Hereby this finding fits for agile performers as well. However, such capabilities of networked value creators as quality and delivery did not emerge as the factor components and need better empirical evidence.

Marketing leaders also showed slightly higher correlations with new-to-market products than with new-to-firm ones (Stankevice 2015). As Drechsler, Natter and Leeflang (2013) demonstrated, "both marketing research quality and the ability to translate customer needs into product characteristics serve to increase marketing's influence on NPD [new product development – authors' remark]. This increased influence, in turn, positively contributes to overall firm innovation performance." (p. 298). Marketing leaders combine advanced (e.g. new pricing, new discount systems) marketing innovations with the non-advanced ones (e.g. loyalty cards) and with organisational innovations (e.g. teamwork, new systems of responsibilities, etc.). So, we can deduct that both innovations and product flexibility are at a high level in such enterprises. Similarly to the networked value creation, the factor components do not have any implications for quality or delivery, but the fact that marketing leaders aim aggressively at new markets, coupled with pretty high performance, lets us assume that high quality and well established delivery are present.

So, both networked value creation and marketing leader innovation practices correspond to cumulative operations strategy in Singh's et al (2015) typology with five high or four high and one average capability. In case of networked value creation, the average-level capability is cost, and in case of marketing leaders, the average-level capability is volume flexibility which is related to marketing leaders' expansion into new markets and consequent challenges, such as the need to increase production capacity.

4. Innovation-based trajectory towards leanness and agility

In practice, it is likely that different enterprises have varied capabilities development trajectories. The discussion presented above has also shown differences in the trajectories of low, lean and agile performers, including differences within a same performance cluster. However, in the highly dynamic and digitalized environment of Industry 4.0, enterprises often need to combine leanness and agility, so it is advantageous to propose a way of doing so by applying right innovation practices at right stages.

Thus, training for innovative activities and successful installation of new delivery, distribution or logistic systems helps to lift performance up and approximate leanness. To increase cost efficiency, it is common to acquire external knowledge, as well as new software, equipment and/or machinery. These changes are typically accompanied by organisational innovations, such as supply chain management, business re-engineering, lean production, quality management, teamwork, etc.

To approach agility closer, enterprises engage into continuous R&D, collaboration with research institutes and higher education institutions; thus, they also need to improve communication and information sharing. Heavy R&D, more often than not, causes decreased cost efficiency, but helps to reach excellence in all the other competitive capabilities. It is also worth mentioning that alongside R&D, complex marketing innovations contribute to verging agility too. Figure 1 illustrates the innovation based trajectories towards leanness and agility.

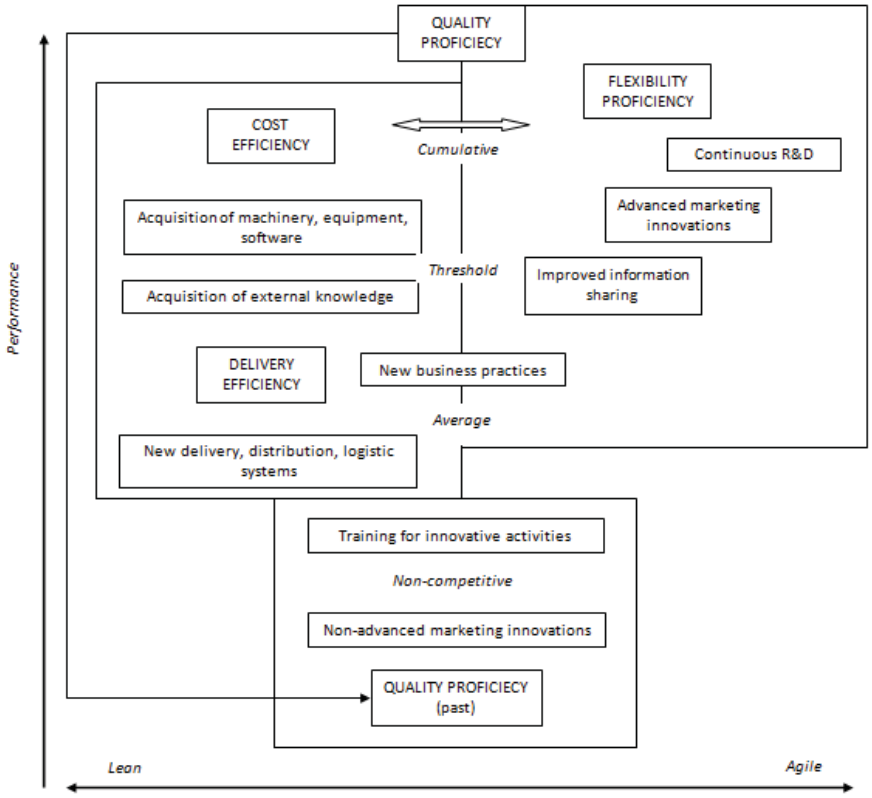

Figure 1: Innovation-based trajectories towards leanness and agility

In the framework above, capabilities development is seen as a cyclic and continuous process. It is demonstrated in various studies that capabilities development is environmentally dependent and goes through different development cycles, especially when innovation is considered (Nair, Boulton 2008; Hallgren, Olhager 2009; Bottani 2010; Schroeder, Shah, Peng 2011; Gligor, Esmark, Holcomb 2016). In the alignment of innovation practices with leanness/agility, no proof was found for quality being the first or the last capability in the performance development trajectory. Hereby we rely on the most popular sequence starting with quality, even though alternative sequences may exist (Schroeder, Shah, Peng 2011). However, quality, as well as other capabilities, needs to constantly be revisited. Similarly, advanced marketing innovations at some point of time become obsolete, new delivery systems become outdated, new knowledge becomes irrelevant. Hereby, the process of capabilities development is cyclic.

Another important aspect of the framework is the two-way path between leanness and agility. Research shows that there may not be a single sequence in which capabilities are built (Narasimhan, Schoenherr 2013), e.g. capabilities may be developed not sequentially, but in parallel. Thus, cost and flexibility can be developed simultaneously (Hallgren, Olhager, Schroeder 2011). Another insight is provided by Gligor, Esmark and Holcomb (2016) who proved that agile strategies are more efficient in highly uncertain environments, and lean strategies fit better for stable environment. Similarly, Prajogo (2016) proved that competitive environments weaken the effect of product innovation on performance, but strengthen process innovation. So, these arguments and evidence from previous aforementioned studies are convincing enough to enable the mutual transformation and convergence of leanness and agility in the framework.

5. Conclusion

There is an increasing support for the idea to include innovation into competitive capabilities development trajectories. In the paper, innovation is not only an additional competitive capability, but its role is critical on enterprises' way towards leanness and agility. Innovation bundles, or innovation practices, may alter capabilities development trajectories, and they may also serve as a means to lift competitive capabilities up to a higher performance level in a cyclic way. However, the deducted trajectories towards leanness and agility have some limitations. First, the data on which the trajectories were built relate to varied industrial sectors, thus meaning that other patterns may appear if to extract manufacturing only. Second, the trajectories do not

specify sequences of competitive capabilities. So, the paper provokes further research to investigate the deficient aspects.

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References

Boon-itt, S. and Wong, C.Y. (2016) “Empirical investigation of alternate cumulative capability models: a multi-method approach”, Production Planning & Control, Vol 27 No. 4, pp 299-311.

Drechsler, W., Natter, M. and Leeflang, P.S.H. (2013) “Improving marketing’s contribution to new product development”, Journal of Product Innovation Management, Vol 30 Issue 2, pp 298-315.

Edison, H., Smørsgård, N.M., Wang, X. and Abrahamsson, P. (2018) “Lean internal startups for software product innovation in large companies: enablers and inhibitors”, The Journal of Systems and Software, 135, pp 69–87.

Eltawy, N. and Gallear, D. (2017) "Leanness and agility: a comparative theoretical view", Industrial Management & Data Systems, Vol 117 No. 1, pp 149-165.

Flynn, B.B. and Flynn, E.J. (2004) “An exploratory study of the nature of cumulative capabilities”, Journal of Operations Management, Vol 22 No. 5, pp 439-457.

Frenz, M. and Lambert, R. (2012). “Mixed modes of innovation: an empiric approach to capturing firms’ innovation behavior”, OECD Science, Technology and Industry Working Papers, 2012/06, OECD Publishing.

Gligor, D.M., Esmark, C.L. and Holcomb, M.C. (2015) “Performance outcomes of supply chain agility: When should you be agile?”, Journal of Operations Management, Vol 33-34, pp 71-82.

Goldsby, T., Griffis, S. and Roath, A. (2006) “Modelling lean, agile and leagile supply chain strategies”, Journal of Business Logistics, Vol 27 No. 1, 57-80.

Hallgren, M. and Olhager, J. (2009) “Lean and agile manufacturing: External and internal drivers and performance outcomes”, International Journal of Operations & Production Management, Vol 29 No. 10, pp 976–999.

Hallgren, M., Olhager, J. and Schroeder, R.G. (2011) "A hybrid model of competitive capabilities", International Journal of Operations & Production Management, Vol 31, No. 5, pp 511-526.

Kisperska-Moron, D. and de Haan, J. (2011) “Improving Supply Chain Performance to Satisfy Final Customers: Leagile Experiences of a Polish Distributor”, International Journal of Production Economics, Vol 133 No. 1, pp 127-134.

Klingenberg, B., Timberlake, R., Geurts, T.G. and Brown, R.J. (2013) “The relationship of operational innovation and financial performance – A critical perspective”, International. Journal of Production Economics, 142, pp 317–323.

Lotfi, M. and Saghiri, S. (2018) "Disentangling resilience, agility and leanness: Conceptual development and empirical analysis", Journal of Manufacturing Technology Management, Vol 29 No. 1, 168-197.

Nair, A. and Boulton, W.R. (2008) “Innovation-oriented operations strategy typology and stage-based model”, International Journal of Operations & Production Management, Vol 28 No. 8, pp 748-771.

Narasimhan, R, and Schoenherr, T. (2013) “Revisiting the progression of competitive capabilities: results from a repeated cross-sectional investigation”, International Journal of Production Research, Vol 51 No. 22, pp. 6631-6650.

Narasimhan, R., Swink, M. and Kim, S.W. (2006) “Disentangling leanness and agility: An empirical investigation”, Journal of Operations Management, Vol 24, 440–457.

Naylor, J.B., Naim, M.M. and Berry, D. (1999) “Leagility: integrating the lean and agile manufacturing paradigms in the total supply chain”, International Journal of Production Economics, Vol 62, pp 107–118.

Prajogo, D.I. (2016) “The strategic fit between innovation strategies and business environment in delivering business performance”, International. Journal of Production Economics, 171, pp 241-249.

Rosenzweig, E.D. and Easton, G.S. (2010) “Tradeoffs in manufacturing? A meta-analysis and critique of the literature”, Production and Operations Management, Vol 19, 127-141.

Schroeder, R.G., Shah, R. and Xiaosong Peng, D. (2011) “The cumulative capability 'sand cone' model revisited: a new perspective for manufacturing strategy”, International Journal of Production Research, Vol 49 No. 16, pp 4879-4901.

Shin, H., Lee, J.-N., Kim, DS. and Rhim, H. (2015) “Strategic agility of Korean small and medium enterprises and its influence on operational and firm performance”, International. Journal of Production Economics, 168, pp 181–196.

Singh, P.J., Wiengarten, F., Nand, A.A. and Betts, T. (2015) “Beyond the trade-off and cumulative capabilities models: alternative models of operations strategy”, International Journal of Production Research, Vol 53 No. 13, pp 4001-4020.

Soltan, H. and Mostafa, S. (2015) “Lean and agile performance framework for manufacturing enterprises”, Procedia Manufacturing, Vol 2, pp 476-484.

Stankevice, I. (2015) “Innovation strategies as outcomes of KM practices and antecedents of firm performance: Evidence from European economies”, The Electronic Journal of Knowledge Management, Volume 13 Issue 1, pp 62-73, available online at www.ejkm.com

Zuniga, P. and Crespi, G. (2013) “Innovation strategies and employment in Latin American firms”, Structural Change & Economic Dynamics, Vol 24, pp 1-17.

Entrepreneurial Mindset as a Driver for Digital Transformation – A Novel Educational Approach from University-Industry Interactions

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Abstract: A major challenge faced by organisations today is how to adopt and leverage new digital technologies (NDT), as it requires organizations and its leaders to embrace different mindsets and skill-sets in order to develop digital transformation strategies. In this scenario, how can universities support the formation of organisations' digital mindset? How to educate students to be (digital) transformational agents? And how to produce value for all stakeholders in the process? The Triple Helix (TH) of University-Industry-Government enables a sustainable innovation ecosystem and promotes regional development. The entrepreneurial university (EUni) supports the transition from a society based on physical artefacts to a knowledge-based society. The EUni model includes increased university autonomy and greater involvement of external stakeholders. At the same time, Entrepreneurship Education (EE) at EUnis has expanded and evolved significantly in the past decades. In 2006 a European Commission report on how to build a knowledge-society, added EE as one of eight key competences for life-long learning, due to the transferability of the entrepreneurial mindset to other branches of one's professional and personal life. Based on learnings from project-based EE programs with industry partners in different contexts (e.g., local/international, classroom-only/virtual-component), a novel educational concept that deep dives into the topics Entrepreneurship & Digital Transformation is being developed through co-creation, as an attempt to answer the presented questions. A specific evaluation framework assesses the experiment, by collecting qualitative and quantitative data throughout the development process, while in parallel an empirical research is aggregating findings from past and current EE programmes. Initial findings presented in this paper illustrate the need of Triple Helix (TH) interactions to co-create programs that produce value for all stakeholders, allowing the conceptualization of a novel approach for EE development, which might enable technology transfer, emergence of start-ups/spin-offs and foster an entrepreneurial mindset.

Keywords: Entrepreneurial Mindset, Digital Transformation, Triple Helix, Entrepreneurial Universities

1. Introduction & Background

A major challenge faced by organisations today is how to adopt and leverage NDT – as the ability to promote digital transformation is in large part determined by a clear digital strategy enabled by a culture of change, risk-taking and innovation, supported by its leaders. The path to digitalization requires organizations to embrace a digital mindset, as NDT demand different mindsets and skill-sets than previous waves of transformative technologies (Fitzgerald *et al.*, 2007; Kaufman and Horton, 2014; Kane *et al.*, 2015).

Effectively developing and communicating a strategy is a difficult task, which design techniques and processes can support. Design Thinking (DT) is proposed as a suitable framework for the development of strategies, products, services, and new businesses, i.e. a model for value innovation and transformation. The person or team to pursue this endeavour should be "T-shaped", that means someone that has a principal skill, e.g. software engineering, that describes the vertical leg of the T; and also, has empathy to branch out into other skills, the width arm of the T (Brown, 2005; Brown and Katz, 2011). At the same time, it is argued that teaching entrepreneurship as a method requires going beyond understanding, knowing, and talking; it requires using, applying, and acting (Neck and Greene, 2011) and the key concepts of DT add value to EE, as it provides educators with a process that facilitate multidisciplinary learning (Huber *et al.*, 2016).

Studies suggest that taking entrepreneurship courses influences students' entrepreneurial intentions (Lange *et al.*, 2011). Ensuring that a broader segment of the population possesses entrepreneurial knowledge seems to positively affect start-up rates and subsequent job creation (Kuckertz, 2013). Since 2006, the European Commission (EC) has included entrepreneurship education as one of eight key competences for life-long learning. Further EC directives have been released since, including a framework for teaching entrepreneurship competences with a respective progression model and learning outcomes (European Council, 2006; Bacigalupo *et al.*, 2016). However, EE by itself may not directly produce entrepreneurship outcomes, its impact is rather indirectly through mediating mechanisms, as personal characteristics, networks and self-efficacy (Rideout and Gray, 2010). The personality traits of innovativeness, pro-activity and self-efficacy strongly correlate with

entrepreneurial behaviour (Rauch and Frese, 2007). From a human capital perspective, knowledge/skills relate higher with entrepreneurial success, than education/experiences (Unger *et al.*, 2011). In this context, entrepreneurial mindset encompasses knowledge, skills and attitudes. Hence the assessment of EE is possible by focusing on the impact of EE measured as the evolution of students' mindset, rather than number of businesses created (Fayolle, Gailly and Lassas-Clerc, 2006). However, beyond the student perspective, the assessment of EE programmes should be stakeholder-driven, i.e. it needs to involve all stakeholders in the process to validate the added value from all perspectives: administrators, faculties, government bodies and donors, external partner firms, etc. (Duval-Couetil, 2013).

In what regards universities, the digital transformation causes dramatically changes in distributing knowledge. Universities will no longer own the traditional monopoly in knowledge creation. Private sector and civil society institutions now provide different education pathways enabling practical knowledge generation and its transfer into society. Moreover today's societies face complex challenges and changes that can only be tackled and resolved peacefully by bundling expert knowledge and finding responsible solutions.

Hence, the future role of universities will be to handle large volumes of information and to integrate the ever-growing diversity of mass communication into sensible contexts of teaching so that applicable knowledge and competences are nurtured and created in both, local and virtual communities. Although bits of information are continuously generated and saved (Big Data), their relational contexts often remain in closed forums or are being discussed on exclusive panels only.

At the same time, knowledge sharing to resolve specific and individual needs and challenges becomes ever more relevant for accessing information, in not only local communities, but also increasingly through virtual communities across the globe.

These circumstances pushes universities to re-define their role and shifting their education mission from pure knowledge transfer towards educating entrepreneurial minds that understand the entire spectrum of societal challenges and new digital technologies, students that are willing and capable to live up to these challenges on a daily basis. The universities have to convert themselves in an entrepreneurial university (EUni), as described by the EC (Hannon, 2013).

The EUni, which adds entrepreneurship as a third mission, in parallel to teach and research, is a key driver for society's transition from being based on classical industries towards being knowledge-based and contributes to regional and national development. The EUni-model includes increased university autonomy and greater involvement of external stakeholders (Etzkowitz and Leydesdorff, 2000; Etzkowitz, 2014). Accepting this new role, universities have to get an emancipated part of the society. Instead of living in knowledge silos, separated by the different disciplines, they have to interconnect with relevant stakeholders from the commercial and public sectors, as well as politics – the so-called Triple Helix – and civil society institutions (Quadruple Helix).

Such University-Industry-Government-Civil Society collaboration enables a sustainable innovation ecosystem and promotes regional development. Nevertheless, it is important to highlight that civil society is a broader democratic format than are institutional spheres, not being a parallel sphere to academia-industry-government and hence the concept of a fourth helix is disputed in literature (Leydesdorff, 2012; Etzkowitz, 2016; Etzkowitz and Zhou, 2018).

The introduction of EUnis new role face barriers due to university-wide cultural issues and gaps between faculties that need to cooperate often restrain the emergence of an institution-wide entrepreneurial culture and due some professors' view of Entrepreneurship as a non-academic discipline. To overcome these barriers a long-term perspective is necessary (Janssen and Bacq, 2010; Kuckertz, 2013).

In this context, hybrid organizations (HOs), e.g. entrepreneurship centers, play an important role, as a key micro-component of TH interactions. HOs allow different practices and experimentations, which eventually help to overcome cultural barriers between stakeholders in a regional entrepreneurial ecosystem (REE) (Etzkowitz and Leydesdorff, 2000; Etzkowitz, 2016; Champenois and Etzkowitz, 2017; Leydesdorff *et al.*, 2017).

The analysis of TH interactions in a REE should take into account relevant elements, as the capacities of the firms, the existing informal relationships between stakeholders and the kind of knowledge that is in exchange

between a university and their surrounding firms. Current research on the status quo of TH interactions show that those are often weak or non-existent in many regions and only a small amount of academics follow the EUni model (Philpott *et al.*, 2011; Fernandez-Esquinas, Merchan-Hernandez and Valmaseda-Andia, 2016).

Furthermore, contextual factors for REE success are elusive (Etzkowitz and Zhou, 2018) and their performance should not be evaluated by simple metrics (e.g. number of startups or spin-offs created), as the emergence and growth of such a complex ecosystem and its ability to produce certain (entrepreneurial) behaviours may require metrics that capture the depth and breadth of those interactions. The use of mix-methods approaches and specifically qualitative comparative analysis (QCA) and interpretivist qualitative research are more appropriate methods to capture the multi-faceted and temporally unfolding characteristics of REE (Roundy, Bradshaw and Brockman, 2018).

2. The Case of MUAS/SCE

The Munich University of Applied Sciences (MUAS) is one of the largest university of applied sciences in Germany with around 18 thousand students across 14 faculties, including a faculty for General and Interdisciplinary studies. The university has adopted entrepreneurship as one of its three guiding principles (together with internationalization and sustainability) and has a long-term commitment to promote an entrepreneurial mindset among faculty staff and students. Affiliated to MUAS is the Strascheg Center for Entrepreneurship (SCE), a hub for entrepreneurial activities within the university and the REE. Founded in 2002, SCE offers startup support and EE programmes across faculties and beyond the university environment and network. The collective efforts of MUAS and SCE have contributed to the emergence of a lively entrepreneurial ecosystem in Bavaria, specifically in its capital, Munich. MUAS had been ranked as the number 1 entrepreneurial university in Germany (Stifterverband and Heinz Nixdorf Stiftung, 2016). An analysis of the development path of entrepreneurship support at MUAS/SCE between 2002 and 2012 showed that internal factors, that is, people involved in the support activities, students, and university governance, were more influential than external factors to SCEs development. However, external factors in the form of private sector influence, public funding and strategic partnerships, were dominant in two dimensions: (i) internal organisation and external collaboration, and (ii) financial resources (Gillig, Hofer and Sailer, 2012).

Throughout the years, learnings from EE programmes developed locally or as part of international consortiums have allowed MUAS/SCE to build expertise, aiming to position the institutions as Thought Leaders in EE nationally and across Europe. A summary of educational approaches and key learnings from four selected programmes (table 1) provide an overview of the background that led to the conceptualization of a novel educational approach in entrepreneurship for digital transformation.

Table 1: Summary of educational formats and learnings from selected MUAS/SCE EE Programmes

Selected EE Programmes	Short Description	Key Learnings
Real Projects (RP)	Cross faculty format available since 2011, in which a SCE facilitator co-teaches a regular course with a professor during a semester, by applying a RP method consisting of: impulse, problem analysis, ideation, implementation, and presentation to the class. There are special editions in collaboration with industry partners, who provide the initial impulse (i.e. innovation challenge). RP has been introduced into the curricula of multiple degree programs of most MUAS faculties. The evaluation is conducted based on the ASTEE assessment tool, which assess EE based on evolution of students' entrepreneurial mindset	The need to combine desired EE learning outcomes (knowledge, skills and attitudes), with the learning goals of each specific course; The need to understand entrepreneurship education as a transdisciplinary method that enables interdisciplinary team work; Not all university professors think and act entrepreneurially, requiring train-the-trainer initiatives in experiential pedagogy; The need of an evaluation tool that measures desired learning outcomes The need to coordinate and organize efforts between SCE and Faculties/Professors: Since 2014 MUAS established Thursdays as a "Project Day" facilitating this process. (Turgut-dao *et al.*, 2015)

Selected EE Programmes	Short Description	Key Learnings
Academic Program in Entrepreneurship (APE)	Facultative advanced program, open to students and participants beyond MUAS, since 2008. It consists of 2 semesters (10 months): one in which participants form teams, ideate and develop their own startup idea around a proposed impulse topic and another where the teams go through a design thinking-enabled process to tackle an innovation challenge from an industry partner. In between, the participants take part in an intensive international APE Bootcamp, in which they work in English with guest participants from around the world (i.e. one week summer school format). APE assessment is based on ASTEE tool and qualitative research efforts.	Design thinking concepts facilitate multidisciplinary learning and provide educators with a number of important concepts, tools and methods that may be directly integrated into existing courses; Enabling an international setting support the development of intercultural and communication skills; Training students in an entrepreneurial as well as intrapreneurial settings allows for multi-faceted career trajectories; More than 30% of APE graduates start a successful startup within five years of graduation; (Huber et al., 2016; Huber, Sailer and Peisl, 2017)

Selected EE Programmes	Short Description	Key Learnings
EU-XCEL	Funded by the Horizon 2020 scheme, EU-XCEL was executed by an international consortium of six partner universities between 2015-2017 engaging with over 400 participants. The aim was to enable the formation of "Born European" ICT startups and train them to be "incubator-ready". The program had 2 editions, each consisted of a one-week workshop, ran by each partner university, in which students and recent graduates from all over Europe immersed in the entrepreneurial journey and formed interdisciplinary international startup teams. Afterwards the teams went through a 12-14 weeks virtual acceleration, enabled by remote work and virtual coaching support. At the end, the 12 best performing teams of each edition met for a final competitive pitching event. In 2017 EU-XCEL was extended for 6 months to enable a "Momentum Workshop" with active teams from both editions to provide further support and mentoring on launching/scaling up (www.euxcel.eu) Extensive empirical research was conducted by partners and included the ASTEE tool.	EU-XCEL demonstrated that creating cross-border collaboration is an achievable policy objective; 95% of participants completed the programme, which indicates that virtual component in EE is feasible – critical success factors seem to be the establishment of structured roadmap with milestones and assignment of a coach; 86% of participants improved their entrepreneurial skillset during the program; 79% indicated greater confidence in their knowledge of start-up development with a European-wide team; And 70% of participants felt their international entrepreneurial network improved due to EU-XCEL; Identified pitfalls for cross-national startup projects were associated with the lack of a roadmap to market readiness in international settings, an adequate international support network including technical support and dedicated mentoring (O'Flaherty *et al.*, 2017)
Bavaria-Israel Partnership Accelerator (BIPA)	A bi-national program funded by the Bavarian Ministry for Economics and the Israeli Consulate in Bavaria aiming to promote exchange between the Israeli and German innovation cultures. At BIPA, SME partners propose innovation challenges, which are tackled by bi-national interdisciplinary teams formed by students and recent graduates. The program already had 82 participants and 20 SME partners and is currently in its 5th edition, each consisting of: A kick-off workshop either in Munich or Israel, followed by a virtual acceleration, in which the teams work remotely and are virtually coached by 2 coaches (one Israeli and one German) and report to the SME partner in milestones. After 8-10 weeks, the teams present the conceptualized solution (www.bip-accelerator.com). Assessment is conducted via ASTEE tool and further empirical research efforts (unpublished).	Bilateral EE promote an enriching intercultural and entrepreneurial experience that bring together both innovation cultures and add value to all stakeholders involved; SME partners that are more involved in the process and interact more with teams seem to be perceived more added value, as they are able to internalize innovation process knowledge and skills, besides receiving the final conceptualized solution; SMEs readiness to engage in such TH-enabled EE program needs to be improved and specific training to this stakeholder seems required; There are short-comes in virtual acceleration related to participants engagement level, coordination of remote work and intercultural communication; Short-term project may not promptly produce startups and spin-offs, though knowledge transfer seem possible;

3. Development Process for a Novel Educational Approach

The development of a new EE program focusing on Digital Transformation was based on the conceptual framework for the design and assessment of entrepreneurship education programs (Figure 1) proposed by (Valliere, Gedeon and Wise, 2014). This framework is based on the causal implications of the Theory of Planned Behavior, the contextual influences of ontology and environment, and additional perspectives offered by Stakeholder Theory. Although the framework is supported mainly by entirely theoretical arguments, it has been previously applied by MUAS/SCE in the curriculum development of RP, EU-XCEL and BIPA. The framework

provides a structured and comprehensive overview of contextual factors and interdependencies effects of the many aspects concerning the design the of the new EE program, enabling a more effective co-creation process.

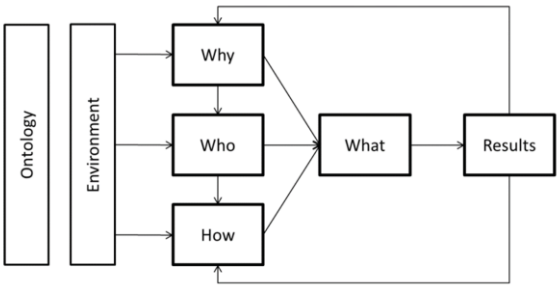

Figure 1: Framework for the development of EE programmes (Valliere, Gedeon and Wise, 2014)

The first step in the co-creation process was to conduct discussion between MUAS/SCE leaders and a series of relevant stakeholders (e.g. professors, faculty deans, and industrial and technology partners) through individual meetings and a larger workshop to formulate the requirements and guidelines for future training in the field of Entrepreneurship and Digitalization. The main insights of this step were:

- The different actors of society (i.e. students from different faculties, teachers, external actors from industry, entrepreneurs, politicians, etc.) play an active, context-related role, which results from the multi-faced interaction of these actors;
- Working on specific projects in small, interdisciplinary groups does not contradict social embedding, but presupposes it. In such a context, one-dimensional instructions in teaching and learning are no longer applicable; rather, continuous reflective experience, coordination and negotiation in direct exchange in both physical and virtual space are essential;
- The more intensively different professional and personal learning areas are trained and experienced in context, the better competencies and personality in the sense of "T-shaped People" can develop;
- Entrepreneurship in conjunction with the involvement of external partners can provide a preferred, holistic learning framework that optimally combines specific professional, personal, interdisciplinary, systemic and cooperative elements;
- Individual learning space can serve different goals, such as working on a real project or further academic education;
- The transition from learning to lifelong learning should be encouraged;
- In the dynamic field of digital transformation and entrepreneurship training, the university sees itself more and more as an initiator, co-designer and enabler, giving students and motivated innovators from industry a holistic, project-specific access to knowledge, experience and practice. In this way, participants can implement their strengths, ideas and visions and develop into responsible, entrepreneurial leaders in the long term.

The resulting outcome, after several feedback-loops, was summarized in the form of a grant proposal for a novel educational approach towards further developments in university education. The so-called DEEP DIVE programme (DDP) is an intensive full-time educational offer at master level, which combines the promotion of professional competences in the field of digital transformation with the development of an entrepreneurial mindset. Hence, DDP should include the following characteristics:

- The university works together with strong external technology and application partners from the REE to meet the demands for a leading international program. Well-regarded organizations have signed letters-of-intent to cooperate;
- DDP intends to support real entrepreneurial projects in small groups individually and according to their needs, through a flexible individualized curriculum, rather than a standard cohort curriculum;
- DDP combines work on a real project in the field of digital transformation with further academic education, being open to both bachelor students and motivated professionals, who see the new challenges of digital transformation as an opportunity and wish to further educate themselves;
- DDP should be inter- and transdisciplinary in its composition of participants and faculty engagement;

- DDP supports projects in different areas of digital transformation through coaching and support by experts and mentors according to their needs;
- DDP is open to international participants and hence, offered in English;
- DDP novel educational approach is to be constantly further developed through continuous evaluation with regard to students' development (entrepreneurial mindset), real projects output and value added to main stakeholders. The evaluation shall be empirically pursued using mix-methods and should include the ASTEE assessment tool, in order to enable comparative analyses with other MUAS/SCE formats;

An overview of DDP format is present on Figure 2. It comprises a four-week preparation phase (Online Immersion Modul, i.e. MOOC) in which a broad target group is prepared for the current challenges of digital transformation and possible entrepreneurial activity via curated online modules. These modules form individual independent learning units with a time expenditure of about five hours each. Topics on current trends and challenges in digital transformation are paired with a reflection on corresponding entrepreneurship concepts.

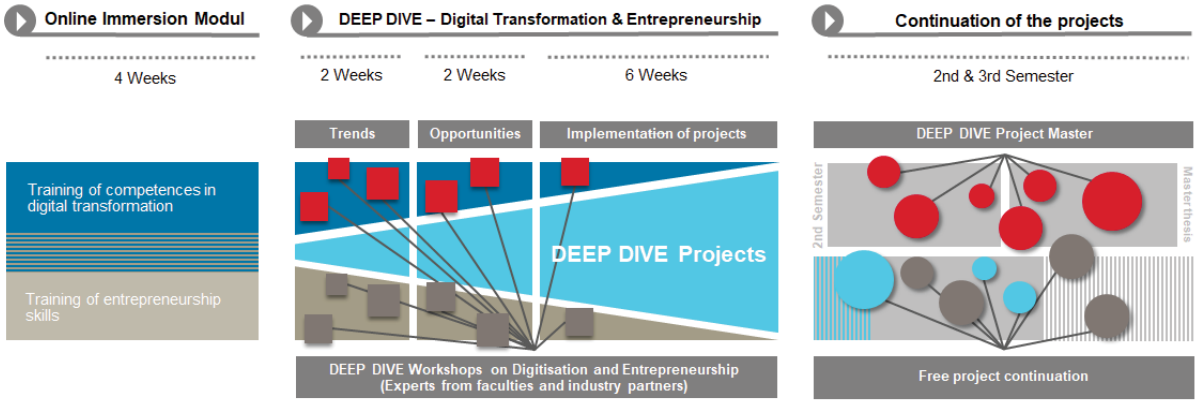

Figure 2: Structure and procedure of the DEEP DIVE program

The master programme is divided in 3 semesters awarding 90 ECTS. In the first semester, DDP selects students with diverse discipline backgrounds (e.g. business, engineering, education and design) to intensively immerse them in current topics and confronted with real complex tasks of digital transformation and entrepreneurship, over a period of one semester (full-time). This measure is designed to identify and intensively promote young, well-trained and above all highly motivated pioneers of digital transformation. At this stage, students should define a project idea to pursue which can be submitted by themselves, industry partners or professors. The development of student projects is enabled through intensive DDP workshops, guided by experts from MUAS, SCE, as well as external partners from the REE.

After completion of DDP first semester participants receive a Certificate and have the possibility to continue for two further semesters to pursue their project as a master thesis, while immersing themselves on specific topics by selecting existing courses from different faculties at MUAS or an international partner university to acquire the necessary ECTS points to obtain a qualified Master's degree.

Moreover, the continuation of projects beyond the DDP format should also be enabled and encouraged, through e.g. cooperation with the industry partner internally or via spin-off format; or by setting up a start-up, which the MUAS incubator start-up consultancy provides valuable support and advice through its proven processes.

Beyond the DDP structure, another key aspect of its development is the decision to create a Joint Commission (JC) to oversee the program, rather than attach it to a specific faculty. This format is enabled by Art. 19 (6) of the Bavarian Higher Education Act in conjunction with § 34 of the Ground rules of the Munich University of Applied Sciences. The JC (figure 3) is formed by a number of faculties and aims to enable an effective interdisciplinary format, overcoming possible regulation barriers of single faculties. The JC is responsible for organizing the study program in coordination with the participating faculties, by for example: Developing the

joint study and examination regulations; Approving adjustments to study content and plans; and Coordinating the access process of new faculty members.

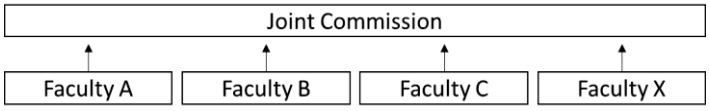

Figure 3: Proposed Program Joint Commission Structure

4. Discussion & Implications

To live up expectations regarding the future role of EUnis, universities will need to drive innovative ways of teaching. Knowledge provision surely remains important (through e.g. research journals). However, EUnis need also to add value to society, by developing and driving new approaches of knowledge generation through decentralized, inter- and transdisciplinary formats. This shift of self-understanding purpose shall be essential to resolve urgent problems and challenges in the field of digital technologies. Teaching formats and research results shall be integrated “real-time“ into the “real-world“ making sure user perspectives and dependencies to other areas of life stay in focus to produce value and advance society.

For this approach to succeed, universities must re-structure, starting with a mindset change – away from “admin-thinking“ towards an “entrepreneurial mindset“ by recognizing opportunities, demonstrating the ability to act quickly and precisely, agile developing new concepts, and enabling a flexible and supportive infrastructure.

In this scenario, transdisciplinary-learning environments in EUnis should not depend on faculties; rather REE stakeholders should be included in co-creation to think, tinker and tackle challenges that are rising in particular fields of society and/or having impact on specific regional areas. In-house EUnis infrastructure would pride itself with a flexible architecture and open access points so that stakeholders connect and communicate easily (e.g. living labs and creative spaces).

This paper presented the development process of a novel interdisciplinary educational approach, regarding the possibility to combine the implementation of an entrepreneurial idea with the acquisition of a Master's degree. This approach shifts away from short-term EE formats to a more long-term continuous approach that deep dive into a topic, while supporting the continuous development of a real project from idea to solution to market. Hence, the expectation is that DDP graduates actively shape the future of digital transformation through entrepreneurial thinking and action in the REE.

Theoretical implications of this paper regard advancements in understanding and shaping EUnis future within in a REE, through the case DDP development by MUAS/SCE. The DDP implementation will also contribute to shed light on which drivers towards a more entrepreneurial mindset are best affected through different educational approaches.

Practical implications are threefold: First, DPP impact and strengthens Munich’s REE by skilling-up future workforce and founders, while knitting ties between REE stakeholders tighter. Second, DPP offer industry partners access to a rich EE teaching experience. Third, DDP shall enable life-long learning opportunities to participants.

Overtime, the DDP continuous evaluation shall empirically establish the value added to all stakeholders involved and shed light into the feasibility, desirability and viability of such educational format.

References

Bacigalupo, M. et al. (2016) EntreComp : The Entrepreneurship Competence Framework, Publication Office of the European Union.

Brown, T. (2005) ‘Strategy By Design’, Fast Company.

Brown, T. and Katz, B. (2011) ‘Change by Design’, Journal of Product Innovation Management, 28, pp. 381–383.

Champenois, C. and Etzkowitz, H. (2017) ‘From boundary line to boundary space: The creation of hybrid organizations as a Triple Helix micro-foundation’, Technovation. Elsevier Ltd.

Duval-Couetil, N. (2013) ‘Assessing the impact of entrepreneurship education programs: Challenges and approaches’, Journal of Small Business Management, 51(3), pp. 394–409.

Etzkowitz, H. (2014) 'The Entrepreneurial University Wave: From Ivory Tower to Global Economic Engine', Industry and Higher Education, 28(4), pp. 223–232.
Etzkowitz, H. (2016) 'The Entrepreneurial University: Vision and Metrics', Industry and Higher Education, 30(2), pp. 83–97.
Etzkowitz, H. and Leydesdorff, L. (2000) 'The dynamics of innovation : from National Systems and "' Mode 2 '" to a Triple Helix of university – industry – government relations', Research Policy, 29, pp. 109–123.
Etzkowitz, H. and Zhou, C. (2018) The Triple Helix, University-Industry-Government Innovation and Entrepreneurship. 2nd Editio. New York & London: Routledge.
European Council (2006) 'Recommendation of the European Parliament and the Council on key competencies for lifelong learning', Official Journal of the European Union, (March 2002), pp. 10–18. Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF.
Fayolle, A., Gailly, B. and Lassas-Clerc, N. (2006) 'Assessing the impact of entrepreneurship education programmes: a new methodology', Journal of European Industrial Training, 30(9), pp. 701–720.
Fernandez-Esquinas, M., Merchan-Hernandez, C. and Valmaseda-Andia, O. (2016) 'How effective are interface organizations in the promotion of university-industry links? Evidence from a regional innovation system', European Journal of Innovation Management, 19(3).
Fitzgerald, M. et al. (2007) 'Embracing Digital Technology - A New Strategic Imperative', MIT Sloan Review. Available at: https://sloanreview.mit.edu/projects/embracing-digital-technology/.
Gillig, H., Hofer, A. R. and Sailer, K. (2012) 'Development Path and Influencing Factors in Promoting Entrepreneurship at the Munich University of Applied Sciences', in Proceedings of the 2012 11th Science to Business Marketing Conference (FINPIN). Münster.
Hannon, P. D. (2013) 'Letter from Academia: Why is the Entrepreneurial University Important?', Journal of Innovation Management Hannon JIM, 1(2), pp. 10–17.
Huber, F. et al. (2016) 'Design Thinking-Based Entrepreneurship Education : How to Incorporate Design Thinking Principles into an Entrepreneurship Course', in Proceedings of the 4th 3E Conference - ECSB Entrepreneurship Education.
Huber, F., Sailer, K. and Peisl, T. (2017) 'Career Trajectories after Graduating from a University-Based Entrepreneurship Certificate Programme', in Proceedings of the 5th 3E Conference - ECSB Entrepreneurship Education.
Janssen, F. and Bacq, S. (2010) 'Cultural and Outcomes-Related Issues in Implementing an Interdisciplinary Cross-Campus Entrepreneurship Education Program', Journal of Small Business & Entrepreneurship, 23(sup1), pp. 733–746.
Kane, G. C. et al. (2015) 'Strategy, not technology, drives digital transformation', MIT Sloan Review. Available at: http://dupress.com/articles/digital-transformation-strategy-digitally-mature-podcast/.
Kaufman, I. and Horton, C. (2014) Digital Marketing - Integrating Strategy and Tactics with Values, a Guidebook for Executives, Managers and Students. 1st edn. New York: Routledge.
Kuckertz, A. (2013) 'Entrepreneurship Education: Status Quo and Prospective Developments', Journal of Entrepreneurship Education, 16, pp. 59–71.
Lange, J. E. et al. (2011) 'Does an entrepreneurship education have lasting value? A study of careers of 4,000 alumni', Frontiers of Entrepreneurship Research, 31(6), pp. 209–224.
Leydesdorff, L. (2012) 'The Triple Helix, Quadruple Helix, ..., and an N-Tuple of Helices: Explanatory Models for Analyzing the Knowledge-Based Economy?', Journal of the Knowledge Economy, 3(1), pp. 25–35.
Leydesdorff, L. et al. (2017) The Measurement of Synergy in Innovation Systems: Redundancy Generation in a Triple Helix of University-Industry-Government Relations, Springer Handbook of Science and Technology Indicators: Working Paper Series (SWPS).
Neck, H. M. and Greene, P. G. (2011) 'Entrepreneurship Education : Known Worlds and Frontiers', Journal of Small Business Management, 49(1), pp. 55–70.
O'Flaherty, B. et al. (2017) 'Towards Born European ICT Enterprises - The Challenges of European ICT Entrepreneurship', in Proceedings of the 2017 11th Mediterranean Conference on Information Systems (MCIS). Genoa, Italy.
Philpott, K. et al. (2011) 'The entrepreneurial university: Examining the underlying academic tensions', Technovation. Elsevier, 31(4), pp. 161–170.
Rauch, A. and Frese, M. (2007) 'Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success', European Journal of Work and Organizational Psychology, 16(4), pp. 353–385.
Rideout, E. C. and Gray, D. O. (2010) 'Does entrepreneurship education really work: A longitudinal study of three university-based E-ed programs', Frontiers of Entrepreneurship Research, 30(21), p. Article 3.
Roundy, P. T., Bradshaw, M. and Brockman, B. K. (2018) 'The emergence of entrepreneurial ecosystems: A complex adaptive systems approach', Journal of Business Research. Elsevier, 86(January), pp. 1–10.
Stifterverband and Heinz Nixdorf Stiftung (2016) Gründungsradar. Available at: http://gruendungsradar.de/themenbereiche/gruendungsaktivitaeten.
Turgut-dao, E. et al. (2015) 'Embedding Experiential Learning in Cross-Faculty Entrepreneurship Education', in Proceedings of the 3th 3E Conference - ECSB Entrepreneurship Education.
Unger, J. M. et al. (2011) 'Human capital and entrepreneurial success: A meta-analytical review', Journal of Business Venturing. Elsevier Inc., 26(3), pp. 341–358.
Valliere, D., Gedeon, S. and Wise, S. (2014) 'A comprehensive framework for entrepreneurship education', Journal of Business and Entrepreneurship, 26(1), pp. 89–120.

Competence-Related Challenges for Micro-Enterprises Entering the Field of Servitization

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Abstract: The purpose of this study was to examine the competencies that micro-enterprises (micros) need in order to enter the field of servitization. Servitization is a great business opportunity for micros, but it is important to know what competencies a firm needs when targeting the longer and more profitable customer relationships that servitization may offer. Micros possess limited human resources and thus competencies, and it is crucial for them to understand competence-related challenges in order to operate successfully. This empirical study was conducted by employing a qualitative research approach in order to enrich the collected data and the findings. The multiple case strategy used here allowed for an extensive examination of the phenomenon of interest. Data were collected by means of interviews in eight Finnish subcontracting micros in the fields of forestry and mining in order to produce new information about the competence-related challenges faced by micros entering the field of servitization. The results show that micros face competence-related challenges in servitization in terms of entrepreneurship, functioning under change and financing. Entrepreneurial competencies are strongly linked to recognising opportunities and envisioning future business opportunities. There is also a need for change competencies, both for micros and customers, including the ability and willingness to change by renewing employees' skills and methods of working. Financial difficulties and a lack of understanding regarding future economic responsibilities were highlighted as challenges. This competence-based approach to studying micros in the context of limited human resources allowed us to identify the competence-related challenges that micros face in the industrial mega-trend of servitization. In addition, this study addressed academic and practical application gaps in the study of micros.

Keywords: micro-enterprises, competencies, servitization, case study, Finland

1. Introduction

This paper concerns the competence-related challenges that micro-enterprises (micros) face when entering the field of servitization. Servitization means enhancing the capabilities and renewing the processes of a company in order to create mutual value for the company and its customers. This process occurs by shaping a firm's offering from traditional products to product–service entities (Baines et al., 2009).

Micros employ 1–9 people and have a turnover ≤ € 2 M€ or a balance sheet total ≤ € 2 M€ (European Commission, 2018). Micros represent over 95% of European enterprises (Muller et al., 2016) and are considered a driver of the European Union's economy. There is a lack of academic research on micros (Kelliher & Reinl, 2009) and a considerable gap in the literature regarding micros (Samujh, 2011). It is widely acknowledged that micros experience resource scarcity, which forces them to operate under financial and expertise constraints (Kelliher & Reinl, 2009). Human resources are limited, and, therefore, competencies are limited as well.

Micros are largely influenced by their owners and managers (Burns, 2010). Predominantly, a micro's culture is an extension of the owner's personality, as the owner plays a pivotal role in an organisation's focus and success (Kelliher & Reinl, 2009; Burns, 2010). When a micro-entrepreneur faces challenges, unexpected changes or crises, he or she must usually solve them alone. Entering the field of servitization may challenge a micro's competencies, and it is crucial for micros to evaluate their limited competencies proactively before entering the servitization field. In addition, to acquire competitive advances in business with limited human resources, Barney, Wright & Kechen (2001) stated that, for small firms, '[. . .] much of the focus of RBV [resource-based view] research has been on larger firms, yet smaller firms also face the need to acquire critical resources to create a sustainable competitive advantage' (p. 634).

Servitization has a great impact on customer value in terms of co-operation and individualisation (Carsten Carsten, Müller-Stewens & Zimmermann, 2017). For micros, servitization is a great business opportunity, but it is important to know what competencies a firm needs when targeting the longer and more profitable customer relationships that servitization may offer.

To study competence-related challenges in micros, the research questions of this study were as follows:

1. What competence-related challenges do micros face when entering the field of servitization?
2. How do limited human resources influence micros entering the field of servitization?

The current paper, being qualitative in nature, examines competence-related challenges from various perspectives and focuses on defining the phenomenon in terms of micros with limited resources. Generally, competence literature concentrates on large business units (Barney et al., 2001) with people who have special competencies that enable them to perform different tasks in a company. However, in a small firm, everybody must perform several tasks (Taipale-Erävala, 2015); thus, the current competence literature cannot be applied micros. This study narrowed a discovered gap in qualitative case study research on management development and training in the context of micro-business entrepreneurship and micros (Devins et al., 2005). Qualitative research and face-to-face interviews are informative and may offer wider understanding of a phenomenon; thus, interviews were conducted. Furthermore, this study obtained new knowledge related to servitization.

Although many academic studies have been conducted on this topic, research on servitization seems to concentrate on existing knowledge in the study of manufacturing industries (Kowalkowski, Gebauer & Oliva, 2017). Micros generally act as subcontractors in various industries and offer a rich platform for research as a result.

2. Previous Research

There are few competence-related studies on micros. Kelleher and Reinl (2009) studied the competencies and competitive advantages of micros, concluding that 'there is an assumption that knowledge must be used optimally within the micro-firm by developing the analytical and critical skills of individuals, groups and the entire organisation so as to sustain and grow these firms' competitive advantage'. Micros employ between one and nine people, so studying competence is partly individual and partly organisational.

Before diving into the previous literature, it is important define *competence*, as it is a fuzzy concept (Delamare-LeDeist & Winterton, 2005) due to its similarity to *competencies* (van der Klink & Boon, 2003). Sanghi (2007) explained that competence is skill-based (i.e., what a person can do), while a competency is behaviour-based, (i.e., how to do it). Many definitions of *competence* and *competencies* exist in the literature (e.g., Biemans et al., 2004; Brockmann, Clarke & Winch, 2008; Spencer & Spencer, 1993). In this study, we define competencies as human features, abilities, attitudes, capabilities, skills, experiences and other traits that influence a firm's operations. According to Klemp (1980), a competency is 'an underlying characteristic of a person which results in effective and/or superior performance on the job' (p. 21).

A business begins when an individual discovers an opportunity, executes an idea into profitable innovation and establishes an enterprise, becoming an entrepreneur (Shane, 2003). The act of discovering an idea, exploiting it and executing it requires entrepreneurial competencies. Entrepreneurial competencies focus on scanning the future business environment, generating ideas and identifying new business opportunities (Mitchelmore & Rowley, 2010). Chandler and Jansen (1992) explained that entrepreneurial competencies include entrepreneurial skills, managerial skills and technical skills. Micros are small; thus, an entrepreneur who exploits and executes an idea often acts as a manager and requires managerial competencies.

Managerial competencies are crucial for firms to develop other competencies (Lado, Boyd & Wright, 1992), including financial and human resource management, marketing and commercial activities and leadership skills (Loué & Baronet, 2012). Thus, an entrepreneur orchestrates physical, human and monetary resources and business performance using managerial competencies. When starting a business, an entrepreneur focuses on physical and monetary resources and then on human resources. Human resources in micros are usually limited. In Europe, micro-, small- and medium-sized enterprises employ at least four people (Lukacs, 2005), forming an organisation with organisational competencies. According to Teece, Pisano & Shuen (1997), organisational competencies are firm-specific assets formed by individuals and groups to facilitate firms' performances. Similar to organisational competencies are network competencies (Ferrer et al., 2009), which focus on inter-organisational networking and co-operation (Lambert & Cooper, 2000). Organisational competencies are built on top of individual competencies (Nurach, Thawesaengskulthai & Chandrachai, 2012).

Overall, individual competencies create a basis for a firm's expertise; therefore, the effect of employees' skills and competencies on any firm's performance is significant. Job competency (i.e., how an individual benefits a micro) is an underlying characteristic of an individual that results in superior and effective performance in a job (Boyatzis, 1982; Klemp, 1980). In order to achieve competitive advantages, both employee- and organisational-level competencies are important (Hitt, Ireland & Hoskisson, 2005). The business environment changes constantly; thus, individuals and originations must be willing to change. Change competencies allow firms to survive through various business changes, such as renewing skills and work mannerisms and having a proactive attitude towards change (Taipale-Erävala, 2015). When a business environment changes, change competencies are required. Servitization, as a modern trend, is a challenge to many companies, including micros.

Servitization is an action where a 'firm offers bundles of customer-focused combinations of products, services, support, self-service and knowledge' (Vandermerwe & Rada, 1988) to enhance competitive advantages (Wise & Baumgarter, 1999; Neely, 2007; Baines et al., 2009a). Over the years, product–service combinations have increasingly shifted from selling a product to customers to leasing, hiring, pooling and paying for availability or performance (Spring & Araujo, 2009). Thus, the boundary between products and services is now obscure (Ren & Gregory, 2007; Baines et al., 2009b).

3. Research methods, data collection methods and data analysis

This study is a cross-sectional multiple-case study (Saunders et al., 2009; Yin, 2009). Case study research produces detailed and holistic knowledge based on the analysis of multiple empirical, context-rich sources (Tellis, 1997). It is commonly used in business research as a method to improve the knowledge of individual, group-level, organisational and social phenomena (Yin, 2009). Case studies can produce rich descriptions of every-day life (Stake, 1995); in this study, this refers to the beliefs, opinions and views of micro-enterprise managers regarding the competence-related challenges of entering the field of servitization. A case may be a unique or special, operating according to a pattern (Stake, 1995). Micros and the competence-related challenges related to servitization are special cases because of their novelty in business.

The data collection used herein involved individual, focused interviews. In a focused interview, the aim is to collect data by interviewing a person or people for a short period of time (Yin, 2009). The data were collected from eight Finnish micros using semi-structured interviews to ensure that rich and focused information was collected (Merriam, 2009). A qualitative approach was selected for this study in order to obtain a better understanding of the context within which decisions are made and actions are performed (Myers, 2009). The researchers interviewed the representatives of the micros. In this study, the firms were chosen based on industry, size and location. The case companies represent Finnish micros functioning in process industry. The interviews were conducted between 24 April 2017 and 22 August 2017. Table 1 summarises the studied micros and interviews.

Table 1: Descriptions of the interviewees and their interviews

Case number	Industry in which the firm operates	Number of employees	Interviewee(s)	Length of interview
1.	Forestry	2–3	Managing director	1 h
2.	Mining and delivering comprehensive ICT services and solutions	5	Managing director, Marketing manager	1 h 18 min
3.	Machining, subcontracting	5	Managing director, Chief financial officer	1 h
4.	Supplying electrical devices and equipment for mining and community infrastructure building	2	Managing director	1 h 16 min
5.	Maintenance services in the mining industry	8	Managing director	59 min
6.	Manufacturing high-speed electronics for mining, the steel industry, pharmacies and bio-pharmacies	6	Managing director, Marketing manager	1 h 11 min
7.	Diving and underwater works for industries, municipalities and ports	1	Managing director	1 h 2 min
8.	Installing equipment for the forestry, mining, energy and steel industries, including maintenance and welding	4, temporary staff when needed	Managing director	1 h 8 min

Before the interviews, all interviewees received a semi-structured questionnaire to familiarise themselves with the topics. During each interview, the order of the topics varied. Interviewer allowed each interviewee to discuss the topics freely, as a relaxing atmosphere allows people to talk openly about their opinions, beliefs and experiences. The questions were clarified and repeated if necessary in order to ensure the interviewees' comprehension. The central themes covered by the interview were; (1) customer, (2) offerings, (3) value proposition, (4) sales structure, and (5) present and future challenges. Before each interview, the researcher explored the publicly available secondary data pertaining to each micro.

A modified grounded theory-based process (Easterby-Smith, Thorpe & Lowe, 1991) was used to conceptualise the framework through the classification of data related to the research questions (Merton & Kendal, 1957). The interviews were first coded based on the research questions, and after that the main coded items were grouped and categorised based of their similarities.

4. Findings

The findings are presented separately related to the research questions RQ1 and RQ2. First, the analysis of the data related to the first research question RQ1 revealed the following competence categories: entrepreneurial and managerial competencies, individual competencies related to an entrepreneur, individual competencies related to an employee, financial competencies and change competencies. Table 2 presents the competence categories classifying the first phase of the coding with examples taken directly from the interviews. Second, the analysis of the data related to the second research question RQ2 revealed that limited human resources are a major challenge for micros entering the field of servitization.

4.1 Competence-related challenges for micro-enterprises entering the field of servitization

The competence-related challenges are categorized in the Table 2 below divided in Entrepreneurial and managerial competencies, Individual competencies of an entrepreneur and an employee, Financial competencies and Change competencies.

Table 2: Competence-related challenges for micros entering the field of servitization

Competence category	Examples	Quotations
Entrepreneurial and managerial competence	A lack of entrepreneurial competencies (case 3) Not actively looking for new business opportunities (case 3) A lack of managerial competence needed to clarify business plans (case 4)	'We need to search for longer customerships and partnerships, but we have not achieved them, and this is our challenge in the field of marketing' (case 3) 'The [business plan] needs to be cleared up because our resources will not last long' (case 4)
Individual competence (entrepreneur)	A lack of language proficiency, which is an obstacle to increasing international trade (case 1) In a network, a single entrepreneur is able to conduct more work; however, in a network, not all possess network competencies (case 7)	'My language proficiency is limited. I had to choose either technology or language. I chose technology' (case 1) 'I could find a partner and get together a packet, but it has failed to happen' (case 7)
Individual competence (employee)	Availability of competent, permanent employees (case 1) Shortage of experienced, skilled, multi-tasking personnel (case 4)	'I have trained about 10 guys, and, when they are skilled, they put their papers [job applications] elsewhere' (case 1) 'We have to recruit, but it is terribly difficult to find employees. This is a special field; it takes time for a person to learn' (case 4)
Financial competence	No observations about cost effects (case 6) Understands variable costs, but not the influence of fixed expenses (case 7)	'It [servitization] may be a goal in the future, but it demands resources from the company and the organisation. We do not possess such resources at the moment' (case 6) 'Goodness, insurance is the greatest nuisance' (case 7)
Change competence	An entrepreneur understands the risk of one supplier shutting down a mine but clings to the past (case 5) Field-specific unwillingness of customers to develop new solutions (case 2) Do-it-yourself attitude prevents new sales (case 1)	'It is kind of difficult to experiment away from here, because the work there remains undone and work here remains undone' (case 5) 'The culture [in mining] is such that people want to do things that they have done before in the same way' (case 2) 'You [the customer] can get the best profit using new skills' (case 1)

4.2 Competence-related challenges for micro-enterprises entering the field of servitization

Herein, entrepreneurial and managerial competencies were treated together, because, in a micro, the entrepreneur acts as the manager as well. Entrepreneurial competencies include searching for new business possibilities by scanning the business environment and developing new business ideas. It is possible to exploit servitization in order to search for new business possibilities, for example, by increasing digitisation or increasing the number of services instead of delivering products. Passiveness is a competence-related challenge in searching for new businesses, as noted in case 3 with the following statement: '*We need to search for longer customerships and partnerships, but we have not achieved them, and this is our challenge in the field of marketing'*. Another challenge is clarifying scattered business plans, as noted in case 4: '*The [business plan] needs to be cleared up because our resources will not last long'*.

Individual competencies were treated from the point of views of entrepreneurs and employees, as micros with few employees may be competent and successful by networking or acquiring other competencies. This study revealed a lack of language proficiency to be a challenge, as noted in case 1: '*My language proficiency is limited. I had to choose either technology or language. I chose technology'*, as well as the need for networking, as noted in case 7*: 'I could find a partner and get together a packet, but it has failed to happen'*. Micros have challenges in terms of the unavailability of professional and permanent personnel. As such, they must train employees to obtain the skills the micro needs, as noted in cases 1 and 4: *'I have trained about 10 guys, and, when they are skilled, they put their papers [job applications] elsewhere' and 'We have to recruit, but it is terribly difficult to find employees'* (case 1) and *'This is a special field; it takes time for a person to learn'* (case 4).

Financial issues and competencies are important for micros to secure financial capital and ensure low turnover. Servitization is a novel issue, and observations on its financial effects on business operations are scarce. In a start-up, *'it [servitization] may be a goal in the future, but it demands resources from the company and the organisation. We do not possess such resources at the moment'* (case 6). In the interviews, insurance came up unexpectedly. When asked about the financial considerations when entering the field of servitization, the interviewee stated, *'Goodness, insurance is the greatest nuisance'* (case 7).

When entering the field of servitization, business operations change; thus, change competencies are required, including a proactive attitude towards change, the ability to tolerate uncertainty and the willingness to renew skills and work mannerisms (Taipale-Erävala, 2015). Change is difficult to implement, as entrepreneurs may cling to the past, as seen in case 5: *'It is kind of difficult to experiment away from here, because the work there remains undone and work here remains undone'*. In addition, customers or industries may avoid novel business solutions and want to proceed as usual, which interferes with servitization, as seen in case 2: *'The culture [in mining] is such that people want to do things that they have done before in the same way'*. In addition, customers' do-it-yourself attitude prevents new sales, as noted in case 1: *'You [the customer] can get the best profit from your forest using new skills'*.

4.3 Limitations of human resources for micros entering the field of servitization

Servitization requires planning. When a micro considers providing advanced services, it may face a lack of time, challenges in increasing business operations, challenges in changing employees' individual attitudes and challenges in recruiting skilled and motivated personnel. These challenges are presented in Table 3.

Table 3: Limitations of human resources for micros entering the field of servitization

Limitation	Quotations
Lack of time	'We do not have the time or human resources to acquire knowledge of the conditions of international business' (case 1) 'No time to invest in marketing and minor human resources in marketing' (case 3)
Challenges in increasing business operations	'We do not have any resources for servitization yet' (case 6) 'The servitization business in the industry is too big for a small firm, so small firms remain small' (case 8)
Employees' individual attitudes and conditions	'We have difficulties getting personnel to work long-distance jobs' (case 5) 'It is a challenge to recruit personnel to work long-distance jobs' (case 8)
Difficulties in recruiting skilled and motivated personnel	'You cannot operate in servitization at a large scale because of the unavailability of competent personnel' (case 1) 'Challenges in recruiting competent staff. Young people are not interested in the field [mining]' (case 5)

A lack of time is a common challenge for small firms, as confirmed in this study. The research question targeted the influences of limited human resources, which were manifested as slight actions in marketing (case 3) and a need for familiarisation with servitization (case 1). Based on the research, servitization seems to be connected to international business, which naturally depends on the industry of the micro.

Overall, micros lack resources for servitization (case 6), which may also mean limited physical or financial resources. In addition, servitization seems to be a big issue for micros (case 8). Servitization refers to certain actions, such as taking care of devices. Thus, employees must work outside of the micro's premises. The study revealed that employees are unwilling to work far away from their normal living areas (cases 5 and 8), which makes entering servitization challenging.

In addition, recruiting challenges hinder micros from entering the field of servitization. Although micros want to offer advanced services to their customers, the unavailability of competent personnel (cases 1 and 5) prevents this. Moreover, attractiveness varies by industry, in that young people are generally not interested in working in some industries (case 5).

5. Discussion and conclusion

The study focused on examining the competencies that micros need in order to enter the field of servitization using empirical and qualitative methods, specifically targeting the competence-related challenges that a micro may face, especially those caused by limited human resources. The findings highlight that servitization is quite novel and unfamiliar to micros. All the interviewed firms operate within large companies in the forestry and mining industries, where servitization has been used for years. Although some micros operate in industries where servitization is used, they might not recognise it as a new trend but rather through the lens of the status quo. However, micros will face servitization eventually; thus, the sooner that enterprises familiarise themselves with the basic issues of implementing servitization, the sooner these firms may benefit from the business obtained by providing advanced services.

A business begins when an individual discovers an opportunity, executes an idea into profitable innovation and establishes an enterprise, becoming an entrepreneur (Shane, 2003). Entrepreneurial competencies focus on scanning the future business environment, generating ideas and identifying new business opportunities (Mitchelmore & Rowley, 2010). This study indicated that micros desire long customerships in order to stabilise business fervency but do not see servitization as a solution. In addition, micros possess unclear business plans due to their limited resources, which can be solved by achieving proper entrepreneurial and managerial competencies (Chandler & Jansen, 1992).

In terms of managerial competencies (Loué & Baronet, 2012), marketing and financial issues are challenges. Actions of marketing focus on acquiring more customers and orders but neglect financial issues, which can deeply harm small businesses. Thus, servitization seems to challenge the financial ability and economic knowledge of micros. Advanced services may produce high revenue for micros, which also means higher costs in terms of increased investments. According to this study, micros experience variable costs, especially insurance costs, to be the biggest challenge, although fixed costs may cause bigger challenges.

Individual competencies refer to all human features, including abilities, attitudes, capabilities, skills and experiences, all of which can affect job performance (Boyatzis, 1982; Klemp, 1980). Both employee- and organisational-level competencies are important (Hitt et al., 2005). This study indicated a lack of individual competencies (e.g., language proficiency and insufficiency to achieve the desired goal) and frustration surrounding the need to train competent employees and then losing them. The unavailability of skilled and competent personnel is a challenge that relates first to the individual competencies of employees and second to entrepreneurial and managerial competencies, as entrepreneurs are in charge of recruiting employees. Discovering the reasons for employee turnover will allow entrepreneurs to enhance their managerial and entrepreneurial competencies.

Servitization is a huge change in manufacturing industries that demands change competencies, such as a proactive attitude towards change, the ability to tolerate uncertainty and the willingness to renew skills and working mannerisms (Taipale-Erävala, 2015). This study revealed that change competencies are required, and entrepreneurs cannot cling to the past. They must put effort towards looking for new customers or business

ideas. Long customerships with only one customer endanger a micro's business continuity if the entrepreneur does not change his or her attitude towards change. The research highlighted that customers hinder change and want to operate in the same way as always. Thus, the progress of servitization depends both on micros and on their customers.

The study found that limited human resources are caused by a lack of time. Acquiring knowledge and familiarising oneself with servitization takes time from entrepreneurs and employees, but small firms can lower the threshold by networking. Sharing resources and building trust with partners in a network broadens human resources and enables efficient, flexible, high-quality and time-based operations (Ferrer et al., 2009). Using network co-operation had not been considered by micros but can be done to broaden human and other resources in the future.

In addition, the quality of personnel limits micros from entering the field of servitization. Employees' individual attitudes and conditions influence new business outputs. The unwillingness to work outside the premises and ambitiousness both indicate the personal valuation of work circumstances and institutional and social appreciations, all of which a micro may find difficult to change.

In conclusion, this study determined competence-related challenges for small enterprises, including a lack of time and the unavailability of personnel, both of which are connected to limited human resources. This may be eased by networking and co-operation with other small enterprises. This study also identified the importance of entrepreneurial competencies, focusing on discovering new businesses and exploiting possibilities for servitization. In addition, this study found that financial competencies challenge micros through the increased consciousness of investments and costs, which may fall on a supplier instead of a subcontractor. Finally, this study found that servitization changes the business environment. Overall, through change competencies, it is easy for a micro to enter the field of servitization.

First, this study is limited to competence-related challenges of micro-enterprises entering the field of servitization in manufacturing industries. In order to have broader view of competence-related challenges in micros, we encourage further research in other industries. Second, the data is collected in Finnish context. To study attitudinal and other competence-related challenges, we recommend opening the phenomenon in other contexts (different countries, regions, cultures, business ecosystems etc.). It may open new perspectives; e.g. if cultural items influence willingness to work outside the local business ecosystem, and other personal valuations of work circumstances. Moreover, in addition to studying the phenomenon in the context of micro-sized enterprises opened in this study, we encourage opening the competence-related challenges of small and medium-sized as well as large enterprises entering the field of servitization.

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References

Barney, J., Wright, M. and Ketchen, D.J. (2001) "The resource-based view of the firm: ten years after 1991", Journal of Management, Vol 27, pp 625-41.

Baines, T.S., Lightfoot, H.W., Benedettini, O. and Kay, J.M. (2009a) "The servitization of manufacturing: A review of literature and reflection on future challenges", Journal of Manufacturing Technology Management, Vol 20, No. 5, pp 547–567.

Baines, T.S., Lightfoot, H., Peppard, J., Johnson, M., Tiwari, A., Shehab, E. and Swink, M. (2009b) "Towards an operation strategy for product-service servitization", International Journal of Operations & Production Management, Vol 29, No. 5, pp 494-519.

Biemans, H., Nieuwenhuis, L., Poell, R., Mulder, M., and Wesselink, R., 2004 "Competence-based VET in the Netherlands: background and pitfalls", Journal of Vocational Education & Training, Vol 56, No. 4, pp 523-538.

Boyatzis, R. E. (1982) The competence manager: A model for effective performance, John Wiley & Sons, New York.

Brockmann, M., Clarke, L., and Winch, C., (2008) "Knowledge, skills, competence: European divergences in vocational education and training (VET)—the English, German and Dutch cases", Oxford Review of Education, Vol 34, No. 5, pp 547-567.

Burns, P. (2010) Entrepreneurship and small business: Start-up. Growth and maturity, 3rd ed., Palgrave Macmillan, Basingstoke.

Carsten, C., Müller-Stewens, G. and Zimmermann, A. (2017) Radical Business Model Transformation: Gaining the Competitive Edge in a Disruptive World, 1st ed., Kogan Page Publishers, London.

Chandler, G.N. and Jansen, E., 1992. "The founder's self-assessed competence and venture performance", Journal of Business Venturing, Vol 7, No. 3, pp 223-36.

Delamare-Le Deist, F. and Winterton, J., (2005) "What Is Competence?", Human Resource Development International, Vol 8, No. 1, pp 27-46.

Devins, D., Gold, J., Johnson, S. and Holden, R. (2005) "Conceptual model of management learning in micro businesses – implications for research and policy", Education & Training, Vol. 47, Nos, 8/9, pp 540-51.

Easterby-Smith, M., Thorpe, R., and Lowe, A. (1991) Management Research, SAGE Publications Ltd, London.

European Commision (EC), What is an SME?, webpages http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_fi.

Ferrer M., Santa R., Soosay, C., and Hyland, P. (2009) "The Critical Competences needed for Innovative Organisational Inter-Firm and Intra- Firm Integration", [Online], available from CINet http://eprints.qut.edu.au/27156/1/ CINet_09_-_Ferrer.pdf.

Hitt, M. A., Ireland, R. D., and Hoskisson, R. E. (2005) Strategic management: Competitiveness and globalization, 6th ed., KY7 South-Western, Versailles.

Kelliher, F. and Reinl, L. (2009) "A resource-based view of micro-firm management practice", Journal of Small Business and Enterprise Development, Vol 16, No. 3, pp 521-532.

Klemp, G. O. (1980) The assessment of occupational competence, Report to the National Institute of Education, Washington, DC:

van der Klink, M. and Boon, J. (2003) "Competencies: the triumph of a fuzzy concept", International Journal of Human Resources Development and Management, Vol 3, No. 2, pp 125-137.

Kowalkowski, C.; Gebauer, H. and Oliva, R. (2017) "Service growth in product firms: Past, Present, and Future", Industrial Marketing Management, Vol 60, pp 80-88.

Lado, A.A., Boyd, N.G., and Wright, P. (1992) "A competency-based model of sustainable competitive advantage", Journal of Management, Vol 18, No. 1, pp 77-91.

Lambert D. and Cooper, M. (2000) "Issues in Supply Chain Management", International Marketing Management, Vol 29, No. 1, pp 65-83.

Loue, C. and Baronet, J. (2012) "Toward a new entrepreneurial skills and competencies framework: A qualitative and quantitative study", International Journal of Entrepreneurship and Small Business, Vol 17, No. 4, pp 455-477.

Lukacs, E. (2005) "The Economic Role of SMEs in World Economy, Especially in Europe", European Integration Studies, Vol 1, No. 4, pp 3-12.

Merriam, S. (2009) Qualitative Research, A Guide to Design and Implementation, Jossey-Bass, John Wiley & Sons, Inc., San Francisco.

Merton, R.K. and Kendal, P. C. (1957) The Student Physician, Harvard University Press., Cambridge.

Mitchelmore, S. and Rowley, J. (2010) "Entrepreneurial competencies: A literature review and development agend", International Journal of Entrepreneurial Behaviour & Research, Vol 16, No. 2, pp 92-111.

Muller, P., Devnani, S., Julius, J., Gagliardi, D., and Marzocchi, C. (2016). Annual Report on European SMEs 2015/2016–SME recovery continues, Contract number: EASME/COSME/2015/012, European Union.

Myers, M. (2009) Qualitative Research in Business and Management, Sage Publications, London.

Nurach, P., Thawesaengskulthai D., and Chandrachai, A. (2012) "Developing an Organization Competencies Framework for SME(s) in Thailand" Chinese Business Review, Vol 11, No. 2, pp 233-241.

Neely, A. (2007) "The servitization of manufacturing: an analysis of global trends", European Operations Management Conference Proceedings, Ankara.

Ren, G. and Gregory, M. (2007) Servitization in manufacturing companies: A conceptualization, critical review and research agenda, University of Cambridge, San Francisco.

Samujh, H. R. (2011) "Micro-businesses need support: Survival precedes sustainability, corporate governance", The International Journal of Business in Society, Vol 11, No. 1, pp 15–28.

Saunders, M., Lewis, P. and Thornhill, A. (2012) Research Methods for Business Students (6th ed.), Pearson, Essex, U.K.

Spencer. L.M. Jr and Spencer, S.M. (1993) Competence at Work, John Wiley & Sons, New York.

Sanghi, S. (2007) The handbook of competency mapping: Understanding, designing and implementing competency models in organizations, Response Books, New Delhi.

Shane, S. (2003) A General Theory of Entrepreneurship. The Individual-Opportunity Nexus, Edward Elgar, Cheltenham.

Spring, M. and Araujo, L. (2009) "Service, services and products: rethinking operations strategy", International Journal of Operations & Production Management, Vol 29, No. 5, pp 444-467.

Stake, R. (1995) The Art of Case Study Research, SAGE Publications Ltd, California.

Taipale-Erävala, K. (2015) Survival competencies in SMEs in changing business environments, Thesis, Åbo Akademi University, http://urn.fi/URN:ISBN:978-952-12-3296-1.

Teece D., Pisano, G., and Shuen, A. (1997) "Dynamic Capabilities and Strategic Management", Strategic Management Journal, Vol 18, Iss. 7, pp. 509-533.
Tellis, W. (1997) Introduction to case study, The Qualitative Report 3(2), available https://nsuworks.nova.edu/tqr/vol3/iss2/4/.
Vandermerwe, S. and Rada, J. (1988) "Servitization Of Business: Adding Value B Adding Services", European Management Journal, Vol 6, No. 4, pp 314-324.
Wise, R. and Baumgarter, P. (1999) "Go Downstream: The Profit Imperative in Manufacturing", Harvard Business Review, Vol. 77, No. 5, pp 133-41.
Yin, R. (2009) Case Study Research, Design and Methods, Sage Publications Inc, California.

Menage a Trois! Innovation, Digital and Knowledge Transfer

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Abstract: Knowledge transfer is often seen as a mechanism to support innovation of this sort, and in this paper, we describe work aimed at developing an understanding of such collaborations. Within this setting we believe that the adoption of digital technologies can lead companies on a path that can take them into new and challenging territories. Our work focuses upon support for digital innovation for Small to Medium Enterprises (SMEs) aiming to identify alternatives/strategies for establishing effective knowledge transfer based innovation. We analysed existing digital innovation models and instruments in order to develop an understanding of the factors valued in characterising digital innovation. Our findings show that although existing approaches have a useful role in digital innovation, they are however inappropriate for SMEs, who have probably not been involved in such a transformation. In addition, this paper reports on the early instrument developed to identify potential for digital innovation based on collaborative knowledge transfer between SMEs and universities. This study provides a better understanding of the makeup and effectiveness of some of the existing digital innovation models and frameworks.

Keywords: Knowledge Transfer, Digital Technology, Knowledge Exchange, Innovation.

1. Introduction

The aim to innovate is commonly proposed as a good means of supporting commercial growth within industry as well as presenting opportunities (Arbell et al., 2016). It normally offers the prospect of moving beyond incremental changes to business models and processes improvements; enabling steep changes through developing new products and services, and also revisions to tried and tested models of operation and distribution. This research is based upon the assumption that there are a number of characteristics of digital technology that make its general role in innovation and commercial growth interesting while also often being poorly understood.

> *"… computing devices are no longer isolated but connected by increasingly ubiquitous communication networks. Mobile devices and pervasive applications link their users to networked applications and to other people almost permanently. The nascent 'Internet of things' and digital/material 'hybrid' objects are beginning to link what we have to come to think of as distinct 'virtual' reality to the reality of everyday material objects."* (Walker et al., 2012)

Digital-based innovation is dominant in many aspects of business transformations and developments. This ranges from operational innovation of realising and developing in-house digital capability, through to the innovative application of novel technology within a specific sector, or market. However, there are two main drivers: technological feasibility and market readiness. These often enable operational transformations resulting from: smaller, faster, more secure, more accessible (geographically and temporally), intelligent and/or automated products and services. While enabling operational improvements at the point of implementation, their potential to be disruptive within a market is high and often the innovation is in terms of business models and processes.

Despite these opportunities, there are significant challenges about how to make the best of digital innovations within business, including technological, financial, organisational and regulatory (Ramilo et al., 2014). As Berkhout and Duin (2004) put it: merely investing in product development does not suffice in a competitive digital industry.

- Our research and assessment is driven by two perspectives concerning governmental and strategic support for company innovation:
-
- *Third party innovators* – This refers to the role adopted often by agencies and consultants, by explicitly bringing innovation to a company. Although this can appear naïve, it has the benefit of being a way of

managing, monitoring and resourcing interventions aimed at supporting innovation. Hence, it is especially relevant to governmental programmes aimed at driving innovation. It should be noted that in terms of management of innovation, value comes from collaborations (such as joint-ventures), as opposed to the transactional perspective offered by third party innovators (BSi, 2008). The third party we focus upon, in this paper, is that of University expertise (sometimes termed a "knowledge provider"). Unlike consultants and professional agencies, Universities provide a level of access to expert knowledge and insight, and thus have an interest in ensuring that their own knowledge and research expertise are employed. Hence, they are not simply facilitators but also actively transfer or apply knowledge.

- *SMEs and Innovation* – SME's are of specific interest for a number of reasons based on their strategic economic relevance (Higón, 2011). Broadly speaking they are opportunistic and flexible and while often valuing innovation they are commonly not in a position de-risk an innovation process (Auzzir et al., 2018; Beck & Demirgruc-Kunt, 2006; Garcia-Perez-de-Lema et al., 2017; Liang et al., 2017; Ramilo et al., 2014). Specifically, in our experience for digital innovative products and services "speed to market" is often prioritised by SMEs in the digital sector.

Given this setting, the problem we wish to address is from the perspective of a "third party innovator" aimed at serving and supporting SMEs:

How can companies be helped to identify opportunities for innovation with digital technologies?

There are many facets to this problem beyond specific technologies. All companies will be at different stages of creating, developing and deploying innovations, hence the current "innovation maturity" of a company needs to be understood. More specifically, innovation may be enabled or inhibited by organisational and operational factors. Naturally, linking these in the business context will normally be motivating or justifying innovation. For a third party to effectively engage and contribute, clearly these facets are all relevant.

In order to gain a deeper understanding of this problem, we have focused upon developing an instrument to assist with scoping and assessing the potential for collaborative innovation. Since our institution is actively engaged as a third party innovator for SMEs, the instrument should be useful in itself. However, its design, development and refinement will provide key insights in to the problem of helping identify quality innovation opportunities.

In this paper, we discuss different innovation models and related instruments for understanding and managing innovation. This has fed into the creation of an initial version of our instrument, which has then been critically reviewed in collaboration with knowledge transfer professionals. We conclude the paper by summarising on our early findings and plans regarding the development of the instrument.

1.1 Knowledge transfer in the context of Higher Education in the UK

Interdisciplinary work and the exchange of knowledge between participants is central to innovation (Wehn & Montalvo, 2018; Lin & Wei, 2018). Within the context of higher education, perspectives are shaped by academic disciplines and objectives. In the broadest sense, it can range from research dissemination to public and professional courses (continuing professional development - CPD), through to an academic-based contribution to business and industry, and commercialisation of intellectual property. In the UK, there have been numerous governmental reviews of how an academic knowledge base could best interact with industry needs (see Wilson 2012, Witty 2013, Dowling 2015). In the context of this work, we focus upon the value of academic collaboration with industry that has relevance for one or both parties:

- There is a strategic and sometimes financial value for academia to realise the benefits of applying their knowledge and expertise in a commercial setting. The classical view being that of arrow projects (Witty 2013), where a discovery or insight forms the core basis for a future product, patent or service. The same value is recognised through the concept of research impact - a core element of UK research excellence framework (Stern 2016, REF 2017).
- There is a pedagogic value to knowledge transfer activity for academia in that it strengthens academic awareness of contemporary practice in industry that can underpin, inform and direct pedagogic objectives and practice. Strong academia-firm interactions have positive impact on innovativeness of SMEs (Jones & Corral de Zubielqui, 2017).

- There is an industrial value to being able to access expertise and knowledge in specific domains. Academic awareness of state of the art practice has the potential to contribute to product and process improvement and growth.

While this is not an exhaustive list of opportunities, it characterises some key cases. It is important to note that the different perspectives do not necessarily align. For example, the academic desire to publish research findings is at odds with an industrial desire to gain commercial advantage from the same insights.

1.2 Concepts of Digital Innovation

Digital innovation has over the years presented companies with a competitive edge in many respects. Numerous examples exist in e-commerce and, less directly, social media. It is hard to characterise such innovations, though we can pick some common features:

- The dissolution of traditional boundaries regarding: location, distance, scale and timeframes.
- The improved automation of processes (i.e. dissolution of boundaries of skills, ability and agency)
- Access to more data (quantity and quality) and the potential for greater transparency and/or insight.

Smart products which are data driven have been emerging to complement the traditional physical products both in homes and industry (Schwab, 2015). Digital innovation impacts also upon organisations' products and services that have been digitised – such as media production and publishing (for example, see Roast, et al., 2011).

These points concur with Nylen & Holmstrom (2014) who highlight that research in digital innovation has not progressed as much as innovation research in other fields, mainly because managers lack knowledge about digital technology and its potential. Hence, there is the potential that digital innovation opportunities need to be managed differently. Two significant challenges presented by digital innovation:

- The pace of digital innovation processes is judged to be different to that of traditional innovation. This is predominantly attributable to the fact that production processes differ and that the quality and integrity of digital products is largely inaccessible and only indirectly understood. This encourages a prioritisation of speed-to-market within digital technology companies and also means they need to keep technically up to date to maintain their competitive advantage.
- Once available, a digital innovation's impact is not easily managed. Digital is present in, and core to, so many processes that innovations have the potential to skew the very business assumptions and context on which the initial concept was based. The wide reach and accessibility of digital technology underpins this disruptive influence, and cascaded innovations. The reach of digital innovation is such that it impinges on many non-digital details (see UBER Rulings - Chapman, 2017).

While these factors are not new in innovation, we'd claim their relevance and velocity is distinctive in the domain of digital innovation.

2. Review of frameworks for understanding Business Innovation with Digital technology

In our research we analysed existing digital innovation frameworks, identifying those that were diagnostic in nature and explicitly relevant to digital innovation (Barbieri & Teixeira Álvares, 2016; Berkhout and Duin, 2004; Binz and Trufer, 2017; Carayannis et al., 2018; Chanaron, 2016; Chen et al, 2018; Gkypali et al., 2018; İzadi et al. 2013; Nylen and Holmstrom, 2014; Scaringella and Silviana, 2018;).

Berkhout and Duin (2004), BSi (2007), and Nylen and Holmstrom (2014) each present a different perspective: technology-cyclic, innovation management, and components of digital innovation. These different frameworks were critically reviewed by the authors and then insights and observations compared. The resulting assessments are summarised below, for each we identify their core features relevant to formulating a comprehensive approach to understanding digital innovation.

2.1 Cyclic Innovation model

The cyclic innovation model (Berkhout and Duin, 2004) is motivated by the fast-paced technological and market developments in the telecommunications industry and how they have continually influenced the way

companies innovate. However, with the advent of technological convergence across many business sectors it can be argued that its scope is not limited to telecommunications. The cyclic view is contrasted with the traditional linear model, where innovation is represented by a pipeline of sequential processes that starts at pure scientific research and ends with commercial applications. The cyclic account captures refinements that take into consideration the feedback from the market, and three other domains, linking changes in science, business, and technology. This gives four interacting "cycles of change" (Figure 1), intending to reflect the complex, contemporary cross-boundary innovation processes.

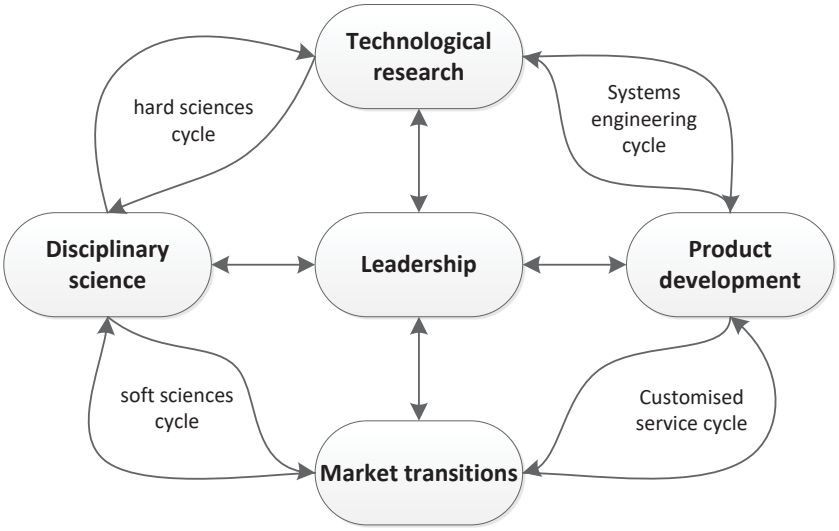

Figure 1: The Cyclic Innovation Model (Berkhout & Duin, 2004).

The model was used to analyse the introduction of a mobile data service into the Dutch telecommunication market. Berkhout and Duin (2004) discuss the complex nature of this specific venture, where a number of stakeholders contributed to the design and implementation of the service. In their analysis, they ascertain that the *Science and Technology* domain had not played any significant role in the new digital service - i.e. new science and technology components were not required to develop the new data service. While the *Market* domain played a vital role in that much attention was needed to understand the emerging business requirements and market potential during the early stages of the project. Subsequently, the understanding of the market allowed the establishment of a number of *Product* requirements (both functional and non-functional). In turn, those requirements specified the technological capabilities of the partners required in the project - i.e. software development, mobile device specs and telecommunications infrastructure.

In this example, innovation happened through the "Customised service cycle" and the "Systems engineering cycle" iteratively. Which illustrates that different innovation processes, will comprise different domain and different cycles of the model. The other cycles in the model clearly reflect viable innovation processes. However, timescales and velocity of each vary and thus shape the manner in which they may interact.

Although this model has not been used extensively, it is of value in that it is inclusive in the sense of recognising innovation drivers from a variety of stakeholders. The validity of this perspective can be found in many digital examples. From a digital focus, *Science and Technology* largely predicates innovations that are closely allied to *Market* transitions through customer engagement (and customer/market creation). Examples, such as UBER and many others illustrate this point - the technological infrastructure used has not purposefully driven the innovation. That said, the model also entertains a "reverse" flow from product concept to technological and scientific research. Some digital examples where product need has driven technological advances might be evident in Internet of Thing (IoT) development and cyber security.

In terms of our research aims, the model substantiates the view that innovation engages many facets of value that are not purely led by technology, or themselves digital. As we have observed above, the model also supports the point that digital results in innovations can gain their value in many "non-digital" contexts (principally business and market contexts). One question it does pose is whether any of the four domain and cycles represent necessary activities.

This model presents an interesting challenge for University based innovation under the auspices of KT, since it suggests that innovation in digital technology is not driving innovation within digitised markets - contrary to the notion of arrow projects. A more positive point is that the model indicates that innovation may benefit multidisciplinary knowledge transfer that Universities could easily support.

2.2 BS 7000-1:2008 Design Management Systems. Guide to managing innovation

BS 7000-1:2008 Design management systems (BSi, 2008), sits in contrast to the process view of the cyclic model, its primary perspective is organisational and focusing upon strategy, managerial structures, features and mechanisms that support innovation. Also, unlike more rigorous notions of a 'standard', it takes the form of guidance and recommendations for supporting innovation that are to be used selectively and adaptively to suit the needs of an organisation. Despite this, the dominant philosophy is that innovation should not be approached half-heartedly. It is not necessarily an individually-driven activity or linked to specific projects or programmes of work, it is something that needs to be practiced as an organisation - an overall philosophy that will reap benefits that will not be immediately measurable or causally related to specific initiatives.

The benefits of managing innovation effectively are those common to knowledge management in general, it supports a better understanding across an organisation, sharing of experience and reduces the risk of innovation 'drying-up'. This managerial perspective means that innovating within a company is not in itself innovative; it also resists the third party innovator model -especially where the innovator has no formal interest in a project.

The framework positions itself mainly in terms of innovation as a means of identifying and meeting customer needs or drawing in new customers in a competitive market. Hence, there is a strong customer focus/drive behind innovation. This emphasis on the domains of *Product* and *Market* means that, while *Science and Technology* are clearly relevant, an innovation without *Product* and *Market* relevance is unlikely to be supported.

As a rather management heavy perspective the standard is not ideal for small enterprises, and enterprises with light management. However, the tools and techniques provided have a greater potential value. Many of the innovation techniques collated are techniques widely adopted in many digital SMEs, especially those working in the B2C context. In addition, the standard offers a number of checklists and diagnostics for assessing innovation within a company, and these are likely to be of relevance within SMEs. This offers pointers towards evidence of innovation maturity within an enterprise with long term relevance, since the practice encouraged that are likely to enable sustained and successful innovation.

2.3 Managing Digital Innovation

Nylen and Holmstrom (2014) devised a framework not only to encourage innovation in organisations but also to help them keep track of their digital innovation ventures. The framework is a product of research examining the innovation processes and the challenges and demands of new technologies. In order to be able to properly manage uncertainties brought about by innovation driven by digital technologies three dimensions were identified: the digital *products/service*; the digital *environment* and characteristics of the *organisation*. Within these, five areas were proposed as being of importance to managing digital innovation:

- User experience (in Product/Service) - The focus of products should not just focus on usability but also on engagement and aesthetics as users are affected and influenced by what the product looks like. It was argued the focus on aesthetic properties by Apple has led to its dominance in the PC market. Within the innovation management processes, the relevance of the users voice and values is also recognised though not prioritise as here.
- Value proposition (in Product/Service) - Organisations need to clearly define the value proposition of the new product or service. The framework evaluates value proposition by assessing customer segmentation. The framework analyses the target market in an effort to ensure that the product is accessible to everyone. The information from the analysis of customers will be used to determine how to customise the product for each customer segment. Value proposition also assesses the revenue from the digital product or service which goes to distribution networks.
- Digital evolution scanning (in Environment) - As digital technology evolves, firms need to continuously look at how they can take advantage of the new technologies to improve goods and services. This is done by gathering information about new and upcoming digital technologies. Firms also need to

explore emerging distribution channels and how users react to them. This relates closely to one of the innovation tactics "horizon scanning" endorsed in the BSi document.

- Skills (in Organisation) - The rapid pace at which the digital innovation process occurs needs to be matched by the skills available within a firm. The framework evaluates this process by looking at ways in which learning is supported and promoted. The learning will have to be continuous to ensure a better understanding of the unique properties of the digital technologies. Companies are encouraged to take note of staff who come up with unprompted initiatives and then put them in roles that will enable them to experiment further with these technologies. Again, this aligns closely to some of the best practices encourage by the BSi document.
- Improvisation (in Organisation) - Traditional ways of designing and developing new products and services will not work because of the pervasive nature of digital technologies. This framework promotes innovation through improvisation. It is recommended that staff be given time and space to explore emerging technologies in an effort to promote creativity and ability to innovate.

Nylen and Holmstrom (2014) devised a diagnostic tool based on these key areas. The tool is "oriented" in the sense that it each element contributes directly to a score of digital innovation readiness. The tool is also not a standalone in that it is proposed as being basis for workshops and discussions about how to support digital innovation - starting with the lowest scoring areas of the framework.

This approach has been developed for the purposes of internal review of innovation practice within companies developing digital media. While our focus is on KT and SMEs in a wider range of industries, the dimensions proposed and their components can be repurposed on a wider context.

3. Developing an Instrument

Bringing together our findings and observations we have developed a pilot diagnostic instrument. This combines ideas from the three frameworks with the aim of helping to address our initial question. Specific attributes of the pilot instrument are: conciseness (for enabling engagement); generality (to cover the diversity of innovation contexts involving digital technology); digital relevance.

The instrument comprises a series of statements aiming at ascertaining a company's business strategy, and their approach to innovation and product/service development and value proposition. Also, company's understanding of their: market, segments and customer expectations; attitude to digital horizon scanning; and approach to the development of knowledge and skills among staff.

To date, the pilot instrument has been collaboratively assessed by nine KT professionals, ranging from 2 to 25+ years of experience in KT and Innovation roles. The full analysis of feedback and refinement of the pilot instrument is currently being conducted. However, on the whole, feedback has been positive with most critical elements concerning operational specifics regarding how it would be used in practice. Other points raised concern: the difficulties of keeping a digital focus (when an innovation may not involve an intrinsically digital advance); the extent to which companies have clear goals; and the importance of managing company expectations of KT, among others.

4. Conclusion and Future work

Our analysis shows that existing innovation frameworks have got a useful role to play in understanding innovation. However the distinctive nature of digital innovation is not easily identified, thus these frameworks may not be suited to companies with limited resources, light management structures, and no specific or explicit innovation goal. The three models reviewed represent different perspectives upon innovation, ranging from managerial to digital solutions. Nylen and Holmstrom (2014) is the closest to the diagnostic instrument we believe will enable to assist companies identify potential for innovation. However, in general, evidence backing their validity is limited.

Our original research interest is: How can companies be helped to identify opportunities for innovation with digital technologies? The three areas of interest shaping our work are: the distinctiveness of digitally based innovation; the role of knowledge transfer principally via third party innovators, and supporting SMEs. Only the first of these is addressed by the previous work of Nylen and Holmstrom (2014), while the second is discouraged by the British Standards Institution (2007).

Following a review, features of the models and frameworks analysed have been used to develop our own pilot instrument for address our original question. The next stage of this project is additional to the formative validation work, prior to applying the instrument within digital innovation opportunities coming from a "live" innovation programme for supporting SMEs.

The differentiation of digital and other technologies in innovation partly reflects the fact that digital is still novel in many respects. As such the authors are conscious that there are on-going legislative and regulatory changes that do, and will, impact upon digital services and their use of data (Government UK, 2017). Hence, while digital can view as presenting extensive new opportunities, it is worth noting that some innovations may be constrained.

References

Abrell, T., Pihlajamaa, M., Kanto,L., vom Brocke, J. & Uebernickel, F. (2016). The role of users and customers in digital innovation: Insights from B2B manufacturing firms. *Information & Management*, 53 (3), 324-335, https://doi.org/10.1016/j.im.2015.12.005.

Auzzir, Z., Haigh, R. & Amaratunga, D. (2018). Impacts of Disaster to SMEs in Malaysia. *Procedia Engineering*, 212, 1131-1138. https://doi.org/10.1016/j.proeng.2018.01.146.

Barbieri, J. C., Teixeira Álvares, A. C. (2016). Sixth generation innovation model: description of a success model. *RAI Revista de Administração e Inovação*, 13 (2), 116-127. https://doi.org/10.1016/j.rai.2016.04.004.

Beck, T. & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & Finance*, 30(11), 2931-2943. https://doi.org/10.1016/j.jbankfin.2006.05.009.

Berkhout, G. & Duin, P.V.D. (2004) Mobile Data Innovation: Lucio and the Cyclic Innovation Model. ICEC'04, Sixth International Conference of Electronic Commerce. Janssen, M. et al. (Eds.). ACM, pp. 603-608

Bertot, J., Estevez, E. & Janowski, T. (2016). Universal and contextualized public services: Digital public service innovation framework. *Government Information Quarterly*, 33(2), 211-222. http://dx.doi.org/10.1016/j.giq.2016.05.004

Binz, C. & Truffer, B. (2017). Global Innovation Systems—A conceptual framework for innovation dynamics in transnational contexts. *Research Policy*, 46 (7), 1284-1298. https://doi.org/10.1016/j.respol.2017.05.012.

BSi (2008). Design management systems. Part 1: Guide to managing innovation. BS 7000-1:2008. 3rd Ed., British Standards Institution.

Carayannis, E. G., Goletsis, Y. & Grigoroudis, E. (2018). Composite innovation metrics: MCDA and the Quadruple Innovation Helix framework. Technological Forecasting and Social Change, 131, 4-17. https://doi.org/10.1016/j.techfore.2017.03.008.

Chapman, B. (2017, December 20). Uber-EU court decision: What the defeat means for customers and drivers across UK and Europe. *The Independent*. https://www.independent.co.uk/news/business/news/uber-eu-court-decision-taxi-company-regulation-what-mean-customers-drivers-uk-europe-a8120471.html

Chen, J., Yin, X. & Mei, L. (2018). Holistic Innovation: An Emerging Innovation Paradigm. International Journal of Innovation Studies, https://doi.org/10.1016/j.ijis.2018.02.001.

Dowling (2015). The Dowling Review of Business-University Research Collaborations July 2015. https://www.raeng.org.uk/policy/dowling-review/the-dowling-review-of-business-university-research

Garcia-Perez-de-Lema, D., Madrid-Guijarro, A. & Martin, D. P. (2017). Influence of university–firm governance on SMEs innovation and performance levels. *Technological Forecasting and Social Change*, 123, 250-261. https://doi.org/10.1016/j.techfore.2016.04.003.

Gkypali, A., Arvantis, S. & Tsekouras, K. (2018), Absorptive capacity, exporting activities, innovation openness and innovation performance: A SEM approach towards a unifying framework. *Technological Forecasting & Social Change*. https://doi.org/10.1016/j.techfore.2018.01.025

Government UK (2017) Government to strengthen UK data protection law. https://www.gov.uk/government/news/government-to-strengthen-uk-data-protection-law

Higón, D. A. (2011). The impact of ICT on innovation activities: Evidence for UK SMEs. *International Small Business Journal*, 30 (6), 684 - 699. https://doi.org/10.1177/0266242610374484

Huang, M. H. & Chen, D.Z. (2017). How can academic innovation performance in university–industry collaboration be improved?. *Technological Forecasting & Social Change*. 123, 210–215. https://doi.org/10.1016/j.techfore.2016.03.024.

İzadi, A., Zarrabi, F. & Zarrabi, F. (2013). Firm-Level Innovation Models. *Procedia - Social and Behavioral Sciences*, 75, 146-153. https://doi.org/10.1016/j.sbspro.2013.04.017.

Jones, J. & Corral de Zubielqui, G. (2017). Doing well by doing good: A study of university-industry interactions, innovationess and firm performance in sustainability-oriented Australian SMEs. *Technological Forecasting and Social Change*, 123, 262-270. https://doi.org/10.1016/j.techfore.2016.07.036.

Liang, L-W., Huang, B-Y, Liao, C-F & Gao, Y-T (2017). The impact of SMEs' lending and credit guarantee on bank efficiency in South Korea. *Review of Development Finance,* Vol 7 (2), 134-141, https://doi.org/10.1016/j.rdf.2017.04.003.

Lin, M. & Wei, J. (2018). The impact of innovation intermediary on knowledge transfer. *Physica A: Statistical Mechanics and its Applications*, 502, 21-28. https://doi.org/10.1016/j.physa.2018.02.207.

Nylén D. & Holmström, J. (2015). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. *Business Horizons*, 58(1), 57-67. https://doi.org/10.1016/j.bushor.2014.09.001.

Ramilo, R., Rashid, M., & Embi, B. (2014). Critical analysis of key determinants and barriers to digital innovation adoption among architectural organizations. *Frontiers of Architectural Research*, 3 (4), 431-451. https://doi.org/10.1016/j.foar.2014.06.005.

REF 2017, Initial decisions on the Research Excellence Framework 2021. http://www.ref.ac.uk/media/ref,2021/downloads/REF2017_01.pdf

Roast, C., Dearden, A. & Uruchurtu, E. (2011). Using and utilizing an innovative media development tool. Proceedings of the 10th Brazilian Symposium on Human Factors in Computing Systems, and the 5th Latin American Conference on Human-Computer Interaction. Porto Alegre, Brazil. ACM, 149-156.

Scaringella, L. & Chanaron, J. J. (2016). Grenoble–GIANT Territorial Innovation Models: Are investments in research infrastructures worthwhile? *Technological Forecasting and Social Change*, 112, 92-101. https://doi.org/10.1016/j.techfore.2016.05.026.

Schwab, K. (2015). The Fourth Industrial Revolution. Foreign Affairs [online]. Available at https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution

Silviana, B. G. (2018). Open innovation model: enabling the market uptake of innovation. *Procedia Manufacturing*, 22, 893-899. https://doi.org/10.1016/j.promfg.2018.03.126.

Stern (2016). Building on Success and Learning from Experience An Independent Review of the Research Excellence Framework. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/541338/ind-16-9-ref-stern-review.pdf

Walker, S., Bell, S., Jackson, A. & Heery, D. (2012). Imagine real avatars and flying shepherds: involvement and engagement in innovative ICT. PCD'12. Roskilde, Denmark: ACM. 101-108.

Wehn, U. & Montalvo, C. (2018). Knowledge transfer dynamics and innovation: Behaviour, interactions and aggregated outcomes. *Journal of Cleaner Production*, 171, S56-S68. https://doi.org/10.1016/j.jclepro.2016.09.198.

Wilson (2012) A Review of Business–University Collaboration Professor Sir Tim Wilson DL February 2012 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32383/12-610-wilson-review-business-university-collaboration.pdf

Witty (2013) Encouraging a British Invention Revolution: Sir Andrew Witty's Review of Universities and Growth. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249720/bis-13-1241-encouraging-a-british-invention-revolution-andrew-witty-review-R1.pdf

A Study on the Growth of Millennial Entrepreneurs in India

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Abstract: India is among the top five countries globally in terms of recent millennial start-up revolution. According to the survey by Deloitte, millennial entrepreneurs are taking the lead in creating new start-ups in emerging markets. Six emerging markets economies like Vietnam, Philippines, Thailand, Malaysia, Peru and Indonesia show higher millennial entrepreneurship rates for women than men. In developing countries there has been a gradual increase in the number of millennial entrepreneurs in the last three years in contrast to United States where millennial entrepreneurship rates have fallen more than 70 percent since 1990s. The yearly percentage change is however projected to decrease from 1.07% in 2020 to 0.28% in 2050. The fact that there are such wide variations between entrepreneurial activity in different countries, distinction between necessity-based and opportunity-driven entrepreneurs is difficult. Millennial Entrepreneurs are important for sustainable development of emerging economies like India. Bengaluru has emerged as the prime destination for IoT (Internet of Things) start-ups to set up base, as it accounts for 55% of the total IoT start-ups in India followed by Delhi NCR with 13%, Mumbai 10%, Hyderabad 4.5%, Chennai 3%, and others together accounting for 18%. India still has a long way to go as compared to global entrepreneurial startup ecosystem. Total number of startups in US is 84,000 whereas India has only 10,000 startups. Technology based startups in US are 49,000 whereas India has only 4,300 tech-based startups. US has 35,100 non-tech based startups whereas India has only 5,700. The potential economic gains could be realised through India's increasing "demographic dividend", as county's working age population becomes larger than the dependent population. In India the median age is forecasted to be between 27 years to 40 years from 2020 to 2050.

Keywords: Millennials, Innovation, Motivation, Entrepreneurship, Economic Development

1. Introduction

Entrepreneurship has received much attention across the world over the last 20 years (Davidsson, 2008).

According to Kobia and Sikalieh (2010), entrepreneurship is relatively a young field of research study. The millennial entrepreneurs are known for their approach towards creative thinking and risk-taking. There are many challenges to starting and operating a new business (Bhuiyan, 2012). The entrepreneurship ecosystem is strongest in the innovation-driven economies. According to Global Entrepreneurship Monitor Report, top five Countries in Global startup ecosystem in 2017 were United States, United Kingdom, Canada, Israel, and Germany. Total number of startups in US is around 84,500 whereas India has only 10,500 startups. Technology based startups in US are 49,500 whereas India has only 4,400 tech-based startups. US has 35,200 non-tech based startups whereas India has only 5,800. Five out of six world's leading firms are U.S. tech companies with investments in artificial intelligence, Internet of things, robotics and automation.

Table 1: Comparison of Global Entrepreneurial Startup Ecosystem

Details of startups	India	China	Isreal	U.S.
Total number of startups	10,500	10,500	4,750	84,500
Tech-based startups	4,400	3,400	4000	49,500
Non-tech based startups	5,800	6,600	750	35,200
Ease of doing business (Days)	30-60	30	13	4
Corporate tax rate	34%	25%	26%	39%
Bank-lending rate	10.30%	5.60%	3.90%	3.30%

Source: World Bank, news article 2017-18

The main reason behind the success of US entrepreneurial stint is easy access to mature venture capital industry. Also, United States startups follow Lean approach in building the right product for the right target market for creating unique customer experience.

Millennial entrepreneurship is important for sustainable development of emerging economies like India. The potential economic gains could be realized through India's increasing "demographic dividend", as county's working age population becomes larger than the dependent population. In India the median age is forecasted

to be between 25 years to 40 years between 2020 to 2050. Currently, India has the highest youth population in the world. Millennial entrepreneurs are likely to create more than 1 million new employment opportunities by 2019-2020. Already, India has jumped 30 positions to become the top 100th country in terms of ease of doing business ranking in 2018 as announced by the World Bank.

2. Literature Review:

The entrepreneurship is the creation of new organizations (Gartner 1985). The Identification, screening and evaluation of business opportunities represents the beginning of the entrepreneurial process (Baron, 2010).

As per Caree 2005, Entrepreneurship is a multidimensional term that is difficult to define. Currently, there is not a single accepted definition of "entrepreneur" that has been uniformly accepted in the literature (Carlock 1994). Generally, the term "entrepreneur" is applied to the founder of a new business, or a person "who started a new business where there was none before" (Gartner 1985). The term has been used to indicate a range of activities from creation, founding, adapting to managing a venture (Cunningham & Lischeron). Peter Drucker in 1965 observed that despite inflation, recessions and major job losses in certain industries and government, there had been huge jobs growth in America. According to him, 40 million have not been created by large corporations or government, but mostly by small and medium sized businesses.

Kirzner (1985) defined entrepreneur as one who perceives market opportunities. According to Hisrich (1990) entrepreneur is a creative thinker who accepts risk and failure. According to Astebro et al (2003), there is a negative correlation between bank loan and business survival and positive relation between non-banking loan and business survival. As per Zara et al 2002, entrepreneurship is a relatively young academic field in the early stages of its developmental cycle. Howard Stevenson "added an element of resourcefulness to the opportunity-oriented definition. There is direct co-relation between marketing efforts and entrepreneurship (Hills et al., 1989-2009). Marketing orientation is central to the creation and sustainability of new ventures (Hunt, 2003), particularly during the opportunity recognition stage. Millennials have been portrayed as less willing to devote themselves to jobs, preferring a balanced lifestyle (Myers 2010). According to Holland's (1997) theory, people are attracted to work environments that conform to their personality orientation. Entrepreneurship is the engine fueling innovation, creativity, opportunity identification, employment generation, better standard of living, regional development contributing to economic growth and development of the country and society at large.

3. Motivational factors for rise of Millennial Entrepreneurs in India

1. Entrepreneurial Intent:

Gird (2008), found that attitude towards entrepreneurship is the strongest predictor in terms of entrepreneurial intent. Entrepreneurial intent plays a major role in entrepreneurship and innovation.

Schweitzer and Lyons (2010) used a large survey sample to determine the career goals, priorities and expectations of the millennial generation. Wang discussed that attitude, funding, family business, experience and education significantly impact millennials' entrepreneurial intention. Entrepreneurship activities are intentional based (Krueger et al., 2000). In other words, millennials will not adopt entrepreneurship without external or internal triggers and most importantly motivation.

According to Ajzen (1991), intention is directly affected by three factors, (i) attitude; (ii) subjective norm and; (iii) perceived behavioral control. According to Ajzen (1991), Attitude is considered as one of the important determinants of intention. Prahalad et al (2010) performed a study to investigate the motivational effects of attitude on students' entrepreneurial intention and found that attitude towards change, money and entrepreneurship were indeed some good predictors of entrepreneurial intention.

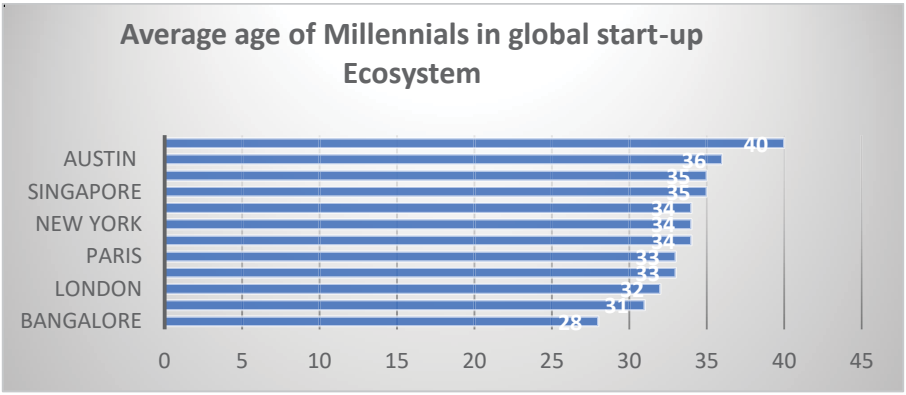
According to Global Entrepreneurship Monitor Report 2016-2017, the following motivational factors influencing millennial entrepreneurs in India were identified:

		H Value	DF	Significance
1.	Passion to become an entrepreneur	17.691	10.00	0.061
2.	Desire to be independent	3.796	4.0	0.435
3.	Funding	3.272	4.0	0.009**
4.	Previous experiences	19.138	4.0	0.008**

5.	Family Business	14.028	4.0	0.007**
6.	Attitude	1.972	1.0	0.006**
7.	Entrepreneurial intent	17.692	4.0	0.003**

The table clearly indicates that the following 5 factors viz., funding (0.009**), previous experience (0.008**), family business (0.007**), attitude (0.006**) and entrepreneurial intent (0.003**) are the key motivational factors contributing in the rise of millennial entrepreneurs in India. Entrepreneurial intention has been extensively researched in the West, Carr and Sequeira (2007). Findings on determinants predicting entrepreneurial intention varies across countries and cultures (Boulton and Turner, 2005).

Graph 1: Comparison of average age of Millennials in Global start-up Ecosystem



Bangalore is India's top city for startups and ranked 15 in the Global Startup Ecosystem Index. Bangalore has the youngest millennial entrepreneurs with an average age of 28S years compared to Silicon Valley's 36.2 years. The country is home to over more than 3,500 startups, making it among the top startup hubs in the world. The National Investment Fund is set to be established with an annual flow of INR 20,500 crore which will fuel entrepreneurship across Tier II and Tier III cities.

3.1 Millennial Startup Ecosystem in India

Chell (2008) suggests that personality traits of entrepreneurs may be important for millennial entrepreneurship. Shepherd et al., (2009) assumes that personality traits of the entrepreneur may explain entrepreneurial failure. Zhao et al., 2010) points out that personality traits have a direct effect on entrepreneurial performance. In India, millennial entrepreneurship has gained significant importance in last five years as a way of boosting economic development and promoting holistic regional development. Millennials are people born between 1980 and 2000 who believe in innovation, have positive mindset, risk-takers, seek opportunities, socially responsible and maintain work-life balance (Lloyd et al 2013). Millennial entrepreneurs are setting up their own businesses as early as 25 years compared to baby boomers that set up most of their first businesses at the age of 35 years.

According to BNP Paribas Global, while baby boomers were opening four companies, millennials were opening nearly eight companies in 2017. Private startups like Flipkart, Ola and PayTM having an equity of more than $1 billion, which has managed to motivate the next generation entrepreneurs. Millennipreneurs are targeting larger gross profit margins of almost 70% compared to 40% by baby boomers.

Table 2: Technology-based millennial start-ups in 2017- 2018

Sector	% share
Technology based E-commerce	34%
B2B	25%
Consumer Internet	14%
SaaS	7%
Other	10%

Source: NASSCOM Startup Report 2018

Share of Technology based start-ups in India were 34% followed by business to business at 25%. The digital economy is growing at a very high rate. Cooey, SenseGiz, PlaySolar, Altiux, iBot, Locanix, Entrib, GetActive,

Retsense, and Leaf wearables are few technology based start-ups which have emerged from the Indian IoT ecosystem.

3.2 India is home to Frugal Innovation

For much of the 20th century, innovation was the largely practiced by more advanced economies of North America, Western Europe and Japan and china (Ahlstrom, 2014; McCloskey, 2010). Millennials thrive on new challenges, innovation and creativity and expect responsibility early on in their careers (Severt et. al. 2009).

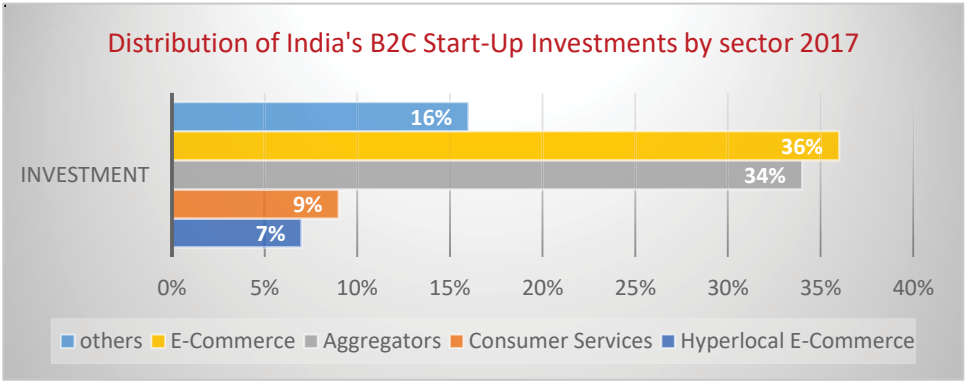
Innovation is critical for growth of millennial startups. Personality traits of entrepreneurs may have a different effect on firm performance in case the firms are innovative (Zhao et al., 2010).

Since 21st Century, much innovation has shifted to the large emerging economies of China, India and Brazil (Ramani & Szirmai, 2014). Also, a significant amount of the innovation taking place in emerging countries can appropriately be characterized as frugal, flexible and inclusive. Emerging markets account for some 86 percent of the global population under 30. Hart and Christensen (2003) explored how generating disruptive and frugal innovations for bottom-of-the-pyramid (BOP) markets represent a significant opportunity for millennial entrepreneurs. 80% of millennial entrepreneurs believe they are major source of technology innovation in India.

84 percent of millennial entrepreneurs are optimistic that entrepreneurial innovation will further rise in the next two years. India has been at the forefront of frugal innovation. Millennials entrepreneurs have vast opportunity related to frugal innovation tailored to meet the needs of emerging markets like India. There are several examples related to frugal innovation in India like a “smart plug” developed to help lower, middle and upper-middle class consumers manage their energy consumption more effectively. Mitticool, a biodegradable low-cost clay fridge has been developed which does not require electricity specially designed for rural population (Radjou, Prabhu & Ahuja, 2012). A similar approach to innovation called “the Swach,” a low-end water filter that does not require electricity and utilizes waste (such as rice husks) (Ahlstrom, 2010). General Electric has also designed ultra-low cost ECG machine to name a few.

3.3 Role of Incubators, Angel Investors, Venture Capitalists and Government in promoting millennial entrepreneurship in India.

India is 3rd largest start-up hub where percentage share of tech-based start-ups is 45% whereas non-tech based is around 55%. India is also home to many unicorns as well. More than 470 active Venture capitalists, private equity and angel investors participated for $5.5 billion funding in 2017. Average number of new tech startups have increased from 495 in 2010 to 940 in 2016 which is further expected to increase to 2,500 by 2020.



E-commerce sector received highest Investments followed by service aggregators at 34%. Till date there are 11,500 technology based new start-ups viz-a-viz 5,700 non-tech based start-ups in India. The average age of startup founders in India is around 26-28 years out of which 9.5% of total new start-ups are founded by women. The total number of incubators has grown by 45% to 115 during 2016-17. Approximately 70% of new jobs were created by MSMEs during 1993-2017. A lot of startups in India have entered the industry either unearthing an entirely new market or through gaps in existing markets or product line for example Housing.com, Zivame, AdPushup, Paytm, Uber, Redbus, InMobi, Chaayos etc.

Following is the list of start-ups and funding received in 2017-2018 from investors.

Table: 4 Top Millennial Start-Ups with Funding

Start-Up	Sector	Funding (USD Million)
Flipkart	E-Commerce	$3,200
Snapdeal	E-commerce	$1,700
Ola Cabs	Taxi services	$1,230
Paytm	Fin Tech	$936
Big Basket	Grocery E- Commerce	$ 249
OYO Rooms	Hotel network	$230
Zomato	Food Tech	$ 234
Practo	Med Tech	$179
Grofers	Logistics	$ 165
Pepperfry	Furniture	$ 128
Mobikwik	Fin Tech	$ 126

Source: Tracxn 2017

Flipkart, Snapdeal and Ola cabs were the three major start-ups which received funding from top investors. With a 57 percent of B2C, 36 percent of B2B, and 5 percent of B2C/ B2B startups, this ecosystem has a lot of ground to cover in terms of funding.

Under the non-technology based start-ups Engineering sector has 18% share followed by construction at 13%, agri-products at 10%, textile at 8% etc.

Table 5: Non-tech startups in India

Sector	**% share**
Engineering	18%
Construction	13%
Agri products	10%
Textile	8%
Printing & packaging	7%
Transport & logistics	6%
Outsourcing & support	5%
Other	33%

Source: NASSCOM Startup Report 2017

Manufacturing startups are driving innovation and widening the frontiers of industry for growth. Startup India is a flagship initiative by the Government for nurturing innovation and design in manufacturing startups in India. The intent of the campaign is to attract foreign investments and encourage reverse innovation to transform India into a manufacturing hub.

E-Commerce companies in India are planning to break into India's rural market as a part of the government's Digital India initiative. By 2020, a projected 11,500 tech-startups are going to emloy around 250,000 people.

Digital India aims to provide thrust in the following nine sectors including Broadband highways, universal access to mobile connectivity, public internet access programme, e-Governance, reforming Government through technology, electronic delivery services, Information for All, e-manufacturing, IT for jobs, and early harvest programmes. Government of India has also introduced expedited services for patent registration.

Large number of educational institutions have also started incubation centers to promote entrepreneurship among aspiring student entrepreneurs. Amity Innovation Incubator helps entrepreneurs realize their startup journeys through range of world class infrastructure facilities including incubation support, business advisory, mentoring, financial services and nurturing creation of university spin-off companies. Amity Innovation Incubator Startups' have been on the top of the innovation curve recognized on platforms like 'The power of ideas', Tata NEN, NASSCOM Innovation Awards, Red Herring Global awards to name a few. It has also launched virtual incubation in 17 cities like Mumbai, Ahmedabad, Kolkata, Hyderabad, Chennai, Kochi etc.

4. Impact of millennial entrepreneurs on growth of Indian Economy

Baron and Shane 2008, discussed about the role entrepreneurs play in bringing economic changes and advancements to a country's economy. According to (Martin and Osberg 2007) entrepreneurship is the product of a combination of three elements, opportunity identification, set of personal traits and the capacity to materialize the opportunity, by transforming it into results. For the Millennials, the most defining experience has been the growth of the Internet and technology (Joshi, Dencker, Gentz, & Martocchio, 2010).

The Indian startup ecosystem is driven by an extremely diverse and inclusive entrepreneurial workforce. India's millennial population is expected to expand to more than 25 percent of the global labor force by 2027, up from 18.5 percent this year. The number of people in China aged 15 to 64 will drop by 20 million to 979 million. In India, this number is expected to exceed more than one billion which provides an opportunity for the country's workforce to adopt entrepreneurship. Out of 500 workers surveyed in India, 60 percent considered quitting their jobs to start their own business." This was the highest percentage globally and the survey was held across 33 countries. Few of the leading millennial start-ups include Flipkart, Oyo Rooms, Paytm, Redbus, Zomato, Chaayos, Ola cabs, Zivame, Limeroad, Quikr, Cardekho, Justdial, Pepperfry, Practo, Urban ladder, Grofers, Shopclues, Nearbuy,Voonik, Inmobi, Yepme, Mobikwik, Bigbasket, Caratlane, Paperboat, Gojavas, Craftsvilla, Roposo, Nykaa, Hopscotch, Bluestone etc. India needs 10.5 million jobs a year and global data shows that it is start-ups that create net new jobs in any country. With over $7 billion worth investment in 2018, India has paved its way to secure the third position in the world in terms of the number of start-ups. India's current youth population is expected to serve for the country at least for the next 3 to 4 decades. India will become the world's youngest country by year 2020, with an average age of 29 years, and account for around 28% of the world's workforce. India will be experiencing a period of "demographic bonus," where the growth rate of the working age population would exceed that of the total population, which is certainly an added advantage.

5. Conclusion

Startup ecosystem in India has risen to a next level. Startup incubators share both tangible and intangible resources such as equipment, office space, services such as accounting, computing and legal services. They also assist startups in raising startup capital and perform various networking activities to reduce the financial burdens and resource issue. Educational institutions are creating centers of excellence to train professionals in the area of entrepreneurship to create a pool of resource persons in guiding and motivating the youth to take up entrepreneurship as a career option and promote research and development required for creating university spin-off companies. Incubators help entrepreneurs in building sustainable business environment while benefitting the broader corporate communities. Pro-reforms measures are therefore required to provide much needed impetus to brand India as a Startup nation.

References

Ajzen, I. (1991). The theory of planned behaviour. Organisational Behaviour and Human Decision Processes, 50, 179-212.

Akhauri, M.M.P (1990) "Entrepreneurship Education, a Concept of Approach and Methodology", Indian Management, Vol. 29, 11-13.

Ahlstrom, D. 2014. Innovation and growth: How business contributes to society. Academy of Management Perspectives, 24(3), 10-23.

Arthurs J, (2009). Firm-Specific Human Capital and Governance in IPO Firms: Addressing Agency and Resource Dependence Concerns. Entrep. Theory Pract., 33(4): 845-865.

Arun Kumbhar and Dilip Kumbhar (2011), Problems & Prospects o f Women Entrepreneurs in India, Global Economic Research Half Yearly Research Journal, ISSN 2249- 4081, Vol. I.

Baron, R.A. and Shane, S.A. (2008), Entrepreneurship: A Process Perspective, 2 Ed., Mason, OH: Thomson South-Western.

Boulton, C. and Turner, P. (2005), Mastering Business in Asia: Entrepreneurship, Singapore: John Wiley and Sons.

Bose, A. (2006) "Information Technology and Women Entrepreneurs, Third Concept, P.45-47

Birley, S. and Westhead, P. (1994). "Business Start-up Reasons and Their Impact on Firm Growth and Size." Journal of Business Venturing, 9, 8-32.

Brush and Hisrich, R.D. (1991). „Antecedent influences on women-owned Business", Journal of Managerial Psychology, 6(2), 10-16.

Carr, J.C. and Sequeira, J.M. (2007), Prior Family Business Exposure as Intergenerational Influence and Entrepreneurial Intent: A Theory of Planned Behavior Approach, Journal of Business Research, 60: 1090-1098.

Carree M, Thurik R (2006). Understanding the role of entrepreneurship for economic growth. Entrep. Econ. Growth, 134(2): 68-79.

Cunningham, J.B. and J. Lischeron (1991) 'Defining entrepreneurship', Journal of Small Business Management, 29, 1: 46-61.

Davidsson, P. (2008), Looking Back at 20 Years of Entrepreneurship Research: What Did We Learn?, In Landström, H., Crijns, H., Laveren, E. and Smallbone, D. (Eds.), Entrepreneurship, Sustainable Growth and Performance: Frontiers in European Entrepreneurship Research (pp. 13-26), Glos, UK: Edward Elgar.

Drucker, P.F., Innovation and Entrepreneurship, P 250 (1985)

Hart, S. L. & Christensen, C. M. 2003. The great leap: Driving innovation from the base of the pyramid. MIT Sloan Management Review, 44(1): 51-56.

Ismail, M., Khalid, and Shekh Zain, R. (2009), Entrepreneurial Intention among Malaysian Undergraduates, International Journal of Business and Management, 4(10): 54-60.

Katz, J. (1988). Properties of Emerging Organizations. Academy of Management Review, 13 (3), 429-431.

Krueger, N. (1993). The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability, P 6–22.

Krueger, N.F. Jr., Reilly, M.D. and Carsrud, A.L. (2000), Competing Models of Entrepreneurial Intentions, Journal of Business Venturing, 15: 411–433.

Kirzner, I. (1983) Perception, opportunity and profit: studies in the theory of entrepreneurship (1st ed. 1979), Chicago: University of Chicago Press

Kobia, M. and Sikalieh, D. (2010), Towards a Search For The Meaning of Entrepreneurship, Journal of European Industrial Training, 34(2): 110-127.

Learned KE (1992). What Happened before the Organization? A Model of Organization Formation. Entrepreneurship Theory and Practice, 17 (1), 39-50.

Lerner, M. (2010), Gender and culture in family business: a ten-nation study" "International Journal of Cross Cultural Management.

Martin R, Osberg (2007), Social Entrepreneurship: The Case for Definition. Stan. Soc. Innov. Rev., pp. 29-39.

McCelland, D. C. (1961). The Achieving Society. Princeton, NJ: Van Nostrand.

McClelland, D. C., & Winter, D. G. (1969). Motivating economic achievement. New York: Free Press.

McClelland, D.C. (1961) The achieving society, Princeton, N.J.: Van Nostrand (See also the New Introduction to this book: New York: Irvington Publishers, 1976)

Mastering business in Asia by Chris Boulton

NASSCOM Startup India report 2016, Microsoft Ventures, Secondary sources, News article

Prasad Hanuman and Verma, B.L. (2006), "Women Entrepreneurship in India", Indian Journal of Commerce", April-June Vol.59, No.3.

Radjou, N. Prabhu, J. & Ahuja, S. 2012. Jugaad innovation: Think frugal, be flexible, generate breakthrough growth. San Francisco, CA.

Rajeev Roy, (2008) "Entrepreneurship", Oxford University Press.

Ramani, S. V. & Szirmai, A. 2014. Innovation in India: Innovation in India: Combining economic growth with inclusive development. 1-38. Cambridge: Cambridge University Press.

Schumpeter, J.A. (1947) 'The creative response in economic history', Journal of Economic History, 7, Nov.: 149-159.

Schwarz, E.J., Wdowiak, M.A., Almer-Jarz, D.A. and Breitenecker, R.J. (2009), The Effects of Attitudes and Perceived Environment Conditions on Students' Entrepreneurial Intent: An Austrian Perspective, Education + Training, 51(4): 272-291.

Wadhwa S, (2006), "Impact of Globalization in Indian Entrepreneurship", Indian Journal of Commerce, July-Spet.,Vol.59, No.3

www.forbes.com/sites/85broads/2013/11/18/the-millennial-startup-revolution/

www.steelcase.com/research/articles/new-gen-workers-in-india-and-china/

www.gemconsortium.org/country-profile/69

Analysis of Factors Affecting Entrepreneurship and Employment of Disabled (Case Study: State Welfare Organization of Region Four of the Iran)

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Abstract: Despite the laws and employment programs and support for people with disabilities, the employment rate for disabled people remains less supportive than non-disabled people. Studies show that disabled people unemployment rate accelerate 63 percent and the clients' unemployment rate is over 48 percent in the society. Accordingly, it causes a high material and spiritual costs for disabled and clients' families as well as the society and supportive organizations. The aim of this study is to explain and codify the Welfare Organization' disabled people employment in region four of the country. This research is descriptive correlational. The participants were all people with disabilities under Welfare Organization in State Welfare Organization of Region Four of the Iran. The sample consisted of 376 people selected using stratified sampling. A researcher-made questionnaire used for data collection. The validity of the questionnaire determined through Factor analysis and academic experts review and Cronbach's Alpha used to enhance reliability. To analyze the data, confirmatory factor analysis and structural equation modeling used. Standard coefficient between variables of financial, personal, governmental, family, and job seeking factors, respectively on disabled people tendency to create business are .46, .86, .55, .70, and .36, which represents the strength and direction of impact is the independent and dependent variable. This ratio indicates that a unit change in these variables disabled people trends in order to create business respectively 46, 86, 55, 70,and 36 percent rise positively. Overall results indicate that individual, family, governmental, financial and job seeking factors of entrepreneurial have a positive and meaningful impact on the business tendency of disabled people. However, belief variable at 95% significance level does not have a meaningful impact on disabled people business tendency. The studies also shown in the development of entrepreneurship in this area should be more reviewed and considered, one of them is to receive and transmit experiences of adults with disabilities, and other changes due to the attitude of employers with disabilities to understand the specific capabilities of people with disabilities.

Keywords: Entrepreneurship, Disabilities, Self-employment, Employment, State Welfare Organization, Iran.

1. Introduction

Work has always been considered as an important aspect of human life throughout history (Sandys, 2000). In today's world, men's new approach and attitude towards life is mostly based on competition and considerable changes in different parts like, economic, politic and socio-cultural. These new approaches have brought about different forms of issues and problems different to that of the past. Among these, one of the challenges is the issue of job and earning especially for the young generation. With regard to increase and change in population, shortage of sources, bankruptcy in business, continual economic stagnation, change in taste and interest and customers' expectation ect. These issues, have formed move intricate question then other social problems (Nahid & Ghanbari, 2010). In addition, disabled people one offer jobs and asking for fair income to that of others, no matter how small the job might which could be in accordance to their capabilities (McConkey and Mezza, 2001, Reid & Bray, 1998; Riches & Green, Schwaman, 1986).

Though physical in capabilities of the person may cause major challenges in finding a job. There are however, many jobs that disabled can have as decent jobs. These jobs can be in accordance to disabled physical and mental abilities and be different. For example, jobs in workshops, home business, self-employment and supportive activities and among the many jobs these people can have. Educational supportive workshops have been designed in a way that a disabled adult with basic professional skills and physical abilities can be employed. The purpose of such workshops is to develop working skills of the disabled in a way that it enables then to have a better chance of getting a job (Siporin & Lysack, 2004). The recommendation letter issued by international work organization has mentioned job opportunities for disabled, such as, supportive employment, way of getting rid of physical barriers. It is worth mentionir that, in developing countries disabled people do not have the same opportunities and access to facilities available for ordinary citizens like, sanitary

services, education, skill programs, employment services etc. (Mirkhani, 2006). In other words, illiteracy, unemployment, poverty, hunger, not a good level of education and health care and proper living condition due to poverty and socio-economic situations are among problems that can affect life and among problems that can effect life and working condition of such group of people to a great extent. It is obvious that by improving the structure of socio-economic condition, helping in poverty and sanitation and medical services and other measures one can to a large extent help to decrease the in capabilities of the disabled (Mohammadi, 2006). In spite of what employers believe in being fair in treating capable and incapable employees in workshops, at least attempts have been taken for the success and improvement of incapable people in their workshops (Dixon, Kruse & Van & Horn, 2003).

What is important in the employment of the disabled is that not only the person himself, but also his family and society can all benefit from it. Therefore, self-employment can be one of the most important solutions for employment for this specific group of people in the society. So, this study attempts to effect in making a tendency for start-up a business in distinct four of State Welfare Organization (SWO) including provinces like, Gilan, Semnan, North Khorasan and Golestan. Explanation will make it clear as to way and for what reasons people in their decisions for self-employment and running an independent business choose home as their starting point of their activity.in this study, the researcher is often finding the dimensions and indecencies that can not only help to explore the impact items in creating self-employment, but also helping in job security and satisfaction. Therefore, the aim of this study is to find out empirically analysis of factors affecting entrepreneurship and employment of disabled in state welfare organization of region four of the Iran. In this case, the next section explains the theoretical framework of the study and methodology used in measuring entrepreneurship. The forth section finds out the data analysis processing entrepreneurship in state welfare organization of region four of the Iran. The last section is the conclusion.

2. Theoretical background

The phenomena of disability gets it's meaning with regards to its kind, causes and the interpretation the society offer, in a way that one cause of it could be social happenings like, war and natural disasters. Other happening could be the effect and many social consequences it could bring about. For example, a person's disorder in making communication with his or her souranding environment. This can in turn, decrease the social economical activities and finding a job for the disabled (Adam et al. 1998). Creating job for the disabled has special importance, which can be done after evaluation stage, professional and educational guidance and general services based on evaluation. The employment of the disabled is based on three aspects of knowing the disabled person, knowing the job and analyzing the suitability of the job with the disabled (Bozorgnia.. 2007). In initiating a business there are usually different kinds of motivations. The existence of an opportunity and entrepreneurial idea. Monetary incentives and willingness of being one's own boss and employer and other motivations the person decides for his/her entrepreneurial. These motivations and affected by means of a person's characterize especially sex (Walker et al. 2008). These kind of motivations in this type of people, even causes them to move towards the activities of pink color staff (Service activities needing low skills) and not willing to develop one's own business (Thompson, 223, 2009).

Risk aversionis another reason which moves people towards self-employment and entrepreneurship. Though, written works and research about different dangers among disabled and non-disabled people are different, what is certain is that, home business can reduce the risk seeking of initiating a business since it needs less capital in comparison with other businesses (Walker and Webster, 406,2004).

2.1 Disabled person

With regard to world health organization, a disabled is a person who has lost part of his/her body either temporary or perm natty due to genetic reasons, accidents or old age, which intern, has reduced his/her independency for learning or working (Ismalinasab, 2003). Also, world health organization in 1981 has defined disabled as creating relation between one's self and environment.

2.2 A disabled person under the support of State Welfare Organization service

According to the definition by health organization, disabled person is referred to as someone whose disability has been recognized and confirmed by medical committee and receive continual or non-continual supportive services offered by state welfare.

2.3 Feeling of being more effective

Irvine and Lupart (2008) had an interview with ten disabled people while working. The results showed experienced a sense of being purposeful as well as experiencing a better social life. Cram et al. (2009) in their study showed that doing some sort of business can help to increase the independency and interaction of the disabled.

2.4 Behavioral benefits

Stephens, Collins, and Dodder (2005) in their study on 2760 adult disabled showed that an increase in Adaptive Behavior like, personal skills, social interaction, group worked, self-control have a positive relation. The advantage of understanding social groups is that unemployed, the disable have no interaction and lose the chance of being with others. Unemployed, they are secluded and have little chance of interaction (Hutchison et l. 2009). Earning money, is another advantage with in which such people can satisfy their necessary needs (Siporin & Lysack, 2004). Reid and Bray (1998), found that the disabled and keen to have control of their life's and make their own decisions. Decisions like, shopping, sharing a living and independency in presenting his/her ideas. Looking at different aspects of life. It is obvious that been with a job is very advantages, though beside these advantages there are some obstacles.

The physical intensity of the disabled has an effect in helping him to final proper job, so inability itself is considered as an important obsticale for an adult with developmental disabled in finding a kind of job (Dusseljee, et al., 2001). According to Cioffi, and Yovanoff (1998), the level of physical disability can seriously effect job experience. Ghoord, Dennin and Hall (1984) believe that the lack of social skill and proper personal ability in making interaction with co-workers makes employment period shorter. Also, the lack of proper facilities and movable goods are among other problems in getting a job (Lemaire & Mallik, 2008). Ford et al., also believe that support of family, friends and institutions the disabled are not capable of keeping one's job.

Although, the relations and supportive believe independency of the disabled at certain time. Proper support at work for the disabled is necessary in being successful at their work (Jahuda et al. 2009; Lengnick-Hall, Gaunt, & Kulkarni, 2008). Although, the severity of disability on high education is effective, but studies show that the higher the degree the disabled hold the better chances they have in getting a job (Achterberg, et al. 2009; Lengnick-Hall, Gaunt, & Kulkarni, 2008). Even the receving benefits in the disabled is increased depending on the intensity of their inability (Ford et al. 1984). In addition, the discriminative view towards the disabled has brought about less chances for employment and in some cases losing their jobs (Schmidt and Smith, 2007).

Based on what has been said so far, the review of literature, information data and statistical reports all are indications of finding ways to employ adult disabled. However, with respect to economic stagnation, Medias of the give reports of employment problems and the related factors which is indication of a more serious situation than it looks like. Therefor this study is to offer some solutions the develop and path the way for employing these group of people in society. It is however true that research is based on the sample studies of the four districts of state welfare organization with in the country on which analysis have been made. In should, however, be mentioned that based on theoretical studies, research findings and conclusions obtained by authors and researchers the effect of some factors considered as strategies can be of some help in developing employment for the disabled these include: financial factors, ideological factors, job seeking factors, family factors, governmental and personal which are taken as independent factors. The effect of these factors which can help in developing employment for the disabled which come under the little of dependent variables are analysis and studies.

Table 1: Summery of Indicators

Alternative	Norm	Reference
Financial factors	Low risk, low initial capital home-based business, you need to come in second, not the cost of renting or buying a place to work, reduce travel costs	Agehi, Naghibegi, & Mirakzadeh, 2014; Yaghobi, Vahdat Moadab & Latifi,2013; Khenfir, Ahmadiazarm, & Zamanifar, 2010; Valker, Vang & Redmond, 2008
Job seeking	The desire to be president and his employer, lack of job opportunities tailored to individual expertise, hatred of unemployment	Khenfir, Ahmadiazarm, & Zamanifar, 2010
Ideological F.	Failing values and beliefs of individual working environment	Khenfir, Ahmadiazarm, & Zamanifar, 2010
Personal F.	The planning, the effort and perseverance, expertise, skills and experience, public relations and social high, having free time, successful experience at home jobs	Agehi, Naghibegi, & Mirakzadeh, 2014; Sadi, Jalilian & Yaghobi, 2014; Golabi, et al., 2011; Najafi &Safa,2014

Alternative	Norm	Reference
Family F.	Flexibility home business, being with family and earning at the same time, participate in and benefit from the support of their family, work and life balance	Agehi, Naghibegi, & Mirakzadeh, 2014; Yaghobi, Vahdat Moadab & Latifi,2013; Khenfir, Ahmadiazarm, & Zamanifar, 2010
Governmental F.	There are proper market, hold on workshops and classes from organizations, get insurance, the availability of tourism and tourism, the domestic Career Fair	Yaghobi & Jalilian, 2015; Milotfi, Alavizadeh & Badakhsh, 2014; Yaghobi & Vahdatmoadab, 2014; Najafi &Safa,2014; nikelson, 2010

3. IV Methodology

The present study by means of its goals is practical and in terms of data collection research is descriptive and correlational. , which is done for the purpose of identifying the effective factors in developing employment for the disable SWO as well as offering strategies for such our purpose. In doing so, a questionnaire was designed which included Demographic and specific items. The validity of its content were analyised by experts and Construct validity was evaluated by confirmatory factor analysis. The population include all patients of SWO in adult disabled section from 5 province of Iran. The number of population is 224599. With regard to the number of sampling and respect to Structural Equation Modeling (SEM) the following formula is used;

$$5Q \leq n \leq 15Q$$

Hence, at least 376 sample is selected using stratified sampling. In a way that each province chosen as one category and then from each province with regard to its obtained percentage based on Table 1 was done.

Table 1: Population and sample size

	Central P.	Tehran	North Khorasan	Mazanderan	Semnan
Population	31988	154469	21195	52471	14476
Sample size	45	211	30	71	19

As well as to validation, among a sampling of 30 people a pretest was done in which consisted that Cronbach's α coefficient for each factor was higher than 0.7 Indicating the validity of the survey as shown in Table 2.

Table 2: Results of Cronbach's α coefficient

Index	Number of Question	α coefficient
Financial factors	5	0.792
Ideological F.	1	0.901
Job seeking	3	0.818
Personal F.	6	0.755
Family F.	4	0.777
Governmental F.	6	0.745

To analyze data, descriptive statistics, inferential statistics at the beginning of the factor analysis was used for the validity of questioner. Then, Structural equation modeling to study the impact and the intensity of the relationship between independent and dependent variables using LISREL software has been used.

4. V Empirical Results

The descriptive statistics show that the most number of sample are from Tehran with 56% the other Province are respectively; Mazanderan 19%, Central 12%, North Khorasan 8% and Semnan 5%. In case of sex results show that 75% of respondent's men and 25% were female and 77 % of the respondents were married. Also, about 73% of respondent's were unemployed and 27% were employed. Regarding education, about 32% have is high school, 30% had associate degree, 20% bachelor, 12% had M.A and 2% PhD and 4% had primary school.

About age of respondent's, about 16% were age between 20 to 29, less than 8% below 20 years old and Most people in the age category 30 to 39 years, 33% were in the 40 to 49 floors and 6% were more than 50 years old. Confirmatory factor analysis was used to determine the validity of questionnaire. Factor analysis indicated that all sub-criteria factors effective on disabled entrepreneur from the values of t (> 1.96) and load factor (>0.3) accepted, are to evaluate disabled entrepreneur variable sub-criteria are appropriate. In addition, the standard estimates and significant results indicates the fitness of the model. With regard to the LISREL output, χ^2 value divided by the df., equal to 1.93, that is acceptable and appropriate (<3); low levels of this indicator showed little difference between conceptual models with observed data research. Also outputs, the RMSEA =

0.067 for the show. In addition, χ^2, whatever the RMSEA is less than 0.08, indicating that the model is a better fit.

4.1 Second order confirmatory factor analysis for each of the criteria in initiating a business in distinct on disabled of SWO

In the table 3 of second order confirmatory factor analysis shown that all the factors loadings and significant numbers of model parameters, with the exception of ideological factor that are obtained lower than 1.96, Ideally other factors that fit the criteria of the relevant variables are favourable measurement model. Also, $\chi^2/_{df}$, equal to 1.90 and >3 is allowed and RMSEA is also 0.076. . In addition, χ^2, whatever the RMSEA is >0.08, indicating that the model is a goodness fit. Consistency ratio the matrix of paired comparisons was calculated as 0.044, which indicates that the results of paired comparisons are acceptable and valid. In addition, the conceptual model is tested. Therefore, structural equation modelling and LISREL software has been used.

Table 4 represents the coefficients of the variables is standard. These coefficients show the strength and direction of the relationship between variables. In other words, larger values indicate greater impact of independent variable on the dependent.

But when this factor is significant that significant coefficients corresponding to each of the standardized coefficients are also significant. Output from significant coefficient presented in Table 3. The coefficients that are significant when outside of ±1.96. In other words, when standardized coefficients are outside of this limit, standard coefficient of the research variables are significant.

Table 4: Standard and significant coefficients among the variables

Factors	Standard coefficients	Significant coefficients	Hypothesis
Financial Factor	.046	5.32	Is confirmed
Personal Factor	0.86	11.94	Is confirmed
Governmental Factor	0.55	6.24	Is confirmed
Family Factor	0.70	2.36	Is confirmed
Job Seeking Factor	0.36	3.12	Is confirmed
Ideological Factor	0.22	1.8	Is Rejected

As shown in Table 3, for example, the standard coefficient among variables in financial factors is bringing about tendency for start-up a business in distinct four SWO for the disabled is 0.46. The coefficient indicate that if the financial factor 1 unit increase then disabled tendency to create business will rise 46%. Significant coefficient is 5.32, which is out of ±1.96, so, at 95 percent, financial factor has a significant impact on disabled tendency to create business. Hence, the first research hypothesis is confirmed. Furthermore, the Significant coefficient among variables in ideological factor regarding tendency to start-up a business for the disabled is 1.80, which is within of ±1.96, so, at 95 percent, ideological factor has not significant impact on disabled tendency to create business. Hence, the research hypothesis is not confirmed.

Goodness Fit the model: The results show that χ2 has become significant (P>0.05). When this statistic becomes significant indication of unsuitable fit model with data. Though, this statistic is sensitive to the value of sample and in large samples this statistic usually becomes significant, because complete fit model with data in practice is not in accordance with reality. For this reason, usually $\chi^2/_{df}$ is used. Which has an acceptance domain of <3 for this index. The achieved value for study model is 1.78 which is an indication of a fit with data. The other index is GFI. This index is also in a >0.9 which is acceptable for 0.96 model which is obtained. Thus, this index rest upon the acceptable domain and is accepted. The third index used for studding fit model was AGFI. The acceptable domain for this index was >0.9 and the obtained amount for the study was 0.91 and so the model is fit. RMSEA was the next used index for studying fit. The value obtained for the model is 0.011 and the acceptable domain for this index is <0.05. Therefore, the value obtained for the model is within the acceptable domain. The next two indexes are CFI and RMR. The acceptable domain is >0.9 and <0.1 respectively. The value related to these two indexes are equal to 0.97 and .056 respectively. Both indexes used the acceptable domain. With regard to the indexes used for fitting model, it can be said that, the model is fit and consistence with data. The following Table 4 show that the goodness fit the structural model.

Table 4: Goodness fit the structural model

Fitness Index	$\chi^2/_{df}$	GFI	AGFI	RMSE	CFI	RMR
Acceptable values	<3	>0.9	>0.9	<0.05	>0.9	<0.1
Calculated values	1.78	0.96	0.91	0.011	0.97	0.056

5. VI Discussion and Conclusion

The study is based on employment and tendency for start-up a business in distinct four SWO. The collected data was done by binge present at the disabled's workplace and SWO and by means of interviewing and a questioner was completed. The results of the study showed that the designing model of structural equation model for enabling the disabled is the refection of a goodness fit and to a level of expectancy. Also, the results of factor Analysis shown that the most effective factor for having tendency in start-up a business is personal factor. In addition, the most important variable is related to the personal factor is perseverance and attempt. This factor supported by Satarafza (2010); Pishvaie (2014); Najafi & Safa (2014); Golabi et al. (2011); Tagbigi, Agehi, & Mirakzadeh (2014).

The second effective factor was family factor and the most important variable for having tendency in start-up a business is a balance between work and life. This factor supported by Yaghobi, Vahdat moadab, and latifi (2013), who believed that the six factors including; socio-cultural, Infrastructureand financial, personality, supportive, family and educational are the barrier for start-up a business. Furthermore, Mirghafori, et al. (2009) believe that the Lack of financial and spiritual support from the family is the barrier. Also, the finding of Walker et al. (2008) is alignment.

Governmental factor with the variable of insurance supported by; Tagbigi, Agehi, & Mirakzadeh (2014); Mirlotfi, Alavizadeh, & Badakhsh (2014); & Nicholson (2010). Financial factor with creat a business is alignment with Yaghobi, Vahdat moadab, and latifi (2013); Khenifer, Ahmadi, & Zamanifar (2010), and Mirghafori et al (2009) believed that the variable of Infrastructure and financial are the motivator and stimulator to start-up a business. The fifth factor, job seeking, with the lack of appropriate job relating to disabled education was the effective variable that is alignment with the study of Khenifer, Ahmadi, & Zamanifar (2010).

6. Suggestion

Based on the financial factor, financial support has an important role in developing a business for the disabled. So it seems that, it is essential to make financial support by loans and other financial methods to create and develop a new business.

It seems that the public sector should prepare what is necessary for create a new business for disabled. In addition, one of the most important factor in this area is to develop a market for output from products. So, it is suggested that public sector can be make a link between large firms and disabled business. Also, expansion and development of fairs, (internal & external) supported by public sector is another suggestions.

References

Achterberg, T. J., Wind, H. H., de Boer, A. M., & Frings-Dresen, M. W. (2009). Factors that promote or hinder young disabled people in work participation: A systematic review. Journal of Occupational Rehabilitation, 19(2), 129-141.doi:10.1007/s 10926-009-9169-0

Adam, Philip, Claudine, Hrtslyk (1987). Diseases and Medical Sociology, Translation: Lawrence, Donya Katbi & Morteza Katbi, Tehran: Bavrdaran. [Persian]

Ali Mirzaee, mysticism and tahmasebi, M. (2010). Obstacles to the development of rural women entrepreneurship, International Conference on Innovation & Management, Shiraz. [Persian]

Bozorgnia, F., (1976). Fundamental Principles of Vocational Rehabilitation of Disabled Persons, Welfare Organization, Office of Education and Research, the Serial of the International Labour Organization. [Persian]

Chadsey, J., & Beyer, S. (2001). Social relationships in the workplace. Menta Retardation and Developmental Disabilities Research Reviews, 7(2), 128-133. doi:10.1002/mrdd.1018.

Cramm, J. M., Finkenflügel, H. H., Kuijsten, R. R., & van Exel, N. A. (2009). How employment support and social integration programmes are viewed by the intellectually disabled. Journal of Intellectual Disability Research, 53(6), 512- 520. doi:10.1111/j.1365-2788.2009.01168.x

Dixon, K.A., Kruse, D., & Van Horn, C.E. (2003). Work Trends, Restricted Access: A survey of employers about people with disabilities and lowering barriers to work. http://www.heldrich.rutgers.edu/Resources/Publication/89/WorkTrendsXIVRestricted Access Final Report. Pdf

Dusseljee, J. E., Rijken, P. M., Cardol, M. M., Curfs, L. G., & Groenewegen, P. P. (2011). Participation in daytime activities among people with mild or moderate intellectual disability. Journal of Intellectual Disability Research, 55(1), 4-18. doi:10.1111/j.1365-2788.2010.01342.x

Ford, L., Dineen, J., & Hall, J. (1984). Is there life after placement?. Education & Training of the Mentally Retarded, 19(4), 291-296.

Golabi, A. M., Khodadad Hossini, SH, Yadollahi, J. & Razavi, M. (2011). Conceptualization of the individual entrepreneur, home-based business marketing, Journal of Marketing Management, 4 (11), 85-63. [Persian]

Holmes, J., & Fillary, R. (2000). Handling small talk at work: Challenges for workers with intellectual disabilities. International Journal of Disability, Development and Education, 47(3), 273-291. doi:10.1080/713671114.

Hutchison, P. (1994). Work and leisure: Paradoxes and dilemmas for people with developmental disabilities. Journal on Developmental Disabilities, 3(1), 1-15.

Irvine, A., & Lupart, J. (2008). Into the workforce: Employers' perspectives of inclusion. Developmental Disabilities Bulletin, 36(1-2), 225-250.

Islaminasab, A. (1983). Psychology, injury and disability. Press Safi Ali Shah. [Persian]

Jahoda, A., Kemp, J., Riddell, S., & Banks, P. (2008). Feelings about work: A review of

Javid Nya, K.& JavidNia, M. (2012). Factors affecting the tendency of women to training at home jobs: A Case Study of Garmsar city, Journal of Research in Educational Systems, Volume 6, Issue 17, 168-145. [Persian]

Khanifar, H., Ahmad Azam, H. & ZamaniFar, M. (2010). Home Entrepreneurship: Motivation and demographic factors, Entrepreneurship Development Quarterly, 3(9), 203-81. [Persian]

Lemaire, G., & Mallik, K. (2008). Barriers to supported employment for persons with developmental disabilities. Archives Of Psychiatric Nursing, 22(3), 147-155 doi:10.1016/j.apnu.2007.06.014

Lengnick-Hall, M. L., Gaunt, P. M., & Kulkarni, M. (2008). Overlooked an underutilized: People with disabilities are an untapped human resource. Human Resource Management, 47(2), 255-273. doi:10.1002/hrm.20211

Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic, interest, choice, and performance. Journal of Vocational Behavior, 45¸ 79-122.

Mank, D., Cioffi, A., & Yovanoff, P. (2003). Supported employment outcomes across a decade: Is there evidence of improvement in the quality of implementation? Mental Retardation, 41(3), 188-197. doi:10.1352/0047-6765(2003)41<188: SEOAAD>2.0.CO;2

Matofi, R., (2010), Journal of Social Work, Social Work Association of Iran, Tehran. [Persian]

McConkey, R., & Mezza, F. (2001). Employment aspirations of people with learning disabilities attending day centres. Journal of Learning Disabilities, 5(4), 309-318.

Mirlotfi, Alavizadeh and Badakhshan (2014). Pathology development of domestic jobs in rural areas, and rural planning Journal, 3(5), 12. [Persian]

Mohammadi, N., (1996). Attitudes towards disabled staff Zanjan, Master Thesis, Iran University of Medical Sciences and Health Services, Faculty of Rehabilitation. [Persian]

Mueser, K. T., Clark, R. E., Haines, M., Drake, R. E., McHugo, G. J., Bond, G. R., Essock, S. M., Becker, D. R. Wolfe, R.,& Swain, K. (2004). The Hartford study of supported employment for persons with severe mental illness. Journal of Consulting and Clinical Psychology, 72, 479-490.

Myrkhany, S. M. (1996). Principles of Rehabilitation, Tehran: Welfare Organization, Social Welfare and Rehabilitation Sciences University. [Persian]

Nahid, M. and Ghanbari, M.A.(2010). The Role of Business in employment and youth entrepreneurship, home businesses Development Conference: Challenges - Strategies, Tehran , 24-1. [Persian]

Najafi, B. and Safa, L. (2014). Search for home businesses and entrepreneurial development obstacles and challenges in rural areas, Frny work in agriculture magazine, Summer Serial I, Volume II, 73-61. [Persian]

Nicholson, I."ABrief Guide to starting a Home Based Business (2010), Business eBook comes with the compliments,2010 0f http://www.simple-ebusiness-traffic-solutions.com

oo, H. & Taheri Dimna, M. (2009). Explain and analyze the barriers affecting women's entrepreneurship, research a Change Management,1(2), 64-47. [Persian]

Pishvaie, M. (2014). Comparison of self-esteem, depression and life satisfaction for men who blind and the sighted, the first International Conference on Psychology and Behavioral Sciences , Tehran, , Convention Center, Tehran University. [Persian]

Reid, P. M., & Bray, A. (1998). Real jobs: The perspectives of workers with learning difficulties. Disability & Society, 13(2), 229-239. doi:10.1080/09687599826803.

Riches, V. C., & Green, V. A. (2003). Social integration in the workplace for people with disabilities: An Australian perspective. Journal of Vocational Rehabilitation, 19(3), 127-142.

Sandys, J. (2007). Work and employment for people with intellectual and developmental disabilities. In I. Brown & M. Percy (Eds.), A comprehensive guide to intellectual and developmental disabilities (pp. 527-543). Baltimore, MD: Paul H Brookes.

Sandys, J. (2007). Work and employment for people with intellectual and developmental disabilities. In I. Brown & M. Percy (Eds.), A comprehensive guide to intellectual and developmental disabilities (pp. 527-543). Baltimore, MD: Paul H Brookes.

Schalock, R. L., Gardner, J. F., & Bradley, V. J. (2007a). Quality of life for people with intellectual and other developmental disabilities. Applications across individuals, organizations, communities, and systems. Washington, DC: American Association on Intellectual and Developmental Disabilities

Schmidt, M., & Smith, D. L. (2007). Individuals with Disabilities Perceptions on Preparedness for the Workforce and Factors that Limit Employment. Work: Journal of Prevention, Assessment & Rehabilitation, 28(1), 13-21.

Schwamm, J. B. (1986). Transitional service centers: From school to work for students with developmental disabilities. Rehabilitation Literature, 47(9-10), 236-239.

Shafiabadi, A. (2012). Vocational Rehabilitation of Disabled Persons, Tehran, Forest Press, 4th Ed. [Persian]

Siporin, S., & Lysack, C. (2004). Quality of life and supported employment: A case study of three women with developmental disabilities. American Journal of Occupational Therapy, 58(4), 455-465.

Starafza (2010). Employment status and job satisfaction of graduates practicing in Tehran blind, master's thesis, Central Tehran Branch, Islamic Azad University of Tehran. [Persian]

Statistical Center of Iran (2011). Statistical Yearbook 1390, National Statistical port, www.amar.org.ir [Persian]

Stephens, D. L., Collins, M. D., & Dodder, R. A. (2005). A longitudinal study of employment and skill acquisition among individuals with developmental disabilities. Research in Developmental Disabilities, 26(5), 469-486. doi:10.1016/j.ridd.2003.12.003

Taghibigi, M, Agehi, H. and Mirek Zadeh , A.A. (2014). Barriers and solutions to develop rural home businesses city Islamabad West, Journal of Rural Studies, 5(2), 283-310. [Persian]

Test, D. W., Carver, T., Ewers, L., Haddad, J., & Person, J. (2000). Longitudinal job satisfaction of persons in supported employment. Education & Training in Mental Retardation & Developmental Disabilities, 35(4), 365-373.

the socio-emotional impact of supported employment on people with intellectual disabilities. Journal of Applied Research in Intellectual Disabilities, 21(1), 1-18.

Thompson piers(2009)" Women and Home-based Entrepreneurship: Evidence from the United Kingdom" International Small Business Journal, vol27(2):227-239.

Walker Elizabeth , Wang Calvin and Redmond Janice (2008) "Women and work-life balance :is home-based business ownership the solution? Equal Opportunities International, Volume l27, No.3,258-275.

Walker, Elizabeth & Webster, B, Gender (2004). Issues in home-based businesses. Women in Management Review, Volume19, 404-412.

Yaghobi, A. Jalilian, S. (2015). The effect of economic and social home jobs for rural women in the city of Islamabad West, Quarterly Journal of Economics space and Rural Development, 12(2), 113-93. [Persian]

University–Company Collaboration in the National Innovation System from the Perspectives of Micro-Entrepreneurs

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Abstract: The way we view collaborative projects influences how project practices are built. According to the National Innovation System (NIS), the innovative process is organized into projects. In most research, collaboration has been approached and analyzed by examining, for example, the innovations, interactions, and actions of the collaborators. However, prior to the present study, university–company collaboration has not been examined through the lens of project management in the NIS. The perspectives of companies and especially micro-enterprises in the NIS are under researched. The role of micro-enterprises in university–company collaboration is growing, although there are many challenges. National systems of innovation tend to be rigid and bureaucratic, especially for the agile innovations of micro-enterprises. The background is influenced by different projects approaches whose significance for practices and innovation is not recognized. This empirical study approaches university–company collaboration from the perspectives of companies, focusing on micro-entrepreneurs that are willing to grow and develop. Data was gathered through interviews with big companies and micro-entrepreneurs who have participated in university-company collaboration project in Finland. Data has been analyzed by using content analysis. The framework for the micro-enterprises data analysis derives from an earlier study on companies' point of and project approach in NIS. A strong understanding of project management is essential for organizations engaging in collaborative projects, as it will help them develop the innovative processes in their projects and at the micro-enterprise level.

Keywords: innovation, project management, micro-entrepreneurs, innovation systems, project practices

1. Introduction

An increasing number of collaborative projects between universities and companies have become subject to measurement and improvement (Bruneel et al, 2010), which is important to the organization of innovative processes in the NIS (Lundvall, 1992; Nelson, 1993; Cooke et al, 1997; Caloghirou et al, 2001; Cohen et al, 2002; Perkmann and Walsh, 2007). There are many challenges involved in collaboration, the most important of which are related to processes, outdated structures, and system inefficiencies (Bruneel et al, 2010; Uudistuva Suomi 2015–2020, 2014). Innovation is not even considered possible in rigid and bureaucratic structures (Dougherty, 2006). Too often, collaboration is examined separately from the context in which it takes place, such as the forms of organizations involved (Fagerberg et al, 2005). University–company collaboration has not been studied through the lens of project management, despite the special features of "projectification" that affect the content of the collaboration (Packendorff, 1993).

The NIS has been experiencing a paradigm shift over the last 10 years, particularly in Finland (Viljamaa et al, 2009; Pekkarinen and Harmaakorpi, 2011). The NIS is an institutional, political environment consisting of economic and societal actors and linked to economic and educational policies (Nelson, 1993; Lundvall et al, 2002; Sharif, 2006; Lundvall, 2010). The central task of the NIS is to produce knowledge for commercial use and combine education with the economy (Sharif, 2006). However, the system is transforming into an innovative environment of networks in which the interest is shifting from the products to the processes (Miettinen et al, 1999; Lundvall et al, 2002; Sharif 2006; Löppönen et al, 2009; Viljamaa et al, 2009).

The links between universities and industries are multifaceted (Geisler and Rubenstein, 1989; Perkmann and Walsh, 2007; Ankrah and Al-Tabbaa, 2015). Perkmann and Walsh (2007) described three levels of university–industry connections. The lowest level includes weak interactions, such as the commercialization of intellectual properties, publications, and conferences. The middle level is comprised of mobility, such as human-resource transfer and academic entrepreneurship. The highest level consists of research services and research partnerships. The present study concentrates on research partnerships as high-level interactions between universities and companies. University–company collaboration involves a variety of interactions, not only knowledge transfer, as has been traditionally attributed to such partnerships (Bakhshi et al, 2008).

University–company collaboration is typically utilized by large companies (Laursen and Salter, 2004). Small and medium-sized enterprises (SMEs) or micro-enterprises have traditionally found it very difficult to participate in university–company collaboration, at least in Finland (Uudistuva Suomi 2015–2020, 2014). Last year, the role of SMEs and micro-enterprises in the NIS has grown. For example, Business Finland, national business developing company, reported that 77% of companies funded in 2016 have been SMEs and micro-enterprises (Härmälä, 2017).

The clear majority of SMEs are micro-enterprises, which account for about 93% of all enterprises in the European Union (Muller et al, 2016). Micro-enterprises refer to a type of firm that employs fewer than 10 people and whose annual turnover and/or annual balance sheet does not exceed 2 million euros (Reid, 1995; European Commission, 2003). Micro-enterprises are a significant source of economic growth and play an important role in innovation and the economy in general (Storey, 1994; Fielden et al, 2000). Empirical research has shown that small firms create a higher proportion of new jobs than large firms (Carree et al, 2015). In the European Union, net job-creation rates decrease with each increase in firm size (de Wit and de Kok, 2014), and micro-enterprises accounted for 37% of total employment growth in 2015 (Muller et al, 2016). Compared to larger firms, micro-enterprises are intrinsically different in terms of organizational characteristics and approaches to challenges and obstacles (O'Dwyer and Ryan, 2000; Kelliher and Henderson, 2006).

There is a notable lack of academic studies on university–company collaboration. This phenomenon has largely been examined from a normative point of view (see Pertuze et al, 2010; Perkmann and Salter, 2012), and research partnerships have been studied through the lens of the NIS (see Caloghirou et al, 2001; Cohen et al, 2002; Carayol, 2003; Fagerberg et al, 2005; van Beers et al, 2008; Lundvall, 2010; Nieminen et al, 2011). It is also popular to analyze university–industry relations in general (see Perkmann et al, 2013; Ankrah and Al-Tabbaa, 2015) or define the barriers to collaboration (see Bruneel et al, 2010). Several studies have investigated the role of universities in research partnerships and the differences in corporate culture between the educational and industrial sectors (Gibbons et al, 1994; Etzkowitz and Leydesdorff, 2000; Etzkowitz, 2003).

Although the financier point of view is well represented in previous research, few academic studies focus on the perspectives of companies, especially micro-enterprises, in university–company collaboration (Fagerberg et al, 2005). The innovation practices of micro-enterprises is significantly under researched as well (Faherty and Stephens, 2016).

University–company collaboration typically takes the form of a research project, but there is a gap in the literature concerning project management in this context. Projects as a specific form of organization has not identified, yet project management is seen as one of many issues in university–company collaboration (Kapsali, 2011; Ankrah and Al-Tabbaa, 2015). Understanding the nature of projects and the way in which a project is seen has thus far been relegated to the periphery (see Engwall et al, 2003; Perkmann et al, 2013; Ankrah and Al-Tabbaa, 2015). The present study analyzes these concepts from the perspectives of micro-enterprises involved in collaborative projects with universities.

2. Theoretical background

The ways in which a project is seen affects how it is managed (Packendorff, 1993; Lundin and Midler, 1998; Söderlund, 2004b). Project research is key to understanding and developing modern organizations (Söderlund, 2004b). In knowledge-intensive work and rapidly changing environments, where complex products and services are developed, projects are the preferred working mode (Hodgson and Cicmil, 2007; Hoverfält 2012, p. 11). Projects are considered part of the shift from permanent to temporary structures and functions (Engwall et al, 2003).

Projects are rooted in major industrial processes, which are controlled through engineering (Morris, 1994). They are considered the most effective way to achieve a goal (Lundin and Midler, 1998). Mainstream project-management theories are based on the Project Management Institute's (PMI) classic definition of projects (Packendorff, 1995; Engwall et al, 2003). According to this definition, the project is seen as an effective, task-oriented method for fulfilling unique goals and needs, and the main steps include planning, controlling, and evaluating (Packendorff, 1995; Hoverfält, 2012, p. 12). However, classic project studies are narrow and overly project-centric, as projects are seen only as tools without context (Shenhar and Dvir, 1996; Engwall et al, 2003; Hoverfält, 2012).

Today, the use of projects as a working mode has been increasing and becoming more complex, which must be considered in the project research field (Söderlund, 2013). Along with the classic project approach, an organizational view has emerged in this field, called the "temporary organization" (Engwall et al, 2003).

Temporary organizations are based on descriptive, practice-centered ontology, while the classic approach is based on positive ontology (Geraldi and Söderlund, 2017). As the present study aims to identify the project approaches used in university–company collaboration from the perspectives of micro-entrepreneurs, the differences in the project practices of permanent and temporary organizations will also be studied (see Lundin and Söderholm, 2013).

Although projects are not merely twofold (i.e., permanent vs. temporary), the principles of provisional organization are usually presented in the classic project approach (see Engwall et al, 2003; Hoverfält, 2012), the intention behind the temporary organization is to expand into the mainstream (Engwall et al, 2003).

Temporary organizations concentrate on the relationship between the project and the "parent organization," not on defining the project itself (Engwall et al, 2003; Söderlund, 2004).

According to Enwall et al (2003), the four pillars of a temporary organization include:

- the social construction of project boundaries,
- natural uncertainty in project missions,
- a high degree of embeddedness in project management, and
- the expectations and mission-driven patterns of its projects.

The social construction of project boundaries refers to the idea that a project is not a given entity, as it is seen in the classic approach (Engwall, 2003). As such, project boundaries are compromises that are constructed over the duration of the project. A team is formed around a task, but its members have other "homes" outside the temporary organization (Lundin and Söderholm, 1995). Mainstream projects are based on planning and specification, which are executed by specific practitioners (Engwall et al, 2003, pp. 118–119).

The classic project approach underlines the need to remove uncertainty, as it is highly undesirable (Engwall et al, 2003). In contrast, the temporary-organization approach views uncertainty as a natural part of projects. Temporary organizations also consider the parent organization, as well as the time before and after a project. The project is not an island; it is in close contact with the surrounding organization and reality (Engwall et al, 2003, pp. 111–112).

3. Data and methods

The present study is empirical, and the data consists of interview responses by five micro-entrepreneurs who have participated in collaborative projects with universities. The data will be compared with previous data consisting of eight interviews with ten interviewees from large companies. The initial interviews were carried out in December 2007 and November 2008, with additional rounds in 2010. The previous data illustrates the aforementioned paradigm shift in the NIS. The signs of a new paradigm are reflected in the present material, but this phenomenon is only beginning to emerge in the literature. The interviews thus represent the first phase of the phenomenon (Viljamaa et al, 2009).

The data is constructed in interaction with researcher. Reseacher is interpreter throughout the process, not just a passive finder (Alvesson & Kärreman 2007; Gherardi 2000). The purpose of the data is to give a meaningful theoretical interpretation for the university-company –collaboration from the companies point of view.

3.1 Research sample

The micro-entrepreneurs operate in different industries, including travel and leisure, information and communication technology, and more traditional industries. They all have experience in university–company collaboration and have participated in one or more projects. Three of the micro-entrepreneurs have employees, while the remaining two are solo entrepreneurs.

The previous sample consists of interviewees from large companies who are experts in university–industry collaboration. They are responsible for deciding whether their companies participate in such projects and have many years of experience working in collaborative projects (Welch et al, 2002). Among the interviewees are experts in technology, design, sociology, marketing, and sales. They have worked in R&D-related managerial positions at various companies in the mobile telecommunications sector, the printing industry, traditional industries, and innovative technological industries. This has been attempted to seek scope and diversity, as well as time coverage for building a business perspective.

3.2 Data collection

The first interviews are non-structured with experts. The content included predetermined topics intended to guide the discussion, so the interviews sought to achieve a broad understanding of the interviewees' experiences and ideas regarding the collaborative projects. The four topics addressed in the interviews include: a) experiences and practices before the project started, b) experiences during the project, C) experiences regarding the project results, and d) achievements and practices after the project ended (Engwall 2003, p. 791).

In the present study, the interviews were conducted by phone and lasted from 30 minutes to 1 hour, during which the interviewees discussed their own experiences of the collaborative projects. In the previous study, the duration of the interviews ranged from 45 to 90 minutes and were recorded and subsequently transcribed verbatim for analysis.

3.3 Data analysis

The interviews were analyzed using content analysis (Strauss & Gorbin, 1998; Miles & Hubermann 1994; Erikson & Kovalainen 2008). The stages of analysis included coding, categorization, and thematic definition (Strauss & Gorbin 1998; Saldana 2013). Atlas.Ti and Nvivo has been used as an analyzing tools.

Open coding based on grounded theory, and it has been a lead setting in the first interview analysis (Strauss & Gorbin 1998). Process has been spiral, and included two rounds of coding. After coding categories has constructed based on conzeptualization, and to find differencies and similarities (Erikson and Kovalainen, 2008). Last stage of analysis has been making four descriptive themes (Saldana 2013).

Analysinz the second data, micro-entrepreneur interviews, the firs coding stages has been similar. The categories have since become goal-oriented; that is, they have been arranged by the contextual practices and issues emerging from the interviews (Kivinen and Ristelä, 2000; Luomanen, 2010; Ruusuvuori et al, 2010). The analysis based on conzeptualizing of first data. This technique is not purely data-based, nor is it theory-based (Erikson and Kovalainen, 2008; Strauss & Gorbin 1998). The contents of the interviews therefore do not reflect reality as if it is an object that can be found; rather, a contextual view of collaborative projects from the company perspective is formed through analysis (see Gherardi, 2000; Gherardi and Nicolini, 2001; Pihlström, 2007, p. 160).

4. Findings

4.1 The classic project approach: before the paradigm shift

Projects are key to the inner workings of an organization. Defining the project implicitly also defines the regular activities of its parent company (Johansson et al, 2000; Lundin and Steinhòrsson, 2003). According to the data collected, the concept of the project has changed alongside an emerging paradigm shift in the NIS.

The NIS currently consists of two project approaches that focus on the perspectives of large companies, which generate structures that define the existence and function of a project (Pekkarinen and Harmaakorpi, 2011).

The classic project approach emphasizes design, the goals remaining, predefined working methods, and the importance of reporting (Packendorff, 1993), which the company views as an image of the project produced by the NIS. This is contrary to the fact that design, control, and reporting are seen in the literature as atypical for innovation (Dougherty, 2006; Lovio, 2009).

4.1.1 Project planning

Generally, in the NIS, funding for a research partnership project between a university and a company is based on the project's plan. When examining a cross-section of the innovation paradigm, the significance of project planning is highly evident, as the project's success is largely monitored in relation to its plan and mission (Cooke et al, 1995; Edquist, 1997; Innovaatiotoiminnan vaikutukset, 2008). From a company perspective, project planning must also meet strict goals in content creation, not just project management.

> *"And even in Tekes, there is, unfortunately, the spirit that when you read the project plan, then you have to do it, even if it is quite unattractive."* (Interview 3, research director)

According to the NIS, the starting point of a project consists of the implementation of an approved plan (Cooke et al, 1997; Cooke, 2001); however, project plans are often drafted up to a couple of years before the start of the project. During this time, the company may experience extensive changes in operation, and the plan may no longer be feasible.

"That is a bad project, which is really stiff and where you have to commit to the plan for four years, which you have written three years before the start of the project, after which the business goals have changed and the priorities are, and still, it is obligatory to do what it will be time to do." (Interview 12, micro-entrepreneur)

Defining content in advance is an atypical innovation activity, as the primary goal is to create new content (Dougherty, 2006). In the classic project approach, however, designing and planning are key starting points for a project, which form the prerequisites for success as well as the project's metrics (Packendorff, 1995; Hoverfält 2012, pp. 10–13). These practices hamper innovation and prevent the project from developing new content (Dougherty, 2006).

4.1.2 Working methods

The NIS paradigm initially emphasized a linear model of innovation (Enquist, 1997; Cooke, 2001; Pekkarinen and Harmaakorpi, 2011). The literature describes the practices of the NIS and the linear model (Lundvall et al, 2002). However, such formal structures create challenges for companies. In most cases, the progress of a project is measured through project meetings between the collaborators. All of this is intended to eliminate uncertainties in the process (Viljamaa et al, 2009); however, securing a linear process will lead to weak innovations. According to evaluations of collaborative projects between universities and companies, their impacts appear to be weak (Uudistuva Suomi, 2015–2020, 2014). In the literature, predefined actions are seen as challenges in collaboration. Uncertainty and cyclical activities are, according to the present study, the basis of innovation (Koski, 2001; Lundvall et al, 2002; Pavitt, 2005).

> *"…Then also responsible for the company that the results are really going ahead, not just drinking coffee and knocking it off, whether it's a good research. But that's why you should know that you do not..."* (Interview 11, business development director)

Following the linear innovation model, the NIS emphasizes the transfer of knowledge, and its practices have been built around enhancing this activity (Brown and Duguid, 2001; Hautamäki, 2008, p. 66). The forum for the official launch of a project consists of a management team with pre-appointed personnel. The content of the project is formed elsewhere, and there is no need for a practical interface.

4.1.3 Project reporting

> *"And then, when it is practically revealed that it is something concrete to be able to see and build, of course in cooperation with others, then it is quite a challenging thing."* (Interview 4, development director)

There are few opportunities for companies to make use of the information generated in collaborative projects (Kaufmann and Tödtling, 2001; Bruneel et al, 2010). The transfer of information by various means is ineffective. The challenges lie not only in the quality of the results or how they correlate with the plan, but also in their exploitation. The results are not expected to be ground-breaking and can hardly be utilized commercially (see Kankaala et al, 2007, pp. 73–75). Companies must therefore adapt the project results to fit their own needs, because the results are born outside their practices.

> *"So that I can double the page report, or even the five-page report in Word format, so I can throw it into the garbage from the point of utilization."* (Interview 3, research director)

Collaborative projects are like external organizations, so the results must be transferred from one organization to another. The NIS directs the transfer of information in very traditional ways: via reports and presentations. This is seen as very problematic and contributes to poor results (Cohen and Levinthal, 1990; Kaufmann and Tödtling, 2001).

4.2 University–company collaboration from the approach of establishing a temporary organization

The concept of a project is based on concrete practices (Gherardi and Nicolini, 2000; Gomez et al, 2003). In part, those involved in a project will rebuild the practices produced by the system, which broadens the concept of collaborative projects between universities and companies.

The previous data shows a transformation in the NIS, from a linear innovation model toward a network model (Miettinen et al, 1999; Lundvall et al, 2002; Sharif, 2006; Löppönen et al, 2009; Viljamaa et al, 2009). According to the data, the linear innovation model is linked to the classic project approach; however, companies are trying to shape their practices into modes that are more appropriate and productive for university–company collaboration. In doing so, these companies follow a project approach that differs from the mainstream; they are establishing temporary organizations.

4.2.1 The importance of interaction

Innovation is largely based on advances in technology. The introduction of new technology has led to innovations that follow a very straightforward path from one organization to another (Chesborough, 2006).

Despite the fact that the innovative process is more complex than a simple linear model, the phase-out concept has continued to dominate collaborative projects, and the phases were seen to end and come next, although they could repeat the process (Cooke, 2001; Lundvall et al, 2002; Chesborough, 2006). The underlying concept of information has also remained unchanged, as information is considered to move from one stage to the next (Gherardi and Nicolini, 2000).

> *"Well, actually, at least I have to take advantage of such a project of ways, which suits me. I do not know whether it has changed in culture as a whole, or is it just that it has been the case that such practices work."* (Interview 5, research manager)

In collaborative projects, companies typically develop practices rather than content. According to the interview data, the development of innovative processes is not essential, but challenges in the project practices are considered very important. Interaction and situated learning are emphasized in the innovative process, and experiment-driven innovation is an effective way to develop this process (Nooteboom, 2000; Lovio, 2009). The development of such practices has deepened the nature of collaboration, from the simple procurement of services to a true research partnership (Geisler and Rubenstein, 1989; Perkmann and Walsh, 2007).

> *"But through the projects, it has been learned that, okay, there are some opportunities to do something and it is understood that the stoics are now much better than in history. And it has revealed the challenges and other things that it has."* (Interview 3, development manager)

Companies are learning how to carry out collaborative projects via their experiences. Project managers are developing ways to obtain the most use out of a project and the organizations involved. The innovative process is gradually shifting from the traditional transfer of knowledge toward the interactions between collaborators and the modes of action. The change builds the transformation of the paradigm of the innovation system described (Viljamaa et al, 2009). This phenomenon is especially emphasized in the micro-entrepreneurs' responses, which indicates that their participation and interactions in the project are very important.

> *"So it's nothing like sparring and peer support, and then there's information going to change and that hey, I could do it like you're not doing. That's the way it is, though. If you are participating and active. That it requires it to do something to get it*." (Interview 12, micro-entrepreneur)

4.2.2 The social construction of project boundaries

With these gradually changing practices, the project's boundaries will also be restructured (Engwall, 2003). Collaborators other than those who were initially assigned will become involved in the project. This extends the concept of the project into the temporary-organization approach.

> *"And then usually in the way that the end result is presented in such a way that the audience is that the audience is as wide as possible. For example, if my team were so responsive, it was a person in the project, so the whole team was able to listen to the results."* (Interview 5, research manager)

The aim is to integrate the results into the company's daily operation and practices by involving as many employees as possible in the project, at least in its progression. Information is thereby constructed contextually (Lave and Wenger, 1991; Yanow, 2000). Nooteboom (2000, p. 54) also discussed this point while emphasizing the attitude of the adoptive person, who re-invents and associates information with organizational routines and structures. However, the traditional structure of the NIS has prevented this, as it removes information from its context and forces it into its own objective entity, report, or transferable pre-information packet.

4.2.3 The natural uncertainty of projects

> *"…Especially projects should be…more like extensive, and they should be like…you don't know the result in advance, or it is not necessarily known whether the result is as useful or not. …Companies can specifically try. Not so much money to go but in the future I can really produce a lot. If in a way they dare to get enough."* (Interview 6, chief specialist)

Companies see innovation as a creative, searching process that needs space to evolve (Koski, 2001). According to the data, the goals set in collaborative projects are limiting or somewhat unnecessary, which may not be as planned. This perspective has also been raised in the literature regarding the NIS; that is, the cause and effect of research, technology, and innovation does not produce innovations, and the effectiveness of this approach has come under question (Lundvall et al, 2002; Harmaakorpi and Melkas, 2008). It is now understood that networking and interaction are key elements of innovation (Lundvall et al, 2002).

> *"...I see very important the importance of raising my people's competence and general education and knowledge in the area. That it has such a function. …On a personal level, I would like to be great, so it is, I think it is of great importance because people look at things from a different point of view, ventilate their ideas, network with new people, try new methods."* Interview 5, Research manager

According to the data, participation, interaction, and personal relationships are highly sought in university–company collaboration, in addition to the official project results (Kanunda et al, 2007). The challenges of achieving the official results are compensated by the situated learning and development of individuals.

> *"...You have not come to a surprise in the negative direction that has come, there have been many boys who did not initially even think that it could be born."* (Interview 3, development manager)

In practice, the preconditions for innovation (i.e., insecurity, interaction, and complexity) have created challenges in the innovative process (Dougherty, 2006; Bruneel et al, 2010). Company attitudes toward innovation have gradually become more flexible, which has incited changes in the prevailing paradigm. The systematic and gradual nature of the innovative process is being questioned (Mutanen and Parjanen, 2008).

From the company perspective, the importance of the results has decreased, while the importance of the process has increased (Viljamaa et al, 2009).

5. Discussion

The present study provides data extracted from interviews with micro-entrepreneurs who have experience in university–company collaboration, along with a description of the changes that have taken place in the NIS of Finland over the past 10 years (Viljamaa et al, 2009; Pekkarinen and Harmaakorpi, 2011). These changes indicate that the rigid structure of the NIS has been ineffective, even to the point of inhibiting innovation (Chesborough, 2003; Chanal, 2004; Fagerberg, 2005). The foundation of a collaborative project should be practice and innovation, not bureaucracy (Dougherty, 2006; Hautamäki, 2008).

University–company collaboration projects, having special projects features that also affect the content of the activity, like one such feature is the emergence of innovations (Packendorff, 1997). According to the data, companies construct their own innovation-supporting practices instead of relying on those defined by the NIS.

This paradigm shift mirrors the differences between the classic project approach and the establishment of temporary organizations (Engwall et al, 2003). Understanding these differences in the context of university–company collaboration will help us parse the emerging challenges to project flexibility, openness, and process orientation (see Table 1).

Table 1: Factors that inhibit/support innovation activities and project approaches

Inhibit	Support
Bureaucratic planning	Natural uncertainty
Closed structure	Open structure
Results-oriented	Process-oriented
Classic project approach	Temporary organizations

The formal structure of the NIS is based on the classic project approach, which emphasizes project planning, a closed structure regarding the project and its assigned participants, and the importance of the results and their evaluation through the realization of the project's objectives. The classic project aims to enhance and control its participants in the border region, as well as prioritize a strict adherence to the objectives and practices of the project (Blomquist and Packendorff, 1998; Engwall et al, 2003).

Based on a preliminary analysis, micro-enterprises emphasize a casual attitude toward process-oriented and uncertainty in university–company collaboration. In practice, this means that the companies emphasize interaction between the project participants. Interaction appears as concrete meetings and shared practices and peer support for different ways. Throughout the shared practices situated learning, or learning through action is constructed (Gherardi and Nicolini, 2001).

In addition to this, natural uncertainty is underlined by micro-entrepreneurs. Natural uncertainty is, above all, flexibility with regard to objectives and plans of projects. The plans and aims should update during the project process from the micro-entrepreneurs point of view. Keeping originally plans and implement the project without reflection and interaction, appears really irrational for the companies. Here is a conflict between NIS official project approach and companies way to view projects.

The NIS therefore creates a different field of operation for collaborative projects between universities and companies. According to the data, the formal, bureaucratic structure of the NIS has been partially constrained in such projects, which have been actively pursued through practical measures. The factors emerging from this paradigm shift are linked to differences in the classic project approach and the temporary-organization approach. During the transition, both aspects are present, which causes much of the challenges in collaborative projects. The project approach offers a conzeptualization and way to improve NIS from the micro-entrepreneurs point of view.

References

Uudistava Suomi: tutkimus. ja innovaatiopolitiikan suunta 2015 -2020. Tutkimus- ja innovaatiopoliittinen linjaus 2015-20202014, , Tutkimus- ja innovaationeuvosto, Helsinki.

National Innovation Systems : A Comparative Analysis, 1993, Oxford University Press, Cary, NC, USA.

Ankrah, S. & AL-Tabbaa, O. 2015, Universities–industry collaboration: A systematic review.

Bakhshi, H., Schneider, P. & Walker, C. 2008, Arts and humanities research and innovation, Arts and Humanities Research Council, Bristol.

Beers, C., Berhäll, E. & Poot, T. 2008, "R&D internationalization, R&D collaboration and public knowledge institutions in small economies: Evidence from Finland and Netherlands", Research Policy, vol. 37, pp. 294-308.

Blomquist, T. & Packendorff, J. 1998, "Learning from renewal projects: content, context and embeddedness" in Projects as arenas for renewal and learning processes, eds. R.A. Lundin & C. Midler, Kluwer Academic Publishers, Boston, pp. 37-78.

Brown, J.S. & Duguid, P. 2001, "Knowledge and Organization: A Social-Practice Perspective", Organization Science, vol. 12, no. 2, pp. 198-213.

Bruneel, J., D'Este, P. & Salter, A. 2010, Investigating the factors that diminish the barriers to university–industry collaboration.

Caloghirou, Y., Tsakanikas, A. & Vonortas, N.S. 2001, "University-industry cooperation in the context of the european framework programmes", Journal of Technology Transfer, vol. 26, pp. 153-161.

Carree, M., Congregado, E., Golpe, A., & van Stel, A. (2015). Self-employment and job generation in metropolitan areas, 1969–2009. Entrepreneurship & Regional Development, 27(3-4), 181-201.

Chanal, V. 2004, "Innovation management and organizational learning: a discursive approach", European Journal of Innovation Management, vol. 7, no. 1, pp. 56-64.

Chesbrough, H. 2003, Open innovation. The new imperative for creating and profiting from technology, Harvard business school press, Boston.

Cicmil, S., Williams, T., Thomas, J. & Hodgson, D. 2006, Rethinking Project Management: Researching the actuality of projects.

Cohen, W.M. & Levinthal, D.A. 1990, "Absoptive capacity: a new perspective on learning and innovation", Administrative Science Quarterly, vol. 35, no. 1, pp. 128-152.

Commission Recommendation 2003/361/ EC, as published in the Official Journal of the European Union L 124, p. 36 of 20 May 2003.

Cooke, P. 2001, "Regional Innovation Systems, Clusters, and the Knowledge Economy", Industrial & Corporate Change, vol. 10, no. 4, pp. 945-974.

Cooke, P., Gomez Uranga, M. & Etxebarria, G. 1997, Regional innovation systems: Institutional and organisational dimensions.

De Wit, G., & De Kok, J. (2014). Do small businesses create more jobs? New evidence for Europe. Small Business Economics, 42(2), 283-295.

Dougherty, D. 2006, "Organizing for innovation in the 21st century" in The Sage handbook of organization studies, eds. S.R. Clegg, C. Hardy, T.B. Lawrerence & W.R. Nord, Sage publications, London, pp. 598-617.

Edquist, C. 2005, "Systems of innovation. Perspectives and challenges" in The oxford Handbook of Innovation, eds. J. Fagerberg, D.C. Mowery & R.R. Nelson, Oxford University Press, New York, pp. 181-208.

Engwall, M., Steinthórsson, R.S. & Söderholm, A. 2003, "Temporary organizing - a viking approach to project management research" in The Northern lights: organisation theory in Skandinavia, eds. B. Czarniawska & G. Sevón, Liber, Malmö, pp. 111-130.

Eriksson, P. & Kovalainen, A. 2016, Qualitative methods in business research, 2nd edition edn, Sage, Los Angeles ; London ; New Delhi ; Singapore ; Washington DC.

Etzkowitz, H. 2003, "Innovation in innovation: the Triple Helix of university-industry-government relations", Social Science Information, vol. 42, no. 3, pp. 293-337.

Etzkowitz, H. & Leydesdorff, L. 1997, "Introduction: Universities in the Global Knowledge Economy" in Universities and the Global knowledge Economy. A Triple Helix of University-Industry-Government Relations, eds. H. Etzkowitz & L. Leydesdorff, Pinter, London, pp. 1-10.

Fagerberg, J. 2005, "Innovation. A guide to the literature" in The Oxford Handbook of Innovation, eds. J. Fagerberg, D.C. Mowery & R.R. Nelson, Oxford University Press, Nwe York, pp. 1-26.

Fagerberg, J., Mowery, D.C. & Nelson, R.R. (eds) 2005, The Oxford Handbook of Innovation, 1st edn, Oxford Univarsity Press, New York.

Fielden, S.L., Davidson, M.J. and Makin, P.J. (2000) “Barriers Encountered during Micro and Small Business Start-Up in North-West England”, Journal of Small Business and Enterprise Development, Vol 7, No. 4, pp 295–304.

Geisler, E. & Rubenstein, A., H. 1989, "University-industry relations: a review of major issues" in Cooperative research and development: the industry-university-goverment relationship, eds. A.N. Link & G. Tassey, Kluwer Academic Publishers, Boston, pp. 43-62.

Geraldi, J. & Söderlund, J. "Project studies: What is, where it is going?
", International Journal of Project management, .

Gherardi, S. 2000, "Practice-Based Theorizing on Learning and Knowing in Organizations", Organization, vol. 7, no. 2, pp. 211-223.

Gherardi, S. & Nicolini, D. 2000, "To transfer is to transform: the circulation of safety knowledge", Organization, vol. 7, no. 2, pp. 329-348.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. & Trow, M. 1994, The new production of knowledge. The dynamics of science and research in contemporary societies. Sage, London.

Gomez, M., Bouty, I. & Drucker-Godard, C. 2003, "Developing knowing in practice: behind the scenes of haute cuisine" in Knowing in organizations: a practice-based approach, eds. D. Nicolini, S. Gherardi & D. Yanow, M.E. Sharpe, New York, pp. 100-125.

Harmaakorpi, V. & Melkas, H. (eds) 2008a, Innovaatiopolitiikkaa järjestelmien välimaastossa, Suomen Kuntaliitto, Helsinki.

Harmaakorpi, V. & Melkas, H. 2008b, "Johdanto" in Innovaatiopolitiikka järjestelmien välimaastossa, eds. V. Harmaakorpi & H. Melkas, Kuntaliitto, Helsinki, pp. 13-16.

Härmälä, V. 2017, Kansainvälistymisen kasvupaketti laajentaa Tekesin asiakaskuntaa, Business Finland, Helsinki.

Hautamäki, A. 2008, Kestävä innovointi. Innovaatiopolitiikka uusien haasteiden edessä, Sitra, Helsinki.

Hoverfält, P. 2012, Boundary activities and readiness for change during change program initiation
, Aalto university school of science, Helsinki.

Kankaala, K., Kutinlahti, P. & Törmälä, T. 2007, Tutkimustulosten kaupallinen hyödyntäminen, Sitra, Helsinki.

Kapsali, M. 2011, "Systems thinking in innovation project management: a match that works", International Journal of Project Management, vol. 29, pp. 396-407.
Kaufmann, A. & Tödtling, F. 2001, "Science-industry interaction in the process of innovation: the importance of boundary-crossing between systems", Research Policy, vol. 30, pp. 791-804.
Kelliher, F., & Henderson, J.B. (2006). A learning framework for the small business environment. Journal of European Industrial Training, 30 (7), 512–28
Kivinen, O. & Ristelä, P. 2000, Totuus, kieli ja käytäntö. Pragmatistisia näkökulmia toimintaan ja osaamiseen , WSOY, Helsinki.
Koski, J.T. 2001, Luova Hierre, Gummerrus, Jyväskylä.
Kovalainen, A. 2005, "Sosiologian metodologinen anti liiketaloustieteelle" in Tutkimus menetelmien pyörteissä, eds. P. Räsänen, A. Anttila & H. Melin, PS-kustannus, Jyväskylä, pp. 67-82.
Laursen, K. & Salter, A. 2004, "Searching high and low: what types of firms use universities as a source of innovation?", Research Policy, vol. 33, pp. 1201-1215.
Lave, J. & Wenger, E. 1991, Situated learning: legitimate peripheral participation, Cambridge University Press, Cambridge.
Löppönen, P., Lehvo, A., Vaahtera, K. & Nuutinen, A. (eds) 2009, Suomen tieteen tila ja taso 2009, Suomen Akatemia, Helsinki.
Lovio, R. 2009, "Näkökulmia innovaatiotoiminnan ja -poilitiikan muutoksiin 2000-luvulla" in Kasvuparadigman muutos - Innovaatiotoiminnan uudet trendit, eds. E. Ahola & A. Rautiainen, Tekesin katsaus 250/2009, Helsinki, pp. 3-41.
Lundin, R.A. & Midler, C. 1998, "Evolution of project as empirical trend and theoretical fokus" in Projects as arenas for renewal and learning processes, eds. R.A. Lundin & C. Midler, Kluwer Academic Publisher, Boston, pp. 1-9.
Lundin, R.A. & Söderholm, A. 1995, "A theory of the temporary organisations", Scandinavian journal of management, vol. 11, no. 4, pp. 437-455.
Lundin, R.A. & Steinthòrsson, R.S. 2003, "Studying organizations as temporary", Scandinavian Journal of Management, vol. 19, pp. 233-250.
Lundvall, B. (ed) 2010, National systems of innovation. Toward theory of innovation and interactive learning., 2dn edn, Anthem Press, London.
Luomanen, J. 2010, "Straussilainen grounded theory -menetelmä " in Haastattelun analyysi, eds. J. Ruusuvuori, P. Nikander & M. Hyvärinen, Vastapaino, Tampere, pp. 351-371.
Miettinen, R. 2002, National Innovation System. Scientific Concept or Political Rhetoric, Sitra, Helsinki.
Miettinen, R., Lehenkari, J. & Hasu, M.H., Jukka 1999, Osaaminen ja uuden luominen innovaatioverkoissa, Taloustieto, Helsinki.
Morris, P.W.G. & Jamieson, A. 2005, "Moving from corporate strategy to project strategy", Project Management Journal, vol. 36, no. 4, pp. 5.
Muller, P., Devnani, S., Julius, J., Gagliardi, D., & Marzoc, C. (2016). Annual Report on European SMEs 2015/2016–SME recovery continues.
Müller, K., Rammer, C. & Trüby, J. 2009, The Role of Creative Industries in Industrial Innovation, Centre of European Economic Research (ZEW), http://www.econstor.eu/bitstream/10419/27592/1/dp08109.pdf.
Mutanen, A. & Parjanen, S. 2008, "Käytäntölähtöise innovaatiotoiminnan teoreettiset perusteet" in Innovaatiopolittiikkaa järjestelmien välimaastossa, eds. V. Harmaakorpi & H. Melkas, Suomen Kuntaliitto, Helsinki, pp. 17-27.
Nooteboom, B. 2000, Learning and innovation in organizations and economies, Oxford University Press, New York.
Nooteboom, B., Haverbeeke, V.W., Duysters, G., Gilsing, V. & Oord, v.d.A. 2007, "Optimal cognitive distance and absoptive capacity", Research Policy, vol. 36, pp. 1016-1034.
O'Dwyer, M., & Ryan, E. (2000). Management development issues for owners/managers of micro-enterprises. Journal of European Industrial Training, 24(6), 345–353.
Packendorff, J. 1995, "Inquiring into the temporary organization: new directions for project management research", Scandinavian journal of management, vol. 11, no. 4, pp. 319-333.
Pavitt, K. 2005,"Innovation process " in The Oxford Handbook of Innovatio, eds. J. Fagerberg, D.C. Mowery & R. Nelson R., Oxford University Press, New York, pp. 6-114.
Pekkarinen, S. & Harmaakorpi, V. 2006, "Building regional innovation networks: The definition of an age business core process in a regional innovation system", Regional Studies, vol. 40, no. 4, pp. 401-413.
Perkmann, M. & Walsh, K. 2007, "University-industry relationships and open innovation: towards a research agenda", International Journal of Management Reviews, vol. 9, no. 4, pp. 259-280.
Reid, G. C. (1995). Early life-cycle behaviour of micro-firms in Scotland. Small Business Economics, 7(2), 89–95.
Ruusuvuori, J., Nikander, P. & Hyvärinen, M. 2010, "Haastattelun analyysin vaiheet" in Haastattelun analyysi, eds. J. Ruusuvuori, P. Nikander & M. Hyvärinen, Vastapaino, Tampere, pp. 9-36.
Saldana, J. 2013, The Coding Manual for Qualitative Researchers, 2nd edn, Sage, London.
Sharif, N. 2006, "Emergence and development of the national innovation systems concept", Research Policy, vol. 35, pp. 746-766.
Storey, D.J. (1994) Understanding the Small Business Sector, University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.
Strauss, A. & Corbin, J. 1998, Basics of qualitative research: techniques and procedures for developing grounded theory, 2nd edn, Sage publications, Thousand Oaks.

Söderlund, J. 2004a, "Building theories of project management: past research, questions for the future", International Journal of Project Management, vol. 22, pp. 183-191.
Söderlund, J. 2004b, "On the broadening scope of the research on projects: a review and a model for analysis", International Journal of Project Management, vol. 22, pp. 655-667.
Valovirta, V., Niminen, M., Pelkonen, A. & Turkama, P. 2011, Systeemisen muutoksen haasteet ja innovaatiotoiminnan mahdollisuudet. Tapaustutkimuksia ja politiikkanäkökulmia , Tekes, Helsnki.
Viljamaa, K., Lemola, T., Lehenkari, J. & Lahtinen, H. 2009, Innovaatiopolitiikan aluellinen ulottuvuus. Katsaus viimeaikaisiin kehityssuuntiin, Työ- ja elinkeinoministeriö, Helsinki.
Welch, C., Marschan-Piekkari, R., Penttinen, H. & Tahvanainen, M. 2002, "Corporate elites as informants in qualitative international business research", International Business Review, vol. 11, no. 5, pp. 611-628.
Yanow, D. 2000, "Seeing organizational learning: a cultural view", Organization, vol. 7, pp. 247.

Entrepreneurship Intentions of University Students: Exploring Differences between Management and Engineering Students

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Abstract: In the current economic context of great complexity, entrepreneurship is perceived as an alternative to create employment and reduce uncertainty, and allows the transformation of an innovative idea into a company. Entrepreneurship is a concept with many peculiarities. It is not an exact science to be implanted, but a way of thinking to be developed. It emphasizes opportunities rather than threats and obstacles, and its ability to identify opportunities requires first and foremost the study of entrepreneurial intentions of individuals (Krueger et al., 2000). What determines individual's decision to create their own business? Variables such as personal characteristics, family influence, social background, self-efficacy and others have been pointed out, but the understanding of the different motivations for someone to undertake has revealed a dynamic and complex area of study. According to Theory of Planned Behaviour (Ajzen, 1991), individuals engage in an activity (such as starting a business) as a deliberate action which is reflected on their intention to this behaviour. The aim of the investigation is to measure and compare the entrepreneurial intentions of engineering and management students. The paper presents the results of a survey, named EMPREENDE 2017, which included 436 Portuguese students from the University of Minho. The sample focused on students from the 1st to the 3rd year of different courses at the Engineering School and the Management School at the university, divided into engineering students (49.08%) and management students (50.92%). The study does not identify differences in the entrepreneurial experience of parents but identifies differences in attitude, subjective norms, perceived control, and entrepreneurial intention of the two groups of students.

Keywords: Entrepreneurial intentions; university students; engineering and management students; University of Minho, Portugal; survey

1. Introduction

Entrepreneurship is seen as a mechanism to promote employment in a country and, as a result, to accelerate the development of the respective economy (Bryson et al, 2017; Baptista, Escára and Madruga, 2008; Van Stel, Carree and Thurik, 2005). This is why members of the Organization for Economic Co-operation and Development (OECD) give priority to entrepreneurship as an alternative to counteract the effects of the economic crisis that is still felt in several countries (OECD, 2009). By recognizing new and innovative business opportunities and taking risks, it is possible to reverse the current situation by increasing competitiveness and adjusting markets (Rahman, Ahmad and Taghizadeh, 2016, Hisrich, Peters and Shepherd, 2014, Oosterbeek, Van Praag and Ijsselstein, 2010, Sarkar, 2010).

One of the recommendations to increase entrepreneurship is for universities to take an active formative role. Universities must prepare their students for entrepreneurship by taking a more active position in transmitting technical and theoretical knowledge and providing them with the indispensable tools to start and maintain their own business (Duval-Couetil, Shartrand and Reed, 2016; Souitaris, Zerbinati and Al-Laham, 2007).

Starting from the premise that technical and academic knowledge are important for the creation of an entrepreneur, engineering students have more technological and industrial knowledge, and may be perceived as having greater ability to detect new business opportunities. In turn, students of socio-economic sciences, given their training, are perceived as having greater affinity with issues related to the economic viability of a business. Although they do not all have the same competencies, these two groups of students are considered the most capable individuals to create successful companies that promote economic growth (Maresch et al, 2016). Both have the necessary knowledge to undertake, yet is their predisposition and entrepreneurial intent the same?

The paper is structured as follows. Section 2 defines an entrepreneur. Section 3 presents the conceptual background of entrepreneurship intention. In the Section 4 is presented the results of a survey to engineering

and management students to measure and compare their entrepreneurial intentions. Finally, in Section 5, are presented the main conclusions.

2. What defines an entrepreneur

Like the concept of entrepreneurship, also the concept of entrepreneur has been the subject of discussion by some authors. Between the nineteenth century and the twentieth century the entrepreneur is seen as an individual capable of forming and managing a company in the face of uncertainty, which accounts for expenses and manages to make a profit by the end of the year. Also the ability to "invent" is added to the idea of entrepreneur, that is, the entrepreneur is someone who can innovate through invention or the reinvention of a product or a process (Hisrich, Peters and Shepherd, 2014). Schumpeter, in 1951, was the first author to defend this image of the entrepreneur as an innovator, who has the skills to create new services, products and technologies. This is seen as an individual who has a set of characteristics and skills that enable him to manage, organize and deal with his own business risk (Sarkar, 2010).

The GEM declares the entrepreneur as an individual who is entrepreneurially active in implementing a business or managing an existing one (Reynolds et al, 2005). According to this report the entrepreneur is defined "as those who capture good opportunities to start a business, as well as those who believe they have the required skills, are the potential entrepreneurs of society." (Global Entrepreneurship Research Association, 2017, p.19).

Currently, an entrepreneur is considered to be the one who has technical knowledge and experience, as well has a set of genetic and psychological characteristics that contribute to his predisposition to undertake (Belás and Kljucnikov, 2016; Honjo, 2015; Raijman, 2001). The family and the previous experiences of the individual can influence his decision to start a business. For instance, the contact with the entrepreneurial example of the parents can result in a greater appreciation of the autonomy and independence of a business of its own (Laspita et al, 2012; Wyrwich, 2015). One of the most salient psychological characteristics is leadership, that is, the individual's ability to lead the business, the organization, and the individuals around him. Entrepreneurs, apart from being ambitious, are also passionate about what they are developing and trusting in themselves and their abilities. Another characteristic trait of the entrepreneur, equally important, is constant learning from the analysis of other businesses, both the successful and the failed. This attribute promotes two other features, namely, problem-solving and decision-making (Belas and Ključnikov, 2016; Hisrich, Peters and Shepherd, 2014).

For this there are two approaches to entrepreneurship programs. De Jorge-Moreno, Laborda Castillo and Sanz Triguero (2012), Duval-Couetil, Shartrand and Reed (2016), Liñán (2004) and Souitaris, Zerbinati and Al-Laham (2007) advocate an approach that consists in alerting students to the importance and impact of entrepreneurship in the country's economy, personal life and how the creation of one's own business can become a professional career. The other approach has a more practical approach, such as providing all the necessary tools and promoting academic contact with work reality, for example through networking or mentors in some successful activities or potential funders.

3. Entrepreneurship: from intention to action

Many researchers have studied entrepreneurship including the identification and study of explanatory factors for entrepreneurial behaviour. In the literature of psychology, it has been demonstrated the explanatory power of intention as an important predictor of behaviour. Ajzen (1991) developed the Theory of Planned Behaviour, which explains one's intention to behaviour as the result of three antecedents: 1) the positive or negative attitude with which he faces this behaviour, 2) the opinion that others have of this same behaviour (subjective norms) and 3) the perceived control of the same.

Entrepreneurial intention can be seen as a precise predictor of planned behaviour towards starting a new business. The Theory of Planned Behaviour developed by Ajzen (1991), when applied to the entrepreneurial behaviour (to create the own business), can also explain the entrepreneurial intention of the individuals. In the specific case of entrepreneurship, the attitude towards the behaviour is the reflection of the degree of familiarity that the individual has with entrepreneurship, i.e., whether she/he has a positive or negative attitude towards entrepreneurship, and whether or not she/he can identify benefits in entrepreneurship. The subjective norm translates whether individuals feel influenced by others in the sense of becoming

entrepreneurs, namely the impact that the opinion of others exerts on decision making, especially the opinion of those who are close to them or who are seen as a following example. Finally, the perceived behaviour control measures the ease of acquisition of a particular behaviour, in this specific case the entrepreneurial behaviour (Ajzen, 1991; Carr and Sequeira, 2007; Fretschner, 2014; Küttim et al, 2014; Lee et al, 2011; Liñán, Rodríguez-Cohard and Guzmán, 2011; Liñán and Fayolle, 2015; Maes, Leroy and Sels, 2014; Obschonka, Silbereisen and Schmitt-Rodermund, 2010; Peterman and Kennedy, 2003; Souitaris, Zerbinati and Al-Laham, 2007; Zhang, Duysters and Cloodt, 2014).

Krueger, Reilly and Carsrud (2000) and Shapero and Sokol (1982) suggest that the entrepreneurial intention of an individual is also influenced by two other components, which intertwine with subjective norm and personal attitude: the perceived desire and perceived capacity. The first one reflects how attractive the individual feels that behaviour is (in this case entrepreneurial behaviour), and the second refers to the capacity recognized by the individual to undertake. Perceived capacity is also related to the level of self-confidence of the individual, which consequently influences the perception of perceived control.

The family has an influence on the development of entrepreneurial intentions of an individual. Laspita et al (2012) and Bhandari (2012) argue that the exposition to a family business can propensity offspring's entrepreneurial intentions by increasing their perceptions that self-employment is a meaningful career option and it is possible to obtain highest entrepreneurial rents.

4. Data collection and analysis

This paper presents the preliminary results from a survey designed to measure and compare the entrepreneurial intentions of engineering and management students. Engineering students have a vast technological and industrial background, which eases the recognition of new business opportunities, and management students are familiar with the contents and tools of the economic viability of the business.

Although they have different skills, they are considered as the set of individuals most suitable to create successful companies that promote economic growth (Maresch et al, 2016).

The survey, named by EMPREENDE 2017, was applied to students of engineering and management courses from University of Minho who were approached in their classes and asked to participate in the research. Our sample has a total of 436 respondents, divided into engineering students (49.08%) or management students (50.92%). The gender distribution reflects the female domain among engineering and management students (65.37% females and 34.63% males). From the three analysed years it was verified that 39.68% of the respondents are first year students, followed by 35.32% of the third year and 25.00% of the second year (see Table 1).

Table 1: Respondents' profile

Characteristic		Percentage (%)	Total
Gender	Male	34.63	151
	Female	65.37	285
	Total	100.00	436
School	Engineering	49.08	214
	Management	50.92	222
	Total	100.00	436
Academic year	1º	39.68	173
	2º	25.00	109
	3º	35.32	154
	Total	100.00	436

Age ranges from 18 to 37 years (amplitude 19), with a mean of 19.96 years and a standard deviation of 2.432 years (with mode and median equal to 20 years).

4.1 Entrepreneurial behaviour of students' parents

The study begins by asking the respondents about the entrepreneurial behaviour of their parents: "Have you grown up in an entrepreneurial family? Do you have a father and / or a mother with their own business?" (Adapted from Laspita et al (2012)). Table 2 presents answers: 58.49% of respondents admit that their parents were never entrepreneurs against 41.51% who reported that parents have or have had a business (32.80% of

respondents indicate that the business is still active, 5.28% that has been over for more than five years and 3.44% that the business has ended but still was active until 5 years ago), which represents a significant percentage of entrepreneurs parents.

Table 2: Entrepreneurial behaviour of students' parents

"Have you grown up in an entrepreneurial family? Do you have a father and/or mother with their own business?"	**Total**		**Engineering School**		**Management School**	
	n	**%**	**N**	**%**	**n**	**%**
a. Yes, their business is still active	143	32.80%	65	30.37%	78	35.14%
b. Yes, but it still worked at least until 5 years ago	15	3.44%	6	2.80%	9	4.05%
c. Yes, but their business ended more than 5 years ago.	23	5.28%	12	5.61%	11	4.95%
d. No, my parents were never entrepreneurs	255	58.49%	131	61.21%	124	55.86%
Total	**436**	**100.00%**	**214**	**100.00%**	**222**	**100.00%**

In Table 2, the analysis by also can be seen that 61.21% of engineering students choose the option "No, my parents were never entrepreneurs" against 55.86% of management students with no entrepreneur parents.

The percentage of students whose parents have a business still active is 30.37% for engineering students and 35.14% for management students, respectively.

A chi square test was conducted to determine whether there was an association between school and entrepreneurial behaviour of students' parents. A non-significant relationship was present (χ^2= 1.871 (3), p=0.600).

4.2 Entrepreneurship: attitude, subjective norms and perceived behaviour control

The Theory of Planned Behaviour (Ajzen, 1991) defines that the intention of a given behaviour is based on attitude, subjective norms and perceived behaviour control. In order to explore the differences between the two groups of students under study (engineering students vs management students), the questionnaire included questions to measure their attitude towards entrepreneurship, their perception of the subjective norms for entrepreneurship and their perceived behaviour control in entrepreneurship. Since scales were adapted from previous studies (see Table 3), to refine the scale adaptation process to Portuguese, a back translation and back translation review were implemented (the scales were translated into Portuguese and then translated back into the original English and the versions were compared with the original).

Table 3: Measurements

Scale	Itens	Authors
Attitude towards entrepreneurship	5	Liñán, Rodríguez-Cohard and Guzmán (2011), Matlay et al (2014), Solesvik (2013)
Subjective norms for entrepreneurship	8	Carr and Sequeira (2007), Solesvik (2013)
Perceived behaviour control	5	Solesvik (2013), Souitaris, Zerbinati and Al-Laham (2007), Zhang, Duysters and Cloodt (2014)

4.3 Attitude towards entrepreneurship

The items of attitude towards entrepreneurship were measured on a five-point Likert scale and included the following statements: 1. "Being an entrepreneur implies more advantages than disadvantages for me", 2. "A career as an entrepreneur is attractive to me", 3. "If I had the opportunity and the necessary resources, I would like to open my own company", 4. "Being an entrepreneur generates great satisfaction for me", 5.

"Among the various options in the job market, I prefer to be an entrepreneur". The reliability analysis of scales was assessed by calculating Cronbach's alpha and principal component analysis (PCA). The Cronbach's alpha of the attitude scale was 0.871 and the PCA found that all five statements loaded on a single component.

The score of the variable was obtained by calculating the mean of the answers obtained in the scale items.

Figure 1 shows the attitude towards the entrepreneurship of the students of the management school and the engineering school. Both distributions present outliers answers, that is, respondents who register lower values in the attitude towards entrepreneurship (as their answers were considered valid, they were chosen for their maintenance). Regarding the distribution of the answers, engineering students tend to be lower than their management colleagues.

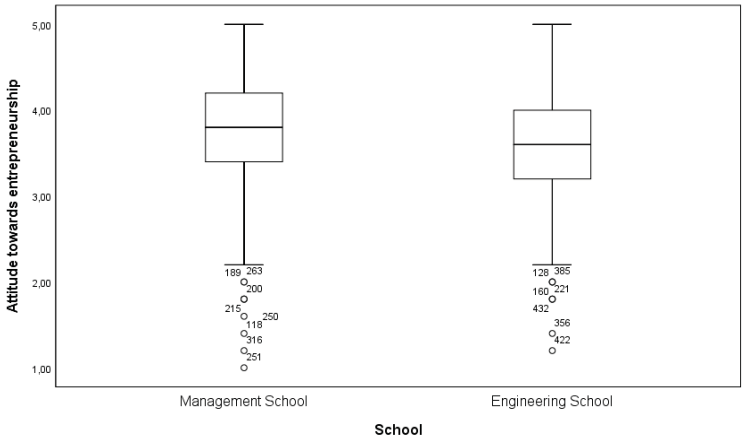

Figure 1: Students' attitude towards entrepreneurship by school

The Kolmogorov-Smirnov test concluded that the data from the two samples did not follow a normal distribution (p=0.042). Thereafter a nonparametric Mann-Whitney test was used to test significant differences between students' schools in attitude towards entrepreneurship confirmed that there was a significant difference in attitude between management and engineering students (Mann-Whitney U=20477.5, p=0.012).

4.4 Subjective norm for entrepreneurship

The items of subjective norms were measured on a 5-level semantic differential scale (1- "Extremely negative" to 5- "Extremely positive") and included the following statements: 1. "My parents consider _____ that I create my own business", 2. "My boyfriend/girlfriend considers _____ that I create my own business", 3. "My brother(s)/sister(s) consider _____ that I create my own business", 4. "In general, my relatives consider _____ that I create my own business", 5. "My neighbours consider _____ that I create my own business", 6.

"My colleagues consider _____ that I create my own business", 7. "In general, my acquaintances consider _____ that I create my own business", 8. "My closest friends consider _____ that I create my own business".

The Cronbach's alpha of the subjective norms scale was 0.876 and the PCA found that all eight statements loaded on a single component.

The score of the variable was obtained by calculating the mean of the answers obtained in the scale items. Figure 2 shows the subjective norm for entrepreneurship by students' school. Both distributions present outliers answers. In the case of the school of management, the outlier is a student with lower perceived subjective norm for entrepreneurship compared to those of his schoolmates. In the case of the engineering school, there are three respondents who register higher values in the subjective norm for entrepreneurship. In both situations the answers were considered valid and they were chosen for their maintenance. Regarding the distribution of responses, management students present a distribution of responses with left asymmetry. The distribution of responses from engineering students is more symmetrical, but has a lower median than that of management students.

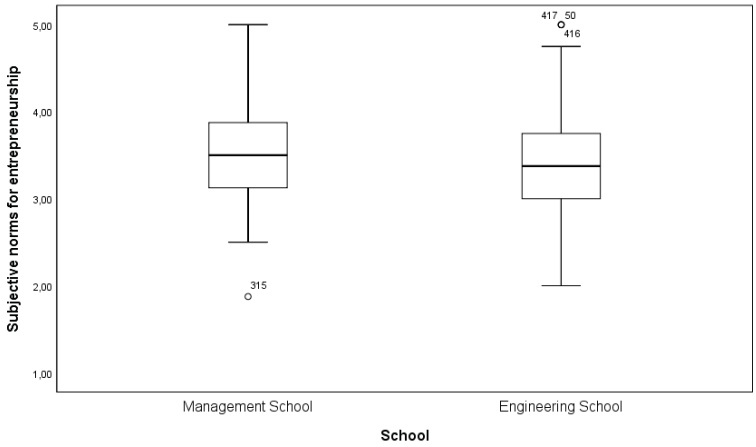

Figure 2: Students' subjective norms for entrepreneurship by school

To explore the existence of differences of the subjective norm for entrepreneurship between the two schools, as the data did not follow a normal distribution (Kolmogorov-Smirnov test with p=0.017) the non-parametric Mann-Whitney test was performed. The test confirmed that there was a significant difference in attitude between management and engineering students (Mann-Whitney U=20861.5, p=0.026).

4.5 Perceived behaviour control in entrepreneurship

The items of perceived behaviour control were measured on a 7-level semantic differential scale and included the following statements: 1 "For me, being a self-employed would be... (from 1- "Very difficult" to 7- "Very Easy")", 2 "If I wanted to, I could easily pursue a career as a self-employed (from 1- "I totally disagree" to 7- "I totally agree")", 3 "As a self-employed person, the control I would have over the situation would be (from 1- "No control" to 7- "Full control")", 4 "The number of events outside my control that could prevent me from being self-employed are (from 1- "Many" to 7- "Few")", 5 "If I were a self-employed person, my chances of success would be (from 1- "Unlikely" to 7- "Very likely")". The Cronbach's alpha of the perceived behaviour control scale was 0.721 and the PCA found that all five statements loaded on a single component.

The score of the variable was obtained by calculating the mean of the answers obtained in the scale items.

Figure 3 shows the perceived behaviour control in entrepreneurship by students' school. Both distributions present outliers answers, with lower perceived behaviour control in entrepreneurship compared to those of his schoolmates. Regarding the distribution of responses, management students present a more symmetric distribution of responses. The distribution of responses from engineering students has a left asymmetry with a lower median than that of management students.

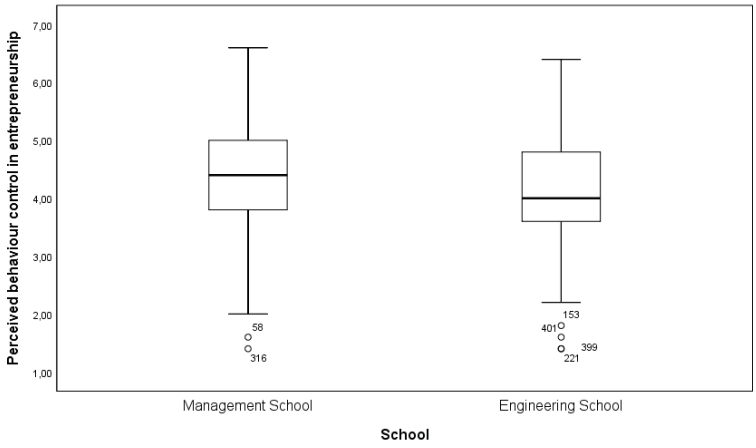

Figure 3: Students' perceived behaviour control in entrepreneurship by school.

As the data did not follow a normal distribution (Kolmogorov-Smirnov test with p=0.003), a non-parametric Mann-Whitney test was performed to explore the existence of differences of the perceived behaviour control

in entrepreneurship. The test confirmed that there was a significant difference in perceived behaviour control in entrepreneurship between management and engineering students (Mann-Whitney U=19937.5, p=0.005).

Thus, at the level of attitude towards entrepreneurship, subjective norms for entrepreneurship and perceived behaviour control in entrepreneurship were found statistically significant differences between the two schools.

Table 4 summarizes the results.

Table 4: Attitude, subjective norms and perceived behaviour control vs. schools

Scale	Management School	Engineering School	Mann-Whitney
Attitude towards entrepreneurship	3.69	3.53	**
Subjective norms for entrepreneurship	3.55	3.45	**
Perceived behaviour control	4.41	4.17	*

(* p-value<1%; **p-value<5% e ***)

4.6 Entrepreneurship intention

In order to understand the entrepreneurship intention, as a career option, the students were asked to indicate their response to three questions (using a semantic scale of 3 items with 7 levels of response adapted from Souitaris, Zerbinati and Al-Laham (2007)):

1. "If you had to choose between your own business and being hired by someone, what would you prefer?" (From -3- "I would rather be hired by someone" to +3- "I would rather have my own business");
2. "How likely are you to be self-employed?" (From -3- "Unlikely" to +3- "Very likely");
3. "How likely are you to work in an organization?" (From -3- "Unlikely" to +3- "Very likely").

In the first question ("If you had to choose between your own business and being hired by someone, what would you prefer?") students indicate prefer have rather their own business with 62.16% of positive responses (the sum of the answers + 1, + 2 and +3). The management students present a bigger preference for their own business (65.77% positive responses against 58.41% for the engineering students).

In the second question ("How likely are you to be self-employed?") only 51.15% of the respondents assume they are likely to have their own business (positive responses). When analysing the students' school, it is interesting to compare the 57.66% of positive responses from the management students and the 44.39% of positive responses from the engineering students. It suggests a lower entrepreneur intention by the engineering students.

In the last question ("How likely are you to work in an organization?") respondent students assume as moderate to high the probability to work in an organization (81.80% of positive responses). When comparing schools, there are no major differences (81.69% of positive responses in engineering students and 81.90% in management students). Given the answers obtained in question 2, we expected lower values, at least on the part of management students. One could try to find a justification such as the age of the students (they are very young, with a mean age of 19.96 years) associated with high expectations of easily finding a job after graduation.

The results obtained are presented in Table 5.

A chi square test was conducted to determine whether there was an association between school and students' entrepreneurial intention. A significant relationship was present between school and the first intention question ("If you had to choose between your own business and being hired by someone, what would you prefer?") (χ^2= 13.505 (6), p=0.036) and the second intention question ("How likely are you to be self-employed?") (χ^2= 14.254 (6), p=0.027).

Table 5: Students' entrepreneurship Intention

	Total		Engineering School		Management School	
	n	%	N	%	n	%
"If you had to choose between your own business and being hired by someone, what would you prefer?"						
I would rather be hired by someone (-3)	31	7.11%	12	5.61%	19	8.56%
-2	38	8.72%	21	9.81%	17	7.66%
-1	31	7.11%	22	10.28%	9	4.05%
0	65	14.91%	34	15.89%	31	13.96%
+1	74	16.97%	39	18.22%	35	15.77%
+2	113	25.92%	55	25.70%	58	26.13%
I would rather have my own business(+3)	84	19.27%	31	14.49%	53	23.87%
Positive responses (sum 1+2+3)	271	62.16%	125	58.41%	146	65.77%
"How likely are you to be self-employed?"						
Unlikely (-3)	27	6.19%	13	6.07%	14	6.31%
-2	31	7.11%	14	6.54%	17	7.66%
-1	51	11.70%	33	15.42%	18	8.11%
0	104	23.85%	59	27.57%	45	20.27%
+1	117	26.83%	55	25.70%	62	27.93%
+2	80	18.35%	28	13.08%	52	23.42%
Very Likely (+3)	26	5.96%	12	5.61%	14	6.31%
Positive responses (sum 1+2+3)	223	51.15%	95	44.39%	128	57.66%
"How likely are you to work in an organization?"						
Unlikely (-3)	1	0.23%	0	0.00%	1	0.45%
-2	6	1.38%	2	0.94%	4	1.81%
-1	12	2.76%	5	2.35%	7	3.17%
0	60	13.82%	32	15.02%	28	12.67%
+1	135	31.11%	64	30.05%	71	32.13%
+2	144	33.18%	74	34.74%	70	31.67%
Very Likely (+3)	76	17.51%	36	16.90%	40	18.10%
Positive responses (sum 1+2+3)	355	81.80%	174	81.69%	181	81.90%

5. Conclusions

In order to raise awareness and arouse individuals' interest in entrepreneurship, several authors call for the role that educational institutions should play in creating initiatives for young students to develop tools and new business ideas. Since technical and academic knowledge are important for the creation of an entrepreneur, students of engineering and socio-economic sciences have been mentioned by several studies as the individuals, who due to their technical skills will have a greater aptitude to build businesses with great success.

The EMPREENDE 2017 Project had as main objectives to understand and compare the entrepreneurial potential of the students of engineering and management. Taking into account the proposed objectives, a survey among graduation students from University of Minho allowed a total of 436 responses. The student's entrepreneurial intention and the factors that could influence it (attitude, subjective norms and perceived behaviour control) were compared between the two groups of students: 1) students of the Engineering School, 2) students of the Management School.

The study identified statistically significant differences between schools concerning attitudes towards entrepreneurship; subjective norms for entrepreneurship; perceived behaviour control in entrepreneurship and entrepreneurship intention. Results suggest a higher awareness from management students when compared with their engineering colleagues:

- have an higher attitude towards entrepreneurship,
- perceive a higher support from family and friends for entrepreneurship,
- have a higher perceived behaviour control in entrepreneurship
- show a higher entrepreneurship intention

What can explain the differences identified? First, the higher attitude of management students can be explained by being more aware of the theme of entrepreneurship, especially in the school context. Second, the increased family and friends support perceived by student management may result from positive reinforcement from peers and friends (an analysis at response levels revealed strong pro-entrepreneurship support from siblings, boyfriends, and friends). Third, management students possess a specific knowledge that is considered important in the creation of a business of their own, that is, the financial, strategic and economic

viability of a business, something that engineering students may not be so keen on. Finally, the highest intention is the result of the combination of the stated factors.

Despite the growing number of studies on entrepreneurial intention, studies on entrepreneurship in engineering are scarce in Portugal. The present study intends to contribute to the discussion of the theme of entrepreneurial intention in students of higher education, in particular comparing the students of engineering with the students of management. Although not generalizable, the conclusions result in important insights of the entrepreneurial intention, revealing differences based on the context of the students' academic formation.

Compared with their management colleagues, the results of engineering students suggest the need for greater awareness-raising and preparation for entrepreneurship as a future work option.

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References

Ajzen, I. (1991) “The theory of planned behavior”, Organizational Behavior and Human Decision Processes, Vol 50. No. 2, pp 179-211.

Baptista, R., Escária, V. and Madruga, P. (2008) "Entrepreneurship, regional development and job creation: the case of Portugal", Small Business Economics, Vol 30, No. 1, pp 49-58.

Belas, J. and Ključnikov, A. (2016) “The most important attributes of entrepreneurs. Case study of the environment of Czech SMEs”, International Journal of Entrepreneurial Knowledge, Vol 4, No. 1, pp 104-111.

Bhandari, N.C. (2012) “Relationship between students’ gender, their own employment, their parents’ employment, and the students’ intention for entrepreneurship”, Journal of Entrepreneurship Education, Vol 15, pp 133-144.

Bryson, J., Sancino, A., Benington, J. and Sørensen, E. (2017) "Towards a multi-actor theory of public value co-creation", Public Management Review, Vol 19, No. 5, pp 640-654.

Carr, J.C and Sequeira J.M. (2007) “Prior family business exposure as intergenerational influence and entrepreneurial intent: a Theory of Planned Behavior approach”, Journal of Business Research, Vol 60, No. 10, pp 1090–1098.

De Jorge-Moreno, J., Laborda Castillo, L. and Sanz Triguero, M. (2012) “The effect of business and economics education programs on students' entrepreneurial intention”, European Journal of Training and Development, Vol 36, No. 4, pp 409-425.

Duval-Couetil, N., Shartrand, A. and Reed, T. (2016) “The role of entrepreneurship program models and experiential activities on engineering student outcomes”, Advances in Engineering Education, Vol 5, No.1, pp 1-27.

Fretschner, M. (2014) “Ajzen's Theory of Planned Behavior in Entrepreneurship Education Research: An Introduction and Review of Impact Studies”. In Becoming an Entrepreneur, Weber S.; F. Oser; F. Achtenhagen; M. Fretschner; and S. Trost (Eds.). Sense Publishers, pp 249-277.

Gird, A. and Bagraim, J.J. 2008 “The theory of planned behaviour as predictor of entrepreneurial intent amongst final-year university students”, South African Journal of Psychology, Vol 38, No. 4, pp 711–724.

Global Entrepreneurship Monitor Research Association (2017) Global Report 2016/17. Retrieved from: http://gemconsortium.org/report/49812

Hisrich, R.D., Peters, M.P. and Shepherd, D.A. (2014) Empreendedorismo-9, AMGH Editora.

Guerrero, M., Rialp, J. and Urbano, D. (2008) “The impact of desirability and feasibility on entrepreneurial intentions: a structural equation model”, International Entrepreneurship and Management Journal, Vol 4, No. 1, pp 35–50.

Honjo, Y. (2015) “Why are entrepreneurship levels so low in Japan?”, Japan and the World Economy, Vol 36, pp 88-101.

Koh, H. C. (1996) “Testing Hypotheses of entrepreneurial characteristics: A Study of Hong Kong MBA Students”, Journal of Managerial Psychology, Vol 11, No. 3, pp 12-25.

Krueger, N.F., Reilly, M. and Carsrud, A.L. (2000) “Competing models of entrepreneurial intentions”, Journal of Business Venturing, Vol 15, No. 5, pp 411-432.

Küttim, M., Kallaste, M., Venesaar, U. and Kiis, A. (2014) “Entrepreneurship education at university level and students’ entrepreneurial intentions”, Procedia-Social and Behavioral Sciences, Vol 110, pp 658-668.

Laspita, S., Breugst, N., Heblich, S. and Patzelt, H. (2012) “Intergenerational transmission of entrepreneurial intentions”, Journal of Business Venturing, Vol 27, No. 4, pp 414–435.

Lee, L., Wong, P.K., Foo, M.D. and Leung, A. (2011) “Entrepreneurial intentions: The influence of organizational and individual factors”, Journal of Business Venturing, Vol 26, No. 1, pp 124–136.

Liñán, F. and Fayolle, A. (2015) "A systematic literature review on entrepreneurial intentions: citation, thematic analyses, and research agenda", International Entrepreneurship and Management Journal, Vol 11, No. 4, pp 907-933.

Liñán, F., Rodríguez-Cohard, J.C. and Guzmán, J. (2011) “Temporal stability of entrepreneurial intentions: a longitudinal study”. In Entrepreneurship Research in Europe: Evolving Concepts and Processes, O. J. Borch, A. Fayolle, P. Kyrö and E. Ljunggren (Eds.). Cheltenham, UK: Edward Elgar, pp 34-55.

Maes, J., Leroy, H. and Sels, L. (2014) “Gender differences in entrepreneurial intentions: A TPB multi-group analysis at factor and indicator level”, European Management Journal, Vol 32, No.5, pp 784-794.

Matlay, H, Solesvik, M. and Westhead, P. (2014) “Cultural factors and entrepreneurial intention: The role of entrepreneurship education”, Education + Training, Vol 56, No. 8/9, pp 680-696.

Mayhew, M.J., Simonoff, J.S., Baumol, J.W., Selznick, S.B. and Vassallo S.J. (2016) "Cultivating innovative entrepreneurs for the twenty-first century: A study of US and German students", The Journal of Higher Education, Vol 87, No. 3, pp 420-455.

Maresch, D., Harms, R., Kailer, N. and Wimmer-Wurm, B. (2016) “The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs, Technological Forecasting and Social Change, Vol 4, pp 172-179.

Obschonka, M., Silbereisen, R.K. and Schmitt-Rodermund, E. (2010) “Entrepreneurial intention as developmental outcome”, Journal of Vocational Behavior, Vol 77, No. 1, pp 63–72.

Oosterbeek, H., Van Praag, M. and Ijsselstein, A. (2010) “The impact of entrepreneurship education on entrepreneurship skills and motivation”, European Economic Review, Vol 54, No. 3, pp 442–454.

Peterman, N.E. and Kennedy, J. (2003) “Enterprise education: Influencing students’ perceptions of entrepreneurship”, Entrepreneurship Theory and Practice, Vol 28, No. 2, pp 129–144.

Rahman, S.A., Ahmad, N.H. and Taghizadeh, S.K. (2016) "Entrepreneurial competencies of BoP entrepreneurs in Bangladesh to achieve business success”, Journal of General Management, Vol 42, No. 1, pp 45-63.

Raijman, R. (2001) “Determinants of entrepreneurial intentions: Mexican immigrants in Chicago”, Journal of Socio-Economics, Vol 30, pp 393–411.

Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N., Servais, I., Chin, N. (2005) “Global entrepreneurship monitor: Data collection design and implementation 1998–2003”, Small Business Economics, Vol 24, No. 3, pp 205-231.

Sarkar, S. (2010) Empreendedorismo e Inovação, Escolar Editora.

Shapero, A. and Sokol, L. (1982) “Social dimensions of entrepreneurship”. In Encyclopedia of Entrepreneurship, C.A. Kent, D.L. Sexton and K.H. Vesper (Eds.), Englewood Cliffs: Prentice Hall, pp 72–90.

Solesvik, M.Z. (2013) “Entrepreneurial motivations and intentions: investigating the role of education major”, Education + Training, Vol 55, No. 3, pp 253-271.

Souitaris, V., Zerbinati, S. and Al-Laham, A. (2007) “Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources”, Journal of Business Venturing, Vol 22, pp 566–591.

Van Praag, C.M. (1999) “Some classic views on entrepreneurship”, De Economist, Vol 147, No. 3, pp 311–335.

Van Stel, A., Carree, M. and Thurik, R. (2005) "The effect of entrepreneurial activity on national economic growth", Small Business Economics,Vol 24, No. 3, pp 311-321.

Von Graevenitz, G., Harhoff, D. and Weber, R. (2010) “The effects of entrepreneurship education”, Journal of Economic Behavior & Organization, Vol 76, pp 90–112.

Wyrwich, M. (2015) “Entrepreneurship and the intergenerational transmission of values”, Small Business Economics, Vol 45, No. 1, pp 191-213.

Zhang, Y., Duysters, G. and Cloodt, M. (2014) “The role of entrepreneurship education as a predictor of university students’ entrepreneurial intention”, International Entrepreneurship and Management Journal, Vol 10, No. 3, pp 623-641.

Zhao, H., Hills, G.E. and Siebert, S.E. 2005 “The mediating role of self-efficacy in the development of entrepreneurial intentions”, Journal of Applied Psychology, Vol 90, No. 6, pp 1265–1272.

The Relationship between Business Environment and Innovativeness of SMEs in the Czech Republic and Slovakia

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Abstract: Innovation plays an important role in the business environment and can be a key competitive advantage for an enterprise. Several factors influence innovation activities of SMEs, including the economic environment, the legislative environment, technological factors and social factors. The aim of the article is to evaluate and compare the influence of individual factors on the innovation and further development of micro and SME enterprises in the Czech Republic and Slovakia. The article deals with the partial results of the empirical questionnaire survey which was conducted in 2018 at the Tomas Bata University in Zlín in the Czech Republic. The survey addressed the owners of micro and SME enterprises and asked about the perception of the quality of the business environment. This article deals with the part of survey focused on innovativeness of SMEs. The research works with 329 valid answers from respondents from the Czech Republic and 312 respondents from Slovakia. Research focused on small and medium-sized enterprises, as they are a major catalyst for the economic growth of individual economies. Within the European Union, 98% of the business sector represents and covers two thirds of the employment contracts in the private sector. Three research questions were set to analyze the difference in the perception of business environment and its impact on SMEs in the Czech Republic and in Slovakia. In the process of solving the formulated research questions, the following statistical tools such as tables, descriptive characteristics (mean, variance, standard, and deviation), and Person coefficient of contingency were used. Research results can be used by the government to address key issues related to SME support. Finally, the results indicate that the perception of macroeconomic environment and its impact on innovativeness of SMEs is different in the Czech Republic and in Slovakia. Entrepreneurs in the Czech Republic are more skeptical about a support of macroeconomic environment in the innovation area. Slovak entrepreneurs are also more confident that current banks' interest rates help innovativeness in SMEs (only 34% of Czech entrepreneurs agree with this statement). The article concludes with a discussion of the possible causes of these differences.

Keywords: innovativeness, SME, business environment, support, financial institution, interest rate

1. Introduction

Globalization has a huge impact on entrepreneurs, especially on SMEs. Economic turbulence in the business world increases uncertainty and risk, which increases the pressure on businesses and SME (Hussain et al., 2015). The SMEs are a very important part of world economy. In line with that, Henderson and Weiler (2010) state that SMEs could be identified as the most important catalyst for economic growth. Bhaiard (2010) states that 99% of all European and American enterprises are from the SME segment.

The economic importance of SMEs wasn't only detected in the Czech Republic or the EU. The predominance of small businesses in the Japanese economy is well documented. About 75% of manufacturing employment in Japan is in small and medium-sized companies, in contrast to about 35% in the United States. (Haward 1990). The vitality of SMEs has been a major factor in the creation of new jobs and the economic renewal of certain regions in Europe, such as the region Emilia-Romagna, Tuscany, Venezia in Italy (Emilia-Romagna, Tuscany, Venezia) or Jutland in Denmark.

Innovativeness of entrepreneurs should drive the market and create competitive advantage (Zortea-Johnston et al. 2012). Veliu et al. (2018) stated that high competition in SMEs has its effect on employees not providing the opportunity to develop their creativity due to minimization of costs. It is important to motivate companies to invest in innovations to maintain the economic growth.

In this article, the influence of individual factors on the innovation and further development of micro and SME enterprises in Czech Republic and Slovakia has been evaluated.

2. Literature Review

The SME segment is a major driving force of growth, innovation and competitiveness, and SMEs are also a major employer in the Czech Republic. The proportion of the added value of SMEs to the total of the Czech Republic was 56,2% in 2016 (MPO, 2017). The SME segment is also important for national economies and their

stability. SMEs only rarely leave the home country and also only rarely transfer the capital out of the country. (Breckova and Havlicek 2013).

A fundamental element of entrepreneurship is innovation which is captured in the form of creating new products or processes (Covin and Miles 1999). Innovation will make new ventures successful (Ireland & Webb, 2007) and will enhance SMEs' performance, especially in the furniture industry (Otero-Neira et al. 2009).

However, for SMEs to achieve a competitive edge and enhance the rate of success of their business, they need to make risky decisions and engage in risky activities so that they can protect the innovativeness of delivering projects (Vargas-Hernandez, 2011).

It is not easy to gain innovations without favourable business environment. The entrepreneurs have to listen to the customers' needs and they have to manage all their activities to be profitable. The base for innovativeness is favourable business environment and good access to the financial sources. In this paper, the following key conditions: macroeconomic environment, access to the financial sources and also costs of bank loans (interest rates) were analysed. In accessing bank finance, compared to large and established companies, small firms are disadvantaged by their information opacity, the relative scarcity of collateralizable assets, and disproportionately high monitoring costs (Beck and Demirguc-Kunt 2006). Microenterprises have lower profitability and higher debt than other enterprises. Empirical results indicate that microenterprises must provide much higher collateral and more guarantees while asking for bank loans than other enterprises, and they must also pay higher interest rates. (De Mitri et al. 2013).

The quality of business environment is determined by of SMEs' possibility to access financial resources. In this context, several authors discussed the financial gap for SMEs and its risks. (Belás et al. 2014, Májková 2012). The restricted access to the financial resources is caused by high risk level of these firms, and they can be limited to pay their commitments. The similar view is also presented by other authors, for instance Ozturk and Mrkaic (2014), Kundid and Erecgovac (2011).

With limited financial resources is also connected their price. In case of many SMEs, it was found out that banks are charging a higher risk premium (Ayadi 2005). Especially after the crisis, increasing bank funding costs were detected. Higher interest rates were detected for the SMEs, not for the large firms. The results of research made by Altman et al. (2010) confirmed that firms aged within 3-9 years are more vulnerable to failure.

A number of papers found that SMEs are more financially constrained than large firms and, importantly, lack of access to external finance is a key obstacle to firm growth, especially for SMEs. (Schiffer and Weder 2001, Cressy 2002). Hernández-Cánovas and Martínez-Solano (2010) state that there is a limit for the degree of concentration of bank relationships in the SMEs area. SMEs that maintain two bank relationships have the lowest interest charges, followed by firms borrowing from only one bank, while firms working with more than two banks have the most expensive debt. Where the relationship between firms and banks is based on trust (in a housebanking relationship), there SMEs improve their access to bank financing and also reduce the cost of debt, but firms have to pledge more guarantees.

3. Aim and Methodology

The aim of the article is to evaluate and compare the influence of individual factors on the innovation and further development of micro and SME enterprises in the Czech Republic and Slovakia. The results are the partial results of extensive research, which was conducted at Tomas Bata University in Zlín in 2018.

The survey was carried out on a sample of 9400 enterprises from Slovakia (S) and 7800 enterprises from the Czech Republic (CR). Entrepreneurs were selected from the database "Albertina" (CR) and "Cribis" (S) by randomized numbers using mathematical functions "RANDBETWEEN". The statistical unit of the research was one enterprise. Individual companies were directly addressed by email or by phone or by a personal meeting.

641 responses from enterprises (312 enterprises CR and 329 enterprises S) were collected. Percentage of the completed questionnaire in form of positive feedback reactions was accounted for 4%. Two socio-demographic factors were selected for evaluation of impact on the perception of business environment:

education and length of action on the market. Following research questions were evaluated to fulfil the main objective of the article:

RQ1: Entrepreneurs in SMEs from the Czech Republic perceive the influence of the macroeconomic environment on their innovative approach differently than entrepreneurs from Slovakia.

RQ2: Entrepreneurs in SMEs from the Czech Republic perceive differently the influence of interest rates of banks on innovation activities of companies than entrepreneurs from Slovakia.

RQ3: Companies in the Czech Republic have better access to the bank loans than companies in Slovakia (according to the entrepreneurs' opinion).

The statements to each research question were formulated to meet the objective and statistical evaluation of them. Entrepreneurs could answer with one of the following choices: (1) I totally agree, (2) I agree, (3) I do not take a stand, (4) I disagree, (5) I totally disagree. The following answers were consolidated for evaluation: (1) and (2) = agree, (4) and (5) = disagree. For every research question, two determinants (entrepreneur's education and length of business) was analyzed. The partial aim was to find out if there are any statistical significant differences in the perception among enterprises in the Czech Republic and Slovakia according to these determinants.

The structure of the sample according to the size of entrepreneur was as follows: (Czech Republic/Slovakia): micro (258/234), small (43/71) and medium (11/24). One of the factors was also the length of the company's business. Most respondents have had their business for more than 10 years (CR/S: 208/147), 48/78 of the entrepreneurs for 5-10 years, and the rest (56/104) of the entrepreneurs have operated their business for 1-5 years. The survey involved all regions of the Czech Republic and Slovak Republic. Education (CR/S): university education (127/224), other education (185/105).

Questionnaires were addressed to entrepreneurs from different areas of the economy: most of them were from service companies, commercial companies, manufacturing companies, the construction area, from transportation and some of them from agriculture.

The following statistical tools of descriptive statistics were used: contingency and association tables, descriptive characteristics - cumulative frequency. These methods were used to apply Z-test method for evaluation of the formulated research questions. Subsequently, we applied statistical methods as absolute abundance and simple sorting of the statistical character. In the simple sorting method, attention was drawn to the expression of the relative number of entrepreneurs according to the selected statistical features (the length of operating the business in the business environment and the highest completed education of the entrepreneur).

The next methods were the classification according to two statistical features, the dependence between qualitative plural statistics (contingency table, contingency intensity). The contingency intensity was measured by the Pearson coefficient of contingency based on the square contingency. By comparing the selected groups of enterprises according to the selected statistical features, the significance of the statistical feature was determined, i.e. the research questions were verified using the above-mentioned tests. The individual questions were verified at a 5% level of statistical significance, with a p-value of less than 0.05 leading to the rejection of the statement on the independence of the variables. The Z-score was used to identify significant statistical differences between individual statistical character changes in selected groups of entrepreneurs. To evaluate the Z-score of parameters we used the p-value of the normal (standardized) distribution. The conditions for performing the Z-test (normal distribution of the statistical character and large sample size) have been fulfilled. The calculations through sophisticated SPSS Statistics software were used.

4. Data Analysis and Research Results

RQ1: Entrepreneurs from the Czech Republic and Slovakia evaluated the following statement: "The current macroeconomic environment supports innovative business activities".

Structure of respondents' answers:

- in the Czech Republic: 81 (26%) agree, 153 (49%) don't take a stand, 78 (25%) disagree;
- in Slovakia: 125 (38%) agree, 86 (26.1%) don't take a stand, 118 (35.9%) disagree.

Among enterprises in the Czech Republic and Slovakia, there are statistically significant differences in the perception of macroeconomic environment and its support of innovative business activities (Z-score = -3.2605, p-value = 0.001).

Table 1: The current macroeconomic environment supports innovative business activities (according to the length of business)

RQ1	Length of business						Z-score (p- value)		
	Czech Republic (CR)			Slovakia (S)			CR/S	CR/S	CR/S
	1-5 years	5-10 years	More than 10 years	1-5 years	5-10 years	More than 10 years	1-5 years	5-10 years	More than 10 years
Agree (%)	18 32.1%	13 27.1%	50 26%	38 36.5%	35 44.9%	52 35.4%	-0.556 0.576	**-1.997** **0.045**	**-2.325** **0.020**
I do not take a stand (%)	28 50%	22 45.8%	103 49%	28 26.9%	21 26.9%	37 25.2%	**2.919** **0.001**	**2.174** **0.030**	**4.624** **0.001**
Disagree (%)	10 17.9%	13 27.1%	55 25%	38 36.5%	22 28.2%	58 39.5%	**-2.459** **0.014**	-0.136 0.889	**-2.593** **0.009**
Chi-square	2.664			3.208					
P-value	0.616			0.524					

Source: author

In the opinion that the current macroeconomic environment supports innovative business activities, the length of operating the business is not a statistically significant factor among selected groups of entrepreneurs in the Czech Republic (Chi-squared = 2.664; p-value = 0.616). It was found out that:

- 44.9% of enterprises in Slovakia with 5 - 10 years of activity in the business environment agreed with the RQ1, compared to 27.1% of enterprises in the CR;
- there are no significant differences in the agreed RQ1 position (p-value = 0.576) between enterprises from the Czech Republic and Slovakia with 1 to 5 years of activity in the business environment;
- there are significant differences in positive attitude to the first statement among enterprises from the Czech Republic and Slovakia with more than 5 years of business activity (5-10 years: p-value = 0.045, more than 10 years: p-value = 0.020).

Table 2: The current macroeconomic environment supports innovative business activities (according to Entrepreneur's education)

RQ1	Entrepreneur's education				Z-score (p-value)	
	Czech Republic (CR)		Slovakia (S)		CR/S	CR/S
	University Education	Other Education	University Education	Other Education	University Education	Other Education
Agree (%)	44 34.6%	37 20%	88 39.3%	37 35.2%	-0.864 0.389	**-2.861** **0.004**
I do not take a stand (%)	56 44.1%	97 52.4%	58 25.9%	28 26.7%	**3.499** **0.001**	**4.258** **0.000**
Disagree (%)	27 21.3%	51 27.6%	78 34.8%	40 38.1%	**-2.667** **0.008**	-1.857 0.006
Chi-square	**8.488**		0.538			
P-value	**0.014**		0.764			

Source: author.

In the opinion that the current macroeconomic environment supports innovative activities of companies, education of entrepreneurs is not a statistically significant factor among selected groups of entrepreneurs in Slovakia (Chi-squared = 0.538; p-value = 0.764). On the contrary, in the Czech Republic, entrepreneurship education is significant in assessing the claim (Chi-squared = 8.488; p-value = 0.014). A comparison of opinions between entrepreneurs in the Czech Republic and Slovakia in selected business groups according to the business period was found out:

- 35.2% of entrepreneurs in Slovakia with non-university education agreed with the statement, compared to 20% of entrepreneurs in the Czech Republic;
- there are significant differences between answers of the entrepreneurs from the Czech Republic and Slovakia with non-university education (p-value = 0.004);
- there are no significant differences between the answers of the entrepreneurs from the Czech Republic and Slovakia with university education (p-value = 0.389).

On the basis of the above-mentioned results of the current macroeconomic environment in enterprises in the Czech Republic and Slovakia, RQ1 was confirmed. There are statistically significant differences between selected groups of enterprises regarding the length of business activity in the business environment as well as the education of entrepreneurs.

RQ2: Entrepreneurs from the Czech Republic and Slovakia evaluated the following statement: "Interest rates in banks have a positive impact on the innovative activities of companies".

Structure of respondent's answers:

- in the Czech Republic: 107 (34.3%) agree, 111 (35.6%) do not take a stand, 94 (30.1%) disagree;
- in Slovakia: 134 (40.7%) agree, 81 (24.6%) do not take a stand, 114 (34.7%) disagree.

There are no statistically significant differences among the enterprises in the Czech Republic and Slovakia in the evaluation of this statement (Z-score = -1.681, p-value = 0.093).

Table 3: Interest rates in banks have a positive impact on the innovative activities of companies (according to the length of business)

RQ2	Length of business						Z-score (p- value)		
	Czech Republic (CR)			Slovakia (S)			CR/S	CR/S	CR/S
	1-5 years	5-10 years	More than 10 years	1-5 years	5-10 years	More than 10 years	1-5 years	5-10 years	More than 10 years
Agree (%)	17 30.4%	19 39.6%	71 34.1%	33 31.7%	31 39.7%	70 47.6%	-0.179 0.858	-0.017 0.984	**-2.557** **0.010**
I do not take a stand (%)	21 37.5%	16 33.3%	74 35.6%	30 28.8%	14 17.9%	37 25.2%	1.121 0.263	**1.969** **0.049**	**2.084** **0.037**
Disagree (%)	18 32.1%	13 27.1%	63 30.3%	41 39.4%	33 42.3%	40 27.2%	-0.910 0.363	-1.724 0.085	0.629 0.528
Chi-square	0.997			**10.335**					
P-value	0.910			**0.035**					

Source: author.

The length of the business is not a statistically significant factor in entrepreneurs' opinion in the Czech Republic (Chi-squared = 0.997; p-value = 0.910). On the contrary, the length of business is significant in the attitude of Slovak entrepreneurs (Chi-squared = 10.335; p-value = 0.035). By comparing the opinions among entrepreneurs in the Czech Republic and Slovakia in selected groups of enterprises according to the business period, it was found:

- 34.1% of enterprises in the Czech Republic with more than 10 years of activity in the business environment agreed with the statement, compared with 47.6% of enterprises in Slovakia.
- within the group of entrepreneurs with more than 10 years of activity in the business environment there are significant differences in the agreed position of statement (p-value = 0.010) between the Czech Republic and Slovakia;
- there are no significant differences between the Czech Republic and Slovakia within the group of entrepreneurs with less than 10 years of activity in the business environment (less than 5 years: p-value = 0.858, p-value = 0.984).

In the opinion that banks' interest rates positively affect the innovative activities of companies, the entrepreneurial education is not a statistically significant factor among selected groups of entrepreneurs either

in the Czech Republic (Chi-squared = 0.040; p-value = 0.980), nor in Slovakia (Chi- squared = 1.319; p-value = 0.517).

By comparing the opinions among entrepreneurs in the Czech Republic and Slovakia in selected groups of enterprises according to the entrepreneur's education, it was found out:

- 33.9% of entrepreneurs in the Czech Republic with university education agreed with the statement, compared to 42.9% of entrepreneurs in Slovakia;
- there are no significant differences in the agreed answer between entrepreneurs in the Czech Republic and the Slovakia with other education (p-value = 0.787) or with university education (p-value = 0.097).

Based on the above-mentioned results of the impact of interest rates on innovative activities in companies in the Czech Republic and Slovakia, RQ2 was declined. Statistically insignificant differences exist between selected groups of enterprises regarding the length of the business, as well as the education of entrepreneurs.

RQ3: Entrepreneurs from the Czech Republic and Slovakia evaluated the following statement: "Companies have good access to bank loans".

Structure of respondents' answers:

- in the Czech Republic: 141 (45.2%) agree, 89 (28.5%) do not take a stand, 82 (26.3%) disagree;
- in Slovakia: 163 (49.5%) agree, 68 (20.7%) do not take a stand, 98 (29.8%) disagree.

There are no statistically significant differences among the enterprises in the Czech Republic and Slovakia in the evaluation of this statement (Z-score = -1.103, p- value = 0.274).

Table 4: Companies have good access to bank loans (according to the length of business)

RQ3	Length of business						Z-score (p- value)		
	Czech Republic (CR)			Slovakia (S)			CR/S	CR/S	CR/S
	1-5 years	5-10 years	More than 10 years	1-5 years	5-10 years	More than 10 years	1-5 years	5-10 years	More than 10 years
Agree (%)	25 44.6%	22 45.8%	94 45.2%	50 48.1%	34 43.6%	79 53.7%	-0.415 0.674	0.246 0.803	-1.587 0.112
I do not take a stand (%)	13 23.2%	11 22.9%	65 31.3%	26 25%	13 16.7%	29 19.7%	-0.251 0.803	0.868 0.384	**2.424** **0.015**
Disagree (%)	18 32.1%	15 31.3%	49 23.6%	28 26.9%	31 39.7%	39 26.5%	0.696 0.484	-0.961 0.337	-0.639 0.522
Chi-square	3.403			6.143					
P-value	0.493			0.189					

Source: author.

The length of the business is not a statistically significant factor in entrepreneurs' opinion neither in the Czech Republic (Chi-squared = 3.403; p- value = 0.493), nor in Slovakia (Chi-squared = 6.143; p-value = 0.189).

By comparing the opinions among entrepreneurs in the Czech Republic and Slovakia in selected groups of enterprises according to the length of business and entrepreneurs' education, it was found out:

- 45.2% of enterprises in the Czech Republic with more than 10 years of activity in the business environment agreed with the statement, in comparison with 53.7% of enterprises in Slovakia;
- there are no significant differences between the Czech Republic and Slovakia (1-5 years: p-value = 0.674; 5-10 years: p-value = 0.803; more than 10 years: p-value = 0.112).
- 54.3% of entrepreneurs in Slovakia with other education agreed with the statement, in comparison with 47.6% of entrepreneurs in the Czech Republic;
- there are no significant differences in the agreed answer between entrepreneurs in the Czech Republic and Slovakia with other education (p = value = 0.271) or with university education (p-value = 0.312).

Based on the above-mentioned results of the impact of companies' access to the bank loans in the Czech Republic and Slovakia, RQ2 was declined. Statistically insignificant differences exist between selected groups of enterprises regarding the length of the business, as well as the education of entrepreneurs.

5. Discussion and Conclusion

The performed research showed that there are differences between perception of business environment and its impact on innovative activities between Czech and Slovak companies. The Slovak entrepreneurs (38%) evaluate current macroeconomic environment as more supportive for innovation in business activities than the Czech entrepreneurs (26%). Furthermore, there are statistically significant differences in perception of macroeconomic environment and its help to innovative business activities, in terms of the business activity length. The answers of entrepreneurs which are active in business for more than five years differed more than those of the entrepreneurs who are active for less than 5 years. It can indicate that Czech entrepreneurs hoped for better business conditions, but they are disappointed by the business development. The real GDP during years 2007-2016 indicates that the development in both countries is similar. There were bigger differences before 2008 in favour of Slovakia, but other years are almost stable. (Fig. 1)

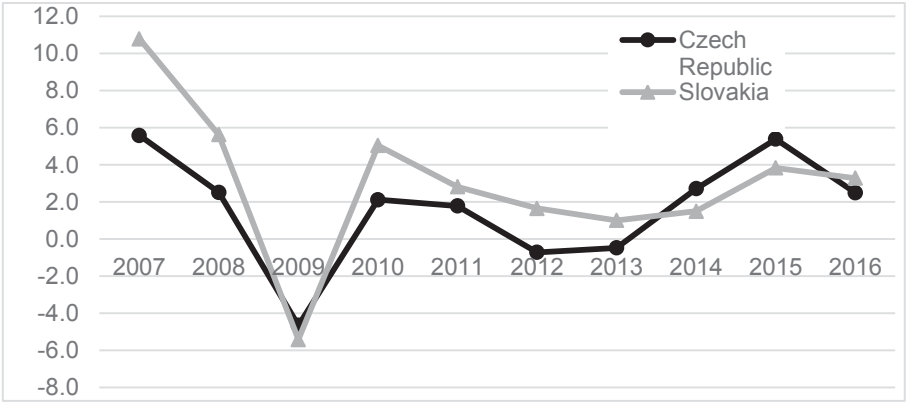

Figure 1: Real GDP in the Czech Republic and Slovakia in years 2007-2016. Source: (OECD, 2018)

The next reason for this difference can be a pessimism of Czech entrepreneurs which can lead from Czech people's character. Despite the fact that the development of business environment is favourable, Czech entrepreneurs can only see a negative impact on their business. The result confirms the statement of European Comission (2013) which declares that innovativeness of the EU as a whole is increasing every year, despite the ongoing economic crisis, although differences in the innovativeness of individual countries' are deepening.

This result corresponds with the research of Dobes et al. (2017) which states that entrepreneurs from the Czech Republic have very critical view of the state's role within the business environment. The same finding was reached by Hamplova and Provaznikova (2015). They came to the conclusion that Czech entrepreneurs classify Czech business environment as administratively demanding and overregulated and they judge the business environment in the Czech Republic critically.

The entrepreneurs' education was identified as a significant factor for perception of macroeconomic environment impact on innovative business activities. 35.2% of entrepreneurs in Slovakia with non-university education agreed with the statement, compared to the 20% of entrepreneurs in the Czech Republic.

Slovak entrepreneurs are also more confident that current banks' interest rates help the innovativeness in SMEs (only 34% of Czech entrepreneurs agree with this statement). There are significant differences in the positive opinion on the statement (p-value = 0.010) between the Czech Republic and Slovakia within group of entrepreneurs with more than 10 years of activity in the business environment. It can signify that entrepreneurs with longer activity in business have more experiences with bank loans applications, so bank loans are more accessible to them.

Entrepreneurs from the Czech Republic and Slovakia have the same opinion on companies' access to the bank loans. Almost 50 % of them state that the bank loans are accessible for entrepreneurs. There is no significant

difference between the countries, regarding neither the entrepreneurs' education, nor the length of the business.

This paper has several limitations. The survey is geographically limited to SMEs from the Czech Republic and Slovakia. Another possible limitation can lead from misunderstanding the questions by the respondents or them providing untruthful answers. Because of these limitations, the results of the survey cannot be generalized.

References

Altman, Edward I., Gande, Amar, and Saunders, Anthony. (2010) "Bank Debt versus Bond Debt: Evidence from Secondary Market Prices", *Journal of Money, Credit and Banking*, Vol 42, No. 4, pp 755–767.

Ayadi, R. (2005) "The New Basel Capital Accord and SME Financing",[online], Center for European Policy Studies, Brussels. [cit. 25.3.2018] http://aei.pitt.edu/11441/1/1268.pdf.

Beck, Thorsten and Demirguc-Kunt, Asli. (2006) "Small and medium-size enterprises: Access to finance as a growth constraint". *Journal of Banking & Finance*. Vol 30, No. 11, pp 2931–2943.

Belas, Jaroslav, Bartos, Premysl, Habanik, Jozef and Novak Petr. (2014) "Significant Attributes of the Business Environment in Small and Medium-Sized Enterprises". *Economics and Sociology*, Vol 7, No. 3, pp 22-39.

Bhaird, C.M. (2010). *Resourcing Small and Medium Sized Enterprises*. Springer Verlag: Berlin, 2010.

Breckova, Pavla, and Havlicek, Karel. (2016) "SMEs export activities in the Czech Republic and export risk insuring". *European Research Studies Journal*. Vol 19, No. 1, pp 3-16.

Covin, Jeffrey G. and Miles, Morgan P. (1999) "Corporate entrepreneurship and the pursuit of competitive advantage". *Entrepreneurship Theory and Practice*. Vol 23, No**.** 3, pp 47-63.

Cressy, Robert. (2002) "Funding gaps: A symposium", *Economic Journal*, Vol 112, No. 477, pp 1–16.

De Mitri, Stefania, De Socio, Antonio, Russo, Paolo F. and Nigro, Valentina. (2013) "Micro-enterprises in Italy: A first analysis of economic and financial conditions". *Questioni di Economia e Finanza* (Occasional Papers). Bank of Italy Vol 65, No. 162.

Dobes Kamil, Kot Sebastian, Kramolis Jan and Sopkova Gabriela. (2017) "The Perception of Governmental Support in The Context of Competitiveness of SMEs in the Czech Republic". *Journal of Competitiveness*, Vol 9, No. 3, pp 34-50.

Drilhon, G and Estime, Marie F. (1993) "Technology watch and the small firm", *OECD Observer*, Vol 9, No. 182, June/July, pp 31-34.

European Commission (2013) *Innovation Union Scoreboard* [online 25.3.2018], https://ec.europa.eu/commission/priorities/jobs-growth-and-investment_cs.

Hamplova, Eva and Provaznikova, Katerina (2015) "Opinion and Attitudes of Entrepreneurs of Small and Medium-Sized Business in the Czech Republic Conditions", *Procedia Economics and Finance*, Vol 23, No**.** 1, pp 942-947.

Henderson, Jaron R. and Weiler, Stephan (2010) "Entrepreneurs and job growth: probing the boundaries of time and space", *Economic Development Quarterly*, Vol 24, No. 1, pp 23-32.

Hernández-Cánovas, Ginés and Martínez-Solano, Pedro. (2010) "Relationship lending and SME financing in the continental european bank-based system", *Small Business Economics*, Vol 34, No. 4, pp 465-482.

Howard, R. (1990) "Can small businesses help countries compete?" [online]. Harvard Business. [cit. 13.3.2018]. Available at: https://hbr.org/1990/11/can-small-business-help-countries-compete.

Hussain, Jawad, Ismail Kamariah, Akhtar and Ch Shoaib. (2015) "Linking Entrepreneurial Orientation with Organizational Performance of Small and Medium Sized Enterprises: A Conceptual Approach", *Asian Social Science*, Vol 11, No. 7, pp 1–10.

Ireland, R. Duane and Webb, Justin W. (2007) "Strategic entrepreneurship: Creating competitive advantage through streams of innovation", *Business Horizons*, Vol 50, No. 1, pp 49-59.

Kundid, Ana and Ercegovac, Roberto. (2011) "Credit Rationing in Financial Distress: Croatia's SMEs. Finance Approach", *International Journal of Law and Management*, Vol 53, No. 1, pp 62-84.

Majkova, Monika. (2012) "Možnosti financovania malých a stredných podnikov v SR", Brno: Tribun.

MPO (2017) Zpráva o vývoji malého a středního podnikání a jeho podpoře v roce 2016. [online 20.3.2018] https://www.mpo.cz/cz/podnikani/male-a-stredni-podnikani/studie-a-strategicke-dokumenty/zprava-o-vyvoji-maleho-a-stredniho-podnikani-a-jeho-podpore-v-roce-2016--232792/.

Neuberger, Doris, Rathke, Solvig. (2009) "Microenterprises and multiple bank relationships: the case of professionals", *Small Business Economics*, Vol. 32 No. 1, pp 207–229.

Organisation for economic (OECD), (2018). *Real GDP forecast*. [online 28.3.2018], https://data.oecd.org/gdp/real-gdp-forecast.htm.

Otero-Neiro, Carmen, Lindman, Martti T, and Fernandez, Julio, M. (2009) "Innovation and performance in SME furniture industries: An international comparative case study", *Marketing Intelligence & Planning*, Vol 27, No. 2, pp 216-232.

Ozturk, Burak and Mrkaic, Mico. (2014), *"Access to Finance by SMEs in the Euro Area: What Helps or Hampers",* IMF Working Paper, European Department. [online 15.3.2018]. https://www.imf.org/external/pubs/ft/wp/2014/wp1478.pdf.

Schiffer, M., Weder, B. (2001) "Firm size and the business environment: Worldwide survey results." International Finance Corporation Discussion Paper 43.

Vargas-Hernandez, José G. (2011), "Modelling risk and innovation management", Advances in Competitiveness Research, Vol. 19 No. 3-4, pp. 45-57.

Veliu Liridon, Manxhari Mimoza, Podvorica Neshat, Fejza Ejup and Hyesni Valon. (2018) "Managing SMEs in a turbulent context: a case study from a Kosovan manufacturing company", *Journal of Competitiveness*, Vol 10, No. 1, pp 155-170.

Zortea-Johnston, Elizabeth, Darroch, Jenny and Matear, Sheelagh. (2012). "Business orientation and innovation in small medium sized enterprises", *International entrepreneurship Management Journal*, Vol 8, No. 1, pp 145–164.

Japanese Expatriate Entrepreneurs in Asia: Cases from Myanmar

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Abstract: This research is the continuation of a project conducted on Japanese self-initiated expatriate entrepreneurs (SIEEs) working in Southeast Asia. Myanmar is strategically located between India, China and other countries in Southeast Asia and its growth is providing many new opportunities for outside investment. For Japanese companies, Myanmar is an exciting new investment opportunity. There are currently 149 Japanese companies registered with the Japan Myanmar Association. According to Matsui (2017) in the Nikkei News, Honda Motor opened its 115th dealership in Myanmar in 2017, an increase in 40% from 2016. The current GDP per capita is around $1,300, yet the strategic location of Myanmar in terms of its proximity to India means that purchasing power is higher among the border consumers; it is also likely to be Southeast Asia's fastest-growing economy in 2018 (The World Bank, 2017). Taking a social-constructivist approach, five in-depth interviews were conducted with Japanese self-initiated expatriate entrepreneurs in Myanmar. This research shows how these individuals develop their careers overseas and take advantage of the business opportunities presented in emerging economies. By examining these cases we can see the types of mindset that entrepreneurs inhabit, how they navigate their social and cultural identities both inside and outside Japan, and the importance of community and brokerage when building new businesses overseas. Compared to Japanese entrepreneurs in Cambodia, those in Myanmar seem less concerned with social entrepreneurship and more concerned with spotting a key niche in the new market, using their skills and experience to exploit opportunities provided by the presence of larger global companies in the host country and favorable economic conditions. By presenting the entrepreneurs successes and failures empirically, research can be used to inform entrepreneurship education, particularly through developing teaching materials that can provide Japanese young people and entrepreneurs with role models as they seek their own employment opportunities in South East Asia.

Keywords: Self-initiated expatriate entrepreneurs, Japan, Myanmar, entrepreneurship education.

1. Background

Since 2015 the authors have been exploring Japanese self-initiated expatriate entrepreneurs (SIEEs) in Thailand, Cambodia, Hong Kong and Myanmar. Initial research found that for both Japanese males and females, who were educated and trained in Japan, exposure to overseas in the exploration stage (Super, 1980) of their career was a significant influencing factor, when deciding to become an expatriate entrepreneur (Yokoyama 2017). This research paper shares the context, characteristics, and outcomes of five Japanese self-initiated expatriate entrepreneurs in Myanmar. We begin by defining SIEEs and presenting literature on and definitions of expatriate entrepreneurship and international employment trends in South East Asia, before presenting explicit cases from Myanmar. We conclude by suggesting how knowledge of these SIEEs can be used in higher education contexts in Japan to improve entrepreneurship education.

2. Self-Initiated Expatriate Entrepreneurs

SIEEs differ from traditional organizational expatriates (OE) as they have not been sponsored or assigned by a parent organization. Instead, they seek out self-initiated work opportunities in a global context. As Andresen and Biemann (2012, p. 105) define, an SIE 'as an employee who migrates voluntarily to a foreign country on his or her own initiative' and in our context, an SIEE, chooses to set up his/her own enterprise in the host country.

The term indicated a great degree of choice and independence to move abroad, putting the entrepreneur in charge of his/her own international mobility and success. Cerdin & Selma (2013) propose four conceptual criteria that can be used as a common denominator for SIEs, namely (a) self-initiated international relocation, (b) regular employment (intentions), (c) intentions of a temporary stay, and (d) skilled/professional qualifications. The entrepreneurs in this study have chosen to internationally relocate, their businesses provide them with regular employment and they are often highly skilled. Although they may have intentions of a temporary stay, many decide to stay long-term.

3. Immigration and Entrepreneurship

Research shows that immigration can be a driver of economic growth in host countries especially through the promotion of immigrant entrepreneurship (Wennekers et al., 1997, Hunt and Gauthier-Loiselle, 2008, Peroni et al., 2016, Yokoyama & Birchley, 2018). In Asia, immigrant entrepreneurs provide often necessary skilled

human capital resources that may be lacking in the home country (Neville et al., 2014). Surprisingly, OECD reports, have shown that immigrants are more likely than non-immigrants to engage in entrepreneurship activity (Desiderio and Mestres-Domènech, 2011, Mestres, 2010).

Research by Shami et.al. (2017) explores the influence of institutional environments on immigrants and entrepreneurship. Their research on the the relationship between features of the institutional environment of the host country and individual characteristics of immigrant entrepreneurs, we suggest, can be applicable to SIEEs. They refer to the *interactive model,* which suggests that immigrant entrepreneurial activity takes place because of opportunities perceived by immigrants originating from their exposure to host country market structures and institutional environments (Aldrich and Waldinger, 1990, Peroni et al., 2016), further developed to include the idea of "mixed embeddedness", where immigrants (or in our case expatriates) belong to specific ethnic networks but they are also entrenched and predisposed to the unique political and socioeconomic institutional environments of their hosting country (Peroni et al., 2016).

4. Myanmar as a Destination for Entrepreneurship

Myanmar is strategically located between India, China and other countries in Southeast Asia. It has a large agricultural sector which makes up approximately 1/3 of the Gross Value Added (GVA), although the share has decreased from 27.9% in 2014 from 47% in 2005 (UNCTAD, 2016). The country has experienced a tumultuous economic situation over the last 5 years which saw the GDP hitting 58 billion US dollars in 2013, rising to 64 billion US dollars in 2015 (UNESCO, 2016, World Bank, 2016). The government developed a new National Economic Development Plan in 2014 which highlighted agriculture, biotechnology, water preservation, renewable energy and building construction and transport as priority areas (Scimago 2016); all industries that could benefit from inward investment. Yet, in terms of global competitiveness, Myanmar is considered to be underperforming when compared to other ASEAN countries. There is currently no entry for Myanmar on the Global Entrepreneurship Monitor and it ranked 131st out of 140 in terms of the World Economic Forum's 2015-2016 Competitiveness rankings. Similarly, it ranks 138th out of 141 on the Global Innovation Index.

Infrastructure developments are seen as key to opening and developing trade between Myanmar and its ASEAN neighbours. According to research by Chakravarty (2017), there has been a 312.64% increase in trade through the India-Myanmar border towns in 2015-2016 with the Indian government identifying Myanmar as a key partner in developing an ASEAN gateway.

5. The Study

5.1 Research Questions

This research explores what kind of people seek out an international career as an expatriate entrepreneur, more specifically, what kind of mindset do they have, what networks facilitate their advancement, and what can we learn from such cases to improve entrepreneurship education?

5.2 Case Study and Narrative as a Research Tool

This research employs a social constructivist approach. Using in-depth case study and narrative analysis the researchers can form a thick description (Geertz, 1973) of the social and cultural context of the entrepreneurs lived experiences, based on the premise that individuals organize their experiences and their interactions with each other, their groups, and culture into narratives. Narratives tell us how people assign meaning to their experiences. Through dialogue between the researcher and the entrepreneur we can ascertain patterns or themes in the individual's life, explore the way in which the individual looks at him/herself and how they make meaning of their context. By collecting individual cases we can use them to better understand the specific community of self-initiated expatriate and the importance of the cultural and social context, how that context changes over time and how these changes affect the individual.

In this study, in-depth interviews were conducted in Yangon, Myanmar in 2018. Interviews were transcribed and coded accordingly. The research went through open coding, axial coding and selective coding and Box 1 shows the both codes derived from our previous study in Cambodia (Yokoyama & Birchley, 2018).

Box 1: Codes for Analysis

High need for achievement	Autonomy Dominance
Low need for conformity	Tolerance for ambiguity and uncertainty
High propensity for risk-taking	Adaptability

Flexibility	Sense of self-esteem	
Self-confidence	Self-assurance	
Alertness	Ability to create a vision	
Ability to build social networks	Evidence of social networks	
Communication capabilities	Cross-cultural sensitivities	
International orientation	Cosmopolitan outlook	Ability to be global
business savvy Passion for diversity		
A sense and quest for adventure	Intercultural empathy	
Interpersonal impact	Diplomacy	
Knowledge of sustainability	Cultural intelligence	
International experience	Self-correction	
Shares credit	Breaks free of structures	
Crosses disciplinary boundaries	Works quietly	
Strong ethics	Involved in community	
Shows concern for social equity		

6. The Cases

The following section describes the five primary cases for analysis.

Table 1: Case A (Male) Career Path (57 at time of interview)

Late teens	Worked part-time at a jeans store, municipal junior college of science and technology, dropped out.
21	Opened his own jeans store.
31	Bored looked for new opportunities, left the store in the hands of his subordinates, moved to the U.S.A., opened a licensing company in Los Angeles, working with major surfing companies.
37	Company folded
38	Returned to Japan, hospitalized with an illness.
39	Transferred the rights of the jeans company to his colleagues, set-up a PR company.
43-54	Continued to grow the PR company, developed a client base of 1,700. Went on to establish an internet mail order company with 40 employees, sold out in 2014.
51-53	Moved to Shanghai and enrolled at university to study Chinese.
52	Decided to start a women's fashion magazine but political unrest halted production. Travelled to Myanmar with his wife for sightseeing. Took second visit with a friend in the Japanese Myanmar Friendship Association, conducted market research. Saw a gap in the market for a magazine aimed at expatriates in Myanmar.
53	Decided to move to Myanmar and start a magazine publishing company. Published first free paper in Myanmar.
57	Celebrated the 50th issue of his magazine. Acts as Vice Chairman of the Myanmar Friendship Association, is on the Special Committee of Japanese New Business Association and is a representative of the Yangon Chamber of Commerce.

Case A's current Free Paper business has four sections; advertising, leasing and introductions to business, HR support and company advancement support consultations. Throughout his career Case A has had a few mentors in Myanmar but primarily works with Japanese companies and people involved in politics. His career anchor is to meditate, to make the mind clear and free. He is extremely satisfied with his work and life yet cited a shortage of quality human resources in Myanmar as an issue for his business.

Table 2: Case B (Female) Career Path (49 at time of interview)

High School	Took part in an international exchange project in the Philippines, stayed with a host family. Is still in contact with the host family and they meet up every two years.
University	Studied English and in the 2nd year took a year out studying abroad in Perth, Australia. Took six months of language classes and one year at vocational school studying business. Returned to university and changed courses to psychology. Had a part time job at a cultural village in Japan.
23	Graduated and took a job at a major Japanese company, working in their real estate and hotel division but left company.
24-27	Got a job at Bali Intercontinental Hotel and was in charge of guest relations and sales.
27	Transferred to Singapore Intercontinental Hotel and was in charge of VIP correspondence and Japanese companies. Moved to the Shangri-la Hotel and was in charge of sales to Japanese companies. Was dissatisfied with the management style in Singapore and visited Myanmar with a friend. Decided to move to Myanmar.
28	Moved to Myanmar and set up a travel agency with some friends. However, she experienced some problems in working with others and sold her share to go into business alone.
29	Married a Myanmar national
30-47	Had children and with her husband, set up a Japanese division of a European-bound travel company. Also started to manage a cram school franchise. Husband died suddenly in a maritime accident so she sold the travel company but kept the cram school franchise. She currently has between 40-50 employees and 1,500-1,600 students at any given time.
47	Started a temp staff agency working with Japanese-based vocational schools.

Case B had a number of mentors throughout her career, of note was her relationship with a former British Airways Cabin Attendant she met at her first workplace who inspired and encouraged her to work in a hotel in Bali. She also has a number of close friends and female company managers in Myanmar. She doesn't have a wide social circle as she doesn't tend to go out but values the close connections she has with friends, family and her employees, many of whom are international. Her work is her priority but she is working hard for her children's education. She had difficulty fitting into a male dominated office culture in Japan and said that working in Japan, she felt that the workplace society lacked a human element but she feels free working overseas and able to express her emotions. She is extremely satisfied with her work and life and has two phrases that anchor her: "it will be ok" and a Japanese expression "calm, charming face, with quiet and warm words."

Table 3: Case C (Male) Career Path (38 at time of interview)

18	Took a year out of education.
19	Entered a university and majored in information technology.
22	Took a leave of absence from university and backpacked around Europe, Morocco, Turkey and China. Did various part time jobs during university in order to save money for travel. Didn't concentrate on classes but spent time working and saving for two overseas trips per year.
24	Graduated and worked at a temp staff agency dispatching engineers. Spent three years working in sales operations and three years working in career counselling.
30	Became a sales manager
33	Decided to make a change in his career. Had two choices a). work for his family's sports store or b). work abroad. Decided to work overseas. First considered becoming a sushi chef but thought it would be bored and was offered a job in Cambodia but after finding out more about Myanmar he decided to go there.
34	Moved to Myanmar, worked for a web venture company.
35	Recognized a niche in the market and decided to found his own company. Launched *Growth.Myanmar*, a car rental and driver company.
38	He employs 95 people, owns a fleet of 80 cars and has two partner companies that he works with. He is also an editor of the Myanmar Business Partner magazine, free paper and is working on a new education project.

Case C had three senior mentors throughout his career. One mentor inspired him through his bright and positive attitude to life, a second mentor taught him how to think logically, and the third taught him how to be empathetic and increase his EQ. He also takes advice from Japanese executives from Singapore and from people in his networks, such as local Japanese expatriates and managers. In his private life he spends time coaching baseball with his kids. He likes the freedom he has as an entrepreneur as he can decide things 100% for himself. He learned Japanese skills and etiquette in his positions in Japan and takes those practices into his business now. His motto is to enjoy working and to enhance his customer's satisfaction and that of his employees. He wants to make the best of the best. He has support from his wife, who is a housewife yet they worry that the business is at risk due to increased competition in the marketplace, the development of A.I. and driverless cars, his own health and the professional development of his staff.

Table 4: Case D (Female) Career Path (41 at time of interview)

Childhood	Travelled with parents to Australia and travelled throughout her working years.
18	Graduated from high school and found employment selling cosmetics in department stores.
24	Moved companies and specialized in skincare and make-up, became a store manager.
29	Got married.
30	Had a child.
29-31	Housewife but took various aesthetic qualifications over three years with a view to open her own beauty business in the future.
31	Made bracelets at home as a hobby. Met a lady from Myanmar related to precious stones.
36	Continued making bracelets, went to Myanmar to source stones for her creations. Decided to separate from her husband and got divorced.
37	Took her child and moved to Myanmar, took her savings of USD20,000. Lived in Yangon living off her savings and supporting herself by providing beauty services to Japanese clients in Myanmar. Started to sell bracelets online, was successful, opened a gem store in Myanmar.
39	Realized her dream of opening a jewellery store in Tokyo.

Case D's company name is *Culumito* which is derived from the Latin meaning healing ties. She wants her brand of jewellery to help women to strengthen and heal the ties of their hearts. She is self-taught as a jewellery designer but over the years she has taken various classes at vocational school to acquire new skills. In her personal life, she went through some trying episodes, namely when her son decided he didn't want to live with her in Myanmar but instead wanted to live with his father in Tokyo. As such this incident and the ailing health

of her grandmother, who was her primary caregiver as a child, encouraged her to open a salon in Tokyo which she did in 2017. Since then she was working three weeks in Tokyo and one week in Yangon per month. She has since closed the store in Yangon in order to focus her energy on her family and new venture in Tokyo. Case D had no mentors as she was developing her career but does have various networks with local craftspeople, Japanese colleagues and jewellery teachers. Her work is good and she was relatively satisfied with her work and life in Myanmar but less satisfied when her son decided to go back to Japan so moving back to Japan and starting her Tokyo salon has increased her work life balance and satisfaction. Her motto is that "in case of hardship, the customer will save us." She does not know what the future will hold but for the moment she is back in Japan caring for her grandmother and has more regular access to her son.

Table 5: Case E (Male) Career Path (47 at time of interview)

18	Took a year out after high-school.
19	Went to university, studied in a faculty of commerce.
19	Took part in a short term study abroad in the USA for 45 days in his first year of university.
21	Took a leave of absence from the university, took a working holiday in New Zealand. Wanted to pursue his dream of becoming a professional skier so trained during this time.
23	Graduated from university, spent one month in Australia, one month in New Zealand, visited Fiji and decided to spend a year at language school in Australia.
24	Took the domestic travel business manager qualification.
26	Became a domestic tour rep and decided to move overseas. Moved to Palau and managed the sales at the Nikko Hotel in Palau.
33	Moved to Myanmar after being recommended to by a friend. Worked at the Nikko Hotel as Restaurant Manager.
34-36	Transferred to the Shangri-la Hotel, became their sales manager.
35	Met his wife while working at the Nikko Hotel, got married.
36	Moved industries to become sales manager at a company, which sell cosmetics and stationary goods in Myanmar, due to financial difficulties the head office in Myanmar was absorbed into the main company, made redundant. Returned to Japan and his parent's home but was unable to find fulfilling work in Japan, decided to go back overseas.
40	Took a job working for an expatriate fruit and vegetable import company in Egypt however with his family still in Myanmar he was looking for a way to move back.
43	Decided to return to Myanmar and open a Japanese restaurant.

Throughout his career, Case E had a mentor who worked at the Nikko Hotel in Palau. He also has strong expatriate and business networks with his customers. In his private life he relies on Facebook and social media to keep in contact with old friends around the world. He greatly values the time he has with his family and makes sure that Saturdays are family days to spend time with his children. His motto for life is the Japanese phrase '*ichi-go-ichi-e'* which means "once in a lifetime." He works hard to support and protect his family but worries that it is difficult to hire good quality staff in Myanmar and thus worries that his business will not survive without him.

7. Discussion

7.1 Mindset

Similar to the research conducted on Japanese SIEEs in Cambodia and Thailand, the expatriates in Myanmar show all the personality traits of entrepreneurs, such as a high need for achievement, autonomy and dominance; low need for conformity; tolerance for ambiguity and uncertainty; high propensity for risk-taking, adaptability and flexibility; sense of self-esteem, self-confidence, self-assurance and alertness. In addition, they have strong communication capabilities and are able to develop interpersonal relationships with both fellow Japanese expatriates and host country individuals. In terms of entrepreneurial behaviours, they have all shown a commitment to Myanmar; their businesses are proactively seeking out growth opportunities in the emerging economy and they have created a strong vision for their future activities in the country. They possess all the traits of a global mindset, particularly in their cosmopolitan outlook and strong self-efficacy and confidence when operating in a global cross-cultural context and in particular Case A shows the ability to deal with failure in a cross-border context and has shown how one can be resilient and tenacious throughout one's life. Yet, in contrast to the Japanese SIEEs in Cambodia, the cases in Myanmar showed less of a propensity towards social or sustainable entrepreneurship, and there were no cases that exemplified a high-impact self-initiated social entrepreneur (Yokoyama & Birchley, 2018).

7.2 Social and Cultural Identity

In terms of traditional family and societal roles, the males in this study, Cases A, C, and E all exemplify a traditional Japanese family model where the male is the breadwinner and the wife is a supportive housewife;

maintaining the home and raising the family, allowing the male to engage in entrepreneurship, take risks and travel internationally. Female cases B and D both expressed an inability to '*fit in*' in Japan. They are both very strong female characters; one who has dealt with divorce, and one who has coped with life as a widow and as such, they are dominant female role models; far from the stereotyped Japanese housewife that is prominent in current cultural and societal discourse. They are prime examples of successful women who can balance work and life and who can be as successful as their male counterparts as entrepreneurs. Cases F and E also expressed the struggles they experienced when returning to Japan from overseas. This transition was problematic and highlights the difficulties that Japanese face when trying to integrate back into their own society having spent time overseas.

7.3 Community and Brokerage

The importance of networks and brokerage is particularly interesting in the Myanmar cases. Although Japanese SIEEs in Cambodia showed evidence of being engaged in a strong expatriate network, the ties and brokerage activities between Japanese SIEEs and OEs in Myanmar appear more entrenched and essential for doing business. This may be due to the kind of work that the SIEEs engage in; most Japanese SIEEs start businesses that are connected to pre-existing companies in Myanmar, while in Cambodia, the social-sustainable businesses that SIEEs build, primarily rely on communication and connections between the SIEES and host country individuals. As such, Free Papers are seen as the primary vehicle for the development of networks. These papers provide cultural and social brokerage to the new SIEEs. In addition, social media is becoming increasingly important in terms of brokerage and networks. New technology enables individuals to expand their networks with greater speed than in the past.

7.4 Business Idea Development

In terms of the triggers and venture idea generation of these individuals, we can see the role that effectuation and bricolage plays as the Japanese entrepreneurs examine their passions, their resources and their abilities and how they can utilize them to make a business. Each case not only saw a niche in the market and took advantage of that gap but they also drew on their prior knowledge and experience. They each pursued something they were personally interested in. Their enterprises were self-funded some family support, thus taking great risks with their own capital and investment, making them fully responsible for the success of their ventures. The expatriate brokers mentioned above were instrumental in each entrepreneur developing and sustaining their business in Myanmar as they were crucial to network development. Yet the problem of a lack of quality local human resources was cited by many as an area for concern, highlighting the need to develop stronger networks, training programs and brokerage between expatriates and locals the host community.

7.5 Career Development

All the respondents had a key moment – a 'turning point' or 'epiphanies' (Denzin, 1989; Strauss, 1962) in their early thirties when they needed to make a crucial decision about their future. They took stock, revised and re-evaluated their future path. This point at the beginning of the exploration stage of their career highlights the need for career development support for early and mid-career individuals. In each of the cases we can see how they have blended their social and cultural factors with their personal choices and how as entrepreneurs, they merge their individual preferences with opportunity that in some ways incorporates serendipity (Hodkinson & Sparke, 1997). The individual's identity is constantly evolving through the journey of becoming an entrepreneur and the early 30's is a key time for growth and development.

8. Conclusion

As this research has shown, Japanese SIEEs in Myanmar exhibit strong entrepreneurial and global mindsets and experience key career turning points at the early exploration stage of their career, yet they also show a propensity towards profit-seeking business over social-sustainable, altruistic endeavours, choosing to settle in Myanmar as a destination due to its fast-growing economy, abundant human resources, community and brokerage.

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References

Aldrich, H.E. and Waldinger, R. (1990). “Ethnicity and Entrepreneurship”. Annual Review of Sociology. 16:1, 111-135.

Andresen, M.; Biemann, T. (2013) “Career Concepts of Self-Initiated Expatriates: A Theoretical Analysis Based on Coupling and Configuration”. In Self-Initiated Expatriation-Individual, Organizational, National Perspective (eds). Andresen, M.; Al Ariss, A; Walther, M. New York, N.Y.: Routledge.

Cerdin, J., & Selmer, J. (2014). “Who is a Self-initiated Expatriate? Towards a Conceptual Clarity of a Common Notion”. The International Journal of Human Resource Management, 25(9), 1281–1301.

Chakravarty, R. (2015) “Role of Trade in Promoting Entrepreneurship Development between North East India and South East Asia”. International Journal of Scientific Research and Management (IJSRM), Volume 5 Issue 08 Pages 6576.

Das, R.B., & Bordoloi, A.K., (2015) “Opportunities of Border Trade in North East India: With Special Reference to Indo-Myanmar Border Trade”, World Journal of Research and Review, Vol. I, Issue I, pp. 04-11. International Journal of Scientific Research and Management (IJSRM), Volume 5 Issue 08 Pages 6576-6585.

Denzin, N.K.; Lincoln, Y.S. (1994) “Introduction: Entering The Field of Qualitative Research”. In: Handbook of Qualitative Research. N.K. Denzing; Y.S., Lincoln. Thousand Oaks, California: Sage Publications.

Denzin, N. (1989). Interpretive biography. London: Sage.

Desiderio, M.V. and Mestres-Domènech. J. (2011) OECD Report on Migrant Entrepreneurship in OECD Countries. https://www.oecd.org/els/mig/Part%20II_Entrepreneurs_engl.pdf Retrieved April 12th 2018.

Geertz, C. (1973) "Thick Description: Toward an Interpretative Theory of Culture." In The Interpretation of Cultures. New York.

Hodkinson P. & Andrew C. Sparkes (1997) “Careership: A Sociological Theory of Career Decision Making”, British Journal of Sociology of Education, 18:1, 29-44.

Hunt, J. & Gauthier-Loiselle, M. (2010) "How Much Does Immigration Boost Innovation?," American Economic Journal: Macroeconomics, American Economic Association, vol. 2(2), pages 31-56.

Matsui, M. (2017) “Japanese Companies Flock to Myanmar”, Nikkei Newspaper.

Mestres, J. (2010) "Migrant entrepreneurship in OECD countries and its contribution to employment", in Open for Business: Migrant Entrepreneurship in OECD Countries, OECD Publishing,

Paris,http://dx.doi.org/10.1787/9789264095830-3-en. Retrieved April 12th 2018.

Peroni, Chiara & Riillo, Cesare & Sarracino, Francesco. (2016)” (available at http://rdcu.be/mG01). Small Business Economics. 46. 10.1007/s11187-016-9708-y.

Scimago (2016). Scimago Journal and Country Rank. Myanmar.

http://www.scimagojr.com/countrysearch.php?country=mm Retrieved April 12th 2018.

Strauss, A. (1962). “Transformations of identity”. In: A. M. Rose, (Ed.), Human Behaviour and Social Processes: An Interactive Approach. London: Routledge and Kegan Paul.

Sullivan, S. E., & Arthur, M. B. (2006) “The Evolution of the Boundary Less Career Concept: Examining Physical and Psychological Mobility”. Journal of Vocational Behavior, 69(1), 19–29.

Super, D.E. (1980) “A Life-Span, Life-Space Approach to Career Development”

Journal of Vocational Behavior 16, 282-298.

Shami, Muntasir & Marek Mickiewicz, Tomasz. (2017). Immigration and Entrepreneurship: A Cross-country Analysis. Academy of Management Proceedings.

UNCTAD (2016). World Investment Report.

http://unctad.org/en/publicationchapters/wir2016_AnnexTables_en.pdf. Retrieved April 12th 2018.

Wennekers, A. R. M., & Thurik, A. R. (1999) “Linking entrepreneurship and economic growth”. Small Business Economics, 13(1), 27–55.

World Bank (2016). World Bank Open Data. https://data.worldbank.org/ Retrieved April 12th 2018.

Yokoyama, K. (2016) “A new trend of Japanese self-initiated expatriation in South East Asia - Case studies from Bangkok and Hong Kong”. The Sixth Workshop on Expatriation by the European Institute from Advanced Studies in Management (EIASM), Catania, Italy, 15-16 September.

Yokoyama, K. and Birchley, S.L. (2018) “Mindset and Social Entrepreneurship: Japanese Self-initited Expatriate Entrepreneurs in Cambodia”. Journal of Entrepreneurship and Innovation in Emerging Economies. Vol. 4., Issue 1. pp.68-88. Sage.

Using the Case Study Method in Studying the National Innovation System: Cross-Country Comparative Analysis

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Abstract: Innovative development of the economy is considered now as a necessary condition for increasing its competitiveness. The most important mechanism for implementing this strategy is the development of the National Innovation System. In developing the directions and mechanisms for the development of the Kazakhstani innovation system, the experience of foreign countries in the field of stimulating innovative activity and the formation of effectively functioning national innovation systems becomes particularly topical. The developed countries (the United States, Great Britain, Germany, Finland, Sweden, Switzerland, Japan, etc.), as well as the states that are intensively developing innovative systems (South Korea, China, Hong Kong, Singapore, the countries of Latin Of America). These countries are characterized by high dynamics of the development of research and development (R & D), significant expenditures for maintaining and stimulating innovations, active support of the education and research complex, and careful attention of governments to the development of national innovation systems. Experience South Korea is particularly interesting due to the fact that this country is one of the most dynamically developing in the innovation plan. The article examines the methodological aspects of the study of the innovative eco-environment by the example of a cross-national study of Kazakhstan and South Korea. The author, relying on the results of the study of actors of the innovative eco-environment in Kazakhstan and South Korea, demonstrates the possibilities of combining qualitative and quantitative research methods, placing emphasis on interviewing and case studies for the derivation of the theory. This article describes the most problematic issues in the collection and analysis of actors in the innovative environment in different countries, taking into account country differences. Recommendations are formulated to conduct research on various representatives of the innovative environment. Along with this, the opportunities for applying the resource-oriented approach for analyzing the internal environment of the innovation company are also described. As a result, an author's qualitative model is proposed for analyzing the innovative environment in a cross-national perspective, which allows describing the environment statically and dynamically, and can also be modified depending on research tasks, national innovation environment.

Keywords: national innovation system, case study, innovative eco-environment, innovation research methodology, cross-national research, qualitative research models, innovative environment of Kazakhstan, innovative environment of South Korea, resource-oriented approach.

1. Introduction

The necessity of forming the National Innovation System (NIS) in Kazakhstan is an opportunity to overcome the raw material orientation of the economy, transforming it into a knowledge economy. Today, knowledge becomes not only the most important production factor, but also a factor in the rapid development of high-tech industries, the basis for ensuring the competitiveness of the national economy and its security. Thus, the investigated problem is multifaceted, when evaluating its development, it is also necessary to take into account research related to the development of theoretical, methodological and practical aspects of NIS construction. At the same time, up to the present time such aspects of the problem as the relationship of NIS with the economic development of the country remain insufficiently developed; factors that influence the formation of NIS in modern conditions; concept of the innovation system of developed countries. In this article we attempted to determine the basic principles and guidelines for innovative development of the economy of Kazakhstan, to identify the features and factors of NIS development, to conduct a conceptual analysis of the NIS of developed country – South Korea.

In this regard, there is an important issue of implementing a set of measures for the transition of the Kazakh economy to an innovative type. One of such instruments is the legislative initiatives of the Government of the Republic of Kazakhstan.

2. Research Methodology

The study was conducted in three stages. At the first stage, a toolkit for the quantitative analysis of innovation networks was created, which is necessary for the study of the innovative eco environment. The second stage of the research emphasizes the role of the context for the analysis of innovations rooted in the local economy

and culture in particular, which is proved by the network theory. The third stage is represented by a qualitative research method - the case study method. At this stage, a cross-national study of innovative systems in Kazakhstan and South Korea was carried out.

3. Literature review

3.1 Innovative economic environment

Currently, there is a significant amount of research in the field of innovation. However, despite the fact that a wide range of economic, social and technological incentives are offered as driving forces for innovation, there is hardly a consensus on how and to what extent innovation activity is deterministic of changes in the social or economic environment. In fact, modern studies confirm that there are many theories that determine the factors that influence the development of innovation and that the universal theory in this case seems unrealistic. Nevertheless, it should be noted that the perspective that takes the driving forces of innovation is often associated with technological shifts and a long-term evolution of the economy, not least evidence of lengthy and still ongoing discussions about the driving forces of the industrial revolution and the origins of industrial capitalism (Crafts, 1985, 1995; Mokyr, 1990, 2009; Allen, 2009; Bottomley, 2014).

A study of many sources allows us to emphasize the set of "positive" driving forces for innovation, for example, the growth of market demand for innovation and "negative" factors, the closure of the innovation process. In many economic models, innovations are motivated by the expected private return on innovation, which is more or less secured by intellectual property rights, for example, patent laws (see Nordhaus, 1969, Scotchmer, 1991, Moser, 2005, 2013) or due to increased market demand and the needs of consumers (Schmookler, 1962; Lundvall, 1985, 1988, von Hippel, 1994). Other structures view innovation as a result of progress in the field of knowledge (Arrow, 1962, Romer, 1990, Aghion and Howitt, 1992), useful knowledge (Mokyr, 2002), new technological possibilities (Klevorick et al., 1995) and diffusion of general-purpose technologies (Bresnahan and Trajtenberg, 1995; Lipsey et al., 2005).

3.2 Network theory of innovation

In his original article titled "In Search of a Useful Innovation Theory," Nelson and Winter (1977) sought "to outline some areas that would seem to be fruitful" in innovative research and policy based on "selected aspects of the prevailing theoretical understanding of innovation" (page 36). Nelson and Winter (1982) followed this book, The Evolutionary Theory of Economic Change, which was based on the field of technology and innovative research (Fagerberg, 2005). Although the innovation process is socially contextualized in the evolutionary economy - in terms of subprograms, trajectories and regimes - the sociological perspective has so far remained largely a complement to the further development of this field of research (Ahrweiler, 2010; Fagerberg, Fosaas, & Sapprasert, 2012; Leydesdorff & Van den Besselaar, 1994).

The constructivist turn and increased attention to reflexivity in research in the field of science and technology led to the fact that sociologists of science and technology theorized innovation as an evolutionary factor in the transition to a knowledge-based economy (Martin, Nightingale and Yegros-Yegros, 2012; see Schumpeter , 1943, 1964, pp. 62ff.). However, various metaphors, such as the "transdisciplinary mode-2 knowledge production" (Gibbons et al., 1994), "trajectories in landscapes" (Geels, 2002), "Risk Society" (Beck, 1992, see Beck, Bonn and Lau, 2003) and the triple spiral of university-industry relations and government (Etzkowitz & Leydesdorff, 2000) provide averages that have informed economic and geographic analysis in a wide range of applications (Geels, 2007).

Theories of diffusion studies and technology assessment focus on the consequences of the enhanced role of organized knowledge in society (eg, Rip, Misa, & Schot, 1995; Teece, 1986). In addition, a social network analysis (eg Powell, White, Koput, Owen Smith, 2005) makes it possible to study the relationship between media in neoinstitutional organizations (Powell & DiMaggio, 1991).

In our opinion, the evolutionary model and the dynamics of technological changes, nevertheless, were refined in the main works of sociological literature, but, unfortunately, in disintegrated, and sometimes mutually antagonistic ways. In a special issue of Mind and Society, one of us called for the sociology of innovation from the point of view of cultural theory (see Adolf et al., 2013; Ahrweiler, 2013; Ahrweiler & Keane, 2013; Mast, 2013). In this study, we collect elements from three or four sociological traditions and determine the prospects for empirical research on this basis.

Thus, the two levels - historical organization and evolutionary self-organization in the environment of choice - can be viewed as independent incentives for innovation that lead to action. Unlike historical changes with a time arrow, innovations absorb reflexivity in interpersonal communication as one of the sources of "creative destruction" (Schumpeter, 1943, pp. 81-86). Thus, historical ties can be dissolved and replaced in anticipation of performative improvements.

3.3 From system expertise to system level comparisons

One of the first comparative studies of NIS was carried out by Porter (Porter 1990). This and other early comparative studies did not correspond to the formalized structure and covered only two or three countries. None of the authors of the early comparisons took into account the social, economic and political situation of the respective countries. This had the same effect on their ability to develop and use technological knowledge as systemic, that is, material characteristics. Therefore, one can state whether it is possible to use the national NIS, unlike other national influences, as a tool for managing the competitive environment of another nation.

Nevertheless, the way to benefit from these comparative studies is to keep political consequences. Institutions such as the OECD or the EU encourage policy-oriented studies that often combine the NIS approach with the idea of benchmarking. The OECD Working Group on Technology and Innovation Policies (TIP), for example, conducted a four-year study on policies related to a systems approach to innovation (OECD, 1999). Some of the conclusions in this report stem from previous OECD studies, such as the 1998 publication "Technology, Productivity and Job Creation: Best Political Practices" (OECD, 1998). In 2000, the EU decided to "develop indicators and a methodology for comparing national research policies" (European Commission, 2000, p.3).

Research of this kind is aimed at identifying "best practice strategies" and "better behavior" among the countries studied by examining different indicators of innovative results or efforts. Based on the results of the search for best practices, recommendations were developed.

Nelson (Nelson, 1993) responded to the lack of a clearly defined analytical framework. He conducted a study in fifteen countries, which was intended to highlight the institutional arrangements that supported technical innovation in these countries. He stressed the similarities and differences and initiated, at least, a preliminary discussion of how these differences arose and seem to matter (Nelson, 1993b).

In the future, we will consider in more detail the NIS of South Korea and Kazakhstan. We will study the composition and strength of these systems by looking at them at the system level in a formalized manner, and not just by comparing system characteristics.

4. Comparison of South Korea and Kazakhstan

4.1 Institutional functions

4.1.1 Development of a policy on technology and innovation

In Korea, various independent ministries and departments carry out activities in the field of science and technology (R & D), which may include research and development (R & D). Duplication and conflict between individual politicians create inefficiency within the system. In order to minimize this inefficiency, a policy coordination and budget coordination process is underway (Chung 2001).

To coordinate policy, the Ministry of Science and Technology (MOST) is the legally central point of policy in the field of science and technology. Ultimately, long-term technological forecasting was added to the role of MOST. Every five years, MOST uses the Delphi method and returns results to policies and research and development (Chung 2001).

In many respects inefficient due to the lack of political power and financial resources, MOST actually acts as the secretariat of the National Council for Science and Technology (NSTC). The NSTC was established in accordance with a special law on scientific and technical innovations in 1997 under the chairmanship of the President of Korea. The NSTC solves the political agenda, policies, priorities for the distribution of R & D and the evaluation of national R & D programs. The Ministry of Planning and Budget (BCH) carries out budgetary coordination, which includes the preparation of the annual budget guidelines and the allocation of budgets.

Previously, MPB had the greatest power in S & T policy; However, it is likely that the balance of power in the future will shift towards the NSTC (Chung 2001).

Innovative policies play an important role in Kazakhstan's economic strategy. To improve the sustainable development of Kazakhstan, on the basis of diversification and modernization of the economy, clear goals and tasks are set for moving from a raw material economy to a knowledge-based economy through the use of revenues from the oil, gas and mining industries. An increasingly important focus in Kazakhstan is on innovation, the country strives to develop scientific and technological capabilities and to close integration of science and business.

Kazakhstan has concentrated considerable efforts on activating innovative activity as a means to accelerate economic development and diversify the economy. Initiatives are aimed at improving the components of the national innovation system, in particular, on the creation of state institutions to support innovation. Attention was also accentuated on increasing the productivity of companies, regional features of the innovation system and the demand for innovation. However, despite the political decisions confirmed by some program documents, practical activities were focused mainly on improving institutional support.

However, the legal environment for innovative regulation is not sufficiently developed in Kazakhstan. Not developed a number of laws that would help in innovative regulation, as well as in the innovation process.

The authorized state body, the leading stages in the creation and implementation of policies in the field of industrial and innovative progress, is the Ministry of Investment and Development of the Republic of Kazakhstan, whose tasks include:

- the generation of ideas and the direction of development in the Government of the Republic of Kazakhstan on the main lines of innovation;
- implementation of innovative grants;
- conducting an accompanying monitoring of implementation and evaluating the effectiveness of the introduction of innovative projects produced through innovative grants;
- state control over the implementation of the legislation of the Republic of Kazakhstan on state support of innovation activities, including the progress of the complex of measures for innovative development.

The organizational structure of the innovation policy in the Republic of Kazakhstan is as follows (Figure 1).

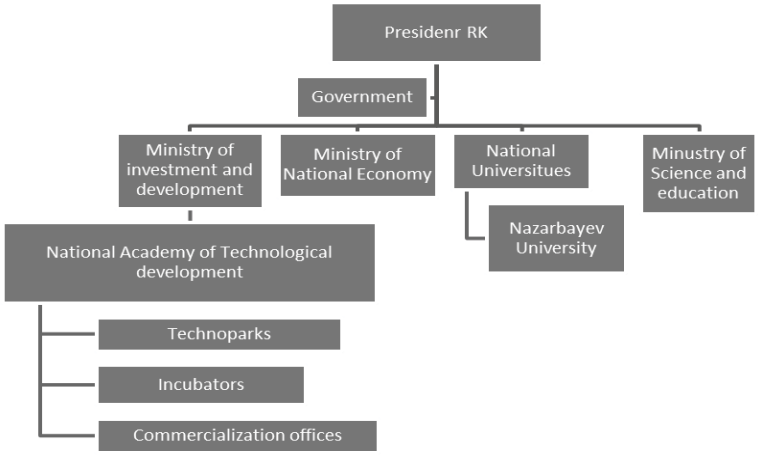

Figure 1: Organizational structure of innovation policy in the Republic of Kazakhstan

The Ministry of Education and Science of the Republic of Kazakhstan is the authorized body responsible for the formation, implementation and coordination of all fundamental and applied research conducted in the country, the state and development of the research infrastructure, the training and professional development of scientific personnel, and the conduct of the State Scientific and Research Expertise scientific projects and programs implemented at the expense of the state budget.

4.1.2 Performing research and development

Over the past two decades, the Korean government has shifted its position from the fact that since the 2000s it has been actively engaged in research and development and encouraged private firms to do research and development. South Korea is spending heavily to achieve its goal. In 1999, the country's investment in research and development (R&D) totaled 2.07% of its gross domestic product (GDP), just below the average for nations in the Organisation for Economic Co-operation and Development (OECD). In the latest figures, the country has stretched out a clear lead at the top. The 4.29% (63.7 trillion won, or US$60.5 billion) that South Korea invested in R&D in 2014 outstrips runner-up Israel (at 4.11%), as well as regional competitor Japan and the United States.

The low level of innovation activity of R & D in Kazakhstan results from the structure of industrial production with its raw materials orientation and foreign direct investment. Contrary to the fact that in recent years the development of the oil and gas complex has served the country's economic development, the demand for R & D has not increased and production growth has not been observed. Large enterprises in the extractive industries use often imported technologies, which national R & D institutes do not produce.

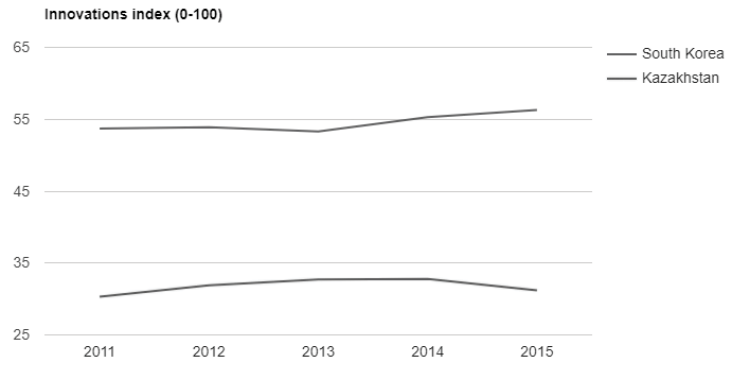

Figure 2: Innovation Index of Kazakhstan and South Korea

For the period 2004-2015 in the Republic of Kazakhstan there was a continuous increase in the costs of enterprises for technological innovation. A characteristic feature is the prevalence of the acquisition of ready equipment and machines. Comparatively not significant funds were allocated specifically for research and projects. An even smaller share of costs was received by the industrial design, that is, the preparation of buildings and structures for the installation of equipment. And very little money was allocated for training and training of production personnel, purchase of software, patents and licenses. On the one hand, this is due to the extreme deterioration of the basic technological equipment and the inevitability of its urgent replacement. And on the other hand, low interest of foreign investors in the full intellectual content of their actually pro-production technologies in our country. The wide development and dissemination of electronic means of communication makes it possible to remotely control almost completely automated production processes in real time.

The type of research and development carried out in Korea has shifted to the development of technology in comparison with the basic ones. In addition, Korean state-owned companies, cheybols, have reached the technological frontier from reverse engineering, and efforts have been directed to research and development to enhance international competitiveness. On the contrary, the most common type of innovation in Kazakhstan is gradual. Alcorta and Peres (1998) set out three reasons for this behavior:

- Great management capabilities. Managers tend to "react, emphasizing commercial and financial decisions, rather than technological ones." Therefore, when problems arise, they are looking for solutions in terms of reducing overhead, rather than improving the product.
- Lack of knowledge in the field of innovation. Firms still view human capital as a value, not as a resource.
- Lack of medium-term / long-term vision. Firms do not have a vision of long-term competitiveness.

4.1.3 Financing R & D

Research and development expenditure (% of GDP) in Kazakhstan was reported at 0.16944 % in 2015, according to the World Bank collection of development indicators, compiled from officially recognized sources.

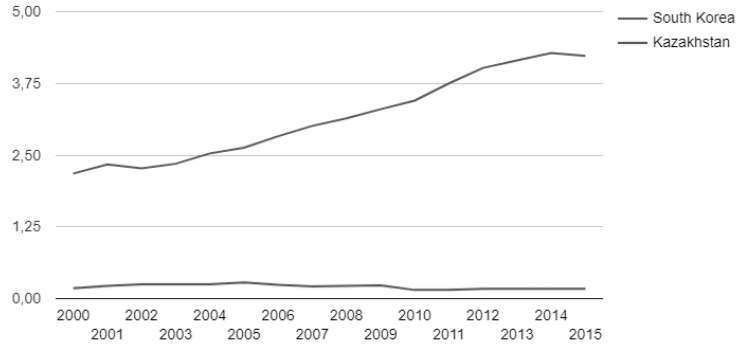

Figure 3: R7D expenditure, percent of GDP

South Korea spends hugely on R&D. Led by technology companies such as Samsung and LG, it invests more than most advanced economies. It was narrowly beaten by Israel to the title of top R&D spender, devoting 4.23 per cent of gross domestic product in 2015, compared with Israel's 4.25 per cent, according to OECD data.

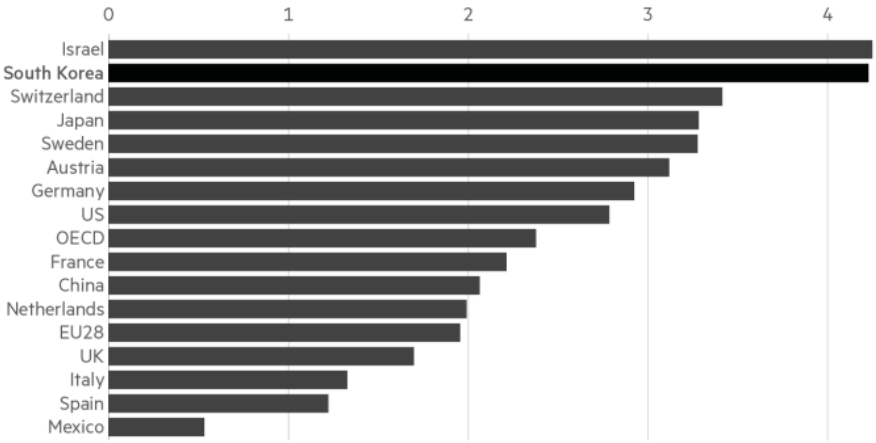

Figure 4: Spending on R&D, as a share of GDP (%)

Investment has been driven mainly by the private sector, although public R&D spending is high. Almost three-quarters of South Korea's R&D is business-led; nearly 90 per cent of that is invested in manufacturing, with the focus tilted towards applied research for industrial competitiveness. Industrial R&D also favours technology industries such as electronics.

An R&D scene dominated by conglomerates has come at a price, however. Industry watchers bemoan that the country lacks "blue sky innovation", especially in software and services, as R&D activities are concentrated on big companies and state-run research institutes. There are too few upstarts with innovative ideas as the chaebol's dominance hinders new entrants.

4.1.4 Promotion of human resources development

The illiterate labor force in the 1950s (22.0% in 1953) to almost 90% of the literacy rate for two decades demonstrated the high priority that Korea has for education. Expenditure on education in comparison with general government expenditures increased from 2.5% (1951) to 5.07% (2015). Despite the high costs, this still represents only one-third of the total cost of education; the rest - through private firms and parental contributions. This rapid growth created a highly skilled workforce. Foreign education has also become the main factor - a hangover since the US assistance in Korea after colonization (Kim 1993). In Kazakhstan in 2000 expenditures were 3.26% of GDP, in 2015 - 2.79%.

Although the number of students has increased dramatically, the quality has declined in both countries. In Korea, according to the Ministry of Education in higher education institutions, there were 19.9 students per teacher in 2000, and in 2015, 13.2 students per teacher. The number of universities increased from 107 to 175 over the period from 1990 to 2007. Kim (Kim, 1993) argues that because of this

Tracing the change in the number of personnel engaged in research and development by sector of activity, one can note a slight increase in their number in the public sector - by 2.7 thousand people, or 35%; in the IT sector - by 0.4 thousand people, or 0.3%; in the NCO sector there is a negative trend, that is a slight decrease of 0.2%. At the same time, the decrease in the number of personnel engaged in research and development in the business sector, by 0.5 thousand people, or 11%, is of particular concern. After all, in the modern market economy, the entrepreneurial sector accumulates a large part of its scientific potential. This is the case in South Korea, where about 2/3 of the total number of researchers are employed in the business sector. These data reflect the low investment interest of domestic entrepreneurs in innovation and development, thereby further exacerbating the prevailing common negative situation.

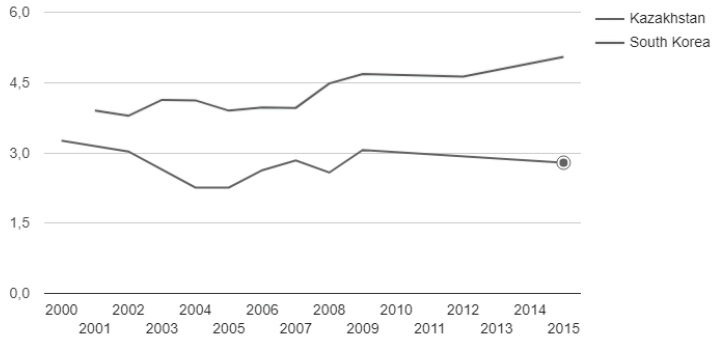

Figure 5: Public spending on education, percent of GDP

4.1.5 Encouraging technological entrepreneurship

Despite their importance, in the 1980s, the chabols began to abuse their economic power and stifled entrepreneurship in small and medium-sized firms (SMEs) (Kim 1993). To respond, the Korean government has taken two actions - they have created sanctuaries and a venture industry. In the sanctuaries 205 business-terrorist acts operate, in which shabols and related subsidies cannot enter - this allowed SMEs to flourish in the high-tech sectors (Kim 1993). Secondly, the first venture company was created within the framework of a special partnership between public and private companies. The subsequent Law on the Formation of Small and Medium-sized Enterprises in 1986 led to the creation of 12 more venture capital firms financed by a combination of public and private sectors (Kim 1993). In addition, the Law on the Promotion of the Financing of New Technologies in the Field of Commercialization, created in 1986, helped to form financial institutions that financed only the high-tech sector (Kim and Dalman 1991).

While entrepreneurs in Korea have a constant capital stock, Kazakhstan does not have the same luxury. There is little venture capital in Kazakhstan, and it is debatable whether there are business opportunities. There is no literature on this, but it seems that the lack of innovations in industry, applied research in the university and capital will lead to stagnation of the entrepreneurs' proposal.

4.2 Interaction of institutions

4.2.1 Cooperation in the field of R & D

Cooperation in both countries is very weak. In Korea, MOST estimates that only 35% of its national research and development is carried out by a combination of universities, research institutes and industries (Chung 2001). Cooperation between universities and the private sector is the weakest link in the Korean NIS. Due to insufficient funding from universities, as mentioned above, industry views universities as not having sufficient capacity for their own purposes, and therefore they attract very little from the private sector. Instead, informal cooperation is more common through the use of consultations from individual members (Kim 1993).

Between branch and state research institutes, cooperation is more frequent, since the government provides subsidies and financial incentives for such cooperation. Recently, large private firms have preferred to keep their R & D secrecy in order to maintain a competitive advantage, despite short-term financial incentives. These interactions are mainly used to support SMEs.

In official forms of R & D among institutions in Kazakhstan, no literature was found. Indeed, it is doubtful whether there is any industry in the industry, since such a small number of firms perform R & D. At the same time, the experts of the JSC "Center for Trade Policy Development" note that the degree of innovation in SMEs in Kazakhstan is limited, which is also indicated by the relatively low percentage of income from new products - 28% in 2015. Despite the fact that the Government highlights the development of entrepreneurship and innovation as priority directions, emphasizing their decisive importance for economic diversification and improving the country's competitiveness, the GPIIR for 2015-2019 does not provide for specific target indicators related to the increase of innovative activity in the business sector. Secondly, a large number of innovative enterprises face barriers such as lack of knowledge and experience among staff, a lack of investment in innovation, a lack of risk capital for innovative projects, and a lack of demand for new products among the local population. Thirdly, in the sphere of innovative activity development, there are gaps in the provision of venture capital to new innovative enterprises that are in the early stages of development.

4.2.2 Diffusion of technology

The role of foreign direct investment (FDI) in both countries varies widely. Kazakhstan's gross direct inflow of foreign investment was $ 7.9 billion in 2005, and rose to $ 20.6 billion in 2015, and Korea received only $ 3.6 before 1986, and it's no wonder, that their role in the Kazakhstan NIS is of paramount importance. Since the 1960s, there has been a clear government policy in attracting FDI. "This was not only to protect the local market, but also to provide significant subsidies and a special regime for foreign investors." (Dahlman and Frischtak, 1993). However, with weak intellectual property rights, foreign companies tend not to invest their most advanced technologies (Dahlman and Frishtak, 1993). However, in Korea, the lack of foreign direct investment is deliberate. The government's policy in Korea requires that all foreign investment be approved by the state - an attempt to neutralize the independence of Korean companies from multinational enterprises (Viotti 2002). This turned out to be decisive in the 1980s: while Korean companies could specialize and switch to innovation, Kazakhstan formed its scientific innovation system from the "fragments" of the Soviet innovation system and there was no interest on the part of enterprises in innovations, the introduction of new technology was necessitated fulfillment of relevant tasks from above.

There is a "strong dependence" on foreign licensing and technology expertise (Arocena and Sutz 2001). This compensates for the lack of internal R & D. While the situation in Korea is the opposite, Chaebols have aggressive own R & D laboratories for "absorbing, assimilating and adapting imported technologies" (Kim 1993). In the 1980s, the Korean government created state research institutes for the sole purpose of spreading technology. The lack of resources meant that they could not create prototypes or perform any effective research and development. Although this may seem like a failure of goals, it actually gave the same effect as researchers from these institutions, and also from state-funded companies joined the industry to lead the research and engineering departments, carrying with them the knowledge gained from government institutions.

In addition, the Korean NIS does not have any "explicit policy instruments" (Kim and Dalman 1991) about the spread of technology. Indirect instruments, such as consulting engineering firms and manufacturers of commodities, allowed the government to focus on these agencies to promote the diffusion of technology. In addition, in connection with the supply and demand for technology, two main tools were used. For SMEs, six government agencies provide various technical services that range from training and automation to assisting firms with product quality. Secondly, scientific and technical information is disseminated through scientific articles in technical information centers (Kim 1993).

4.2.3 Staff mobility

No literature was found on the mobility of personnel in both countries, which indicates its insignificance in both NIS. Kim (1993) notes that the Korean war, in spite of the destruction of large parts of the industrial infrastructure, actually helped "... further economic development by completely transforming the traditional rigid society into a highly mobile one, forcing geographic mobility" (Kim 1993). It is clear that mobility played

an important role in the initial process, and the Koreans probably retained this mobility, because Korea is a relatively small country compared to other industrialized countries such as Indonesia or China.

However, in Kazakhstan there are no hints at the role of mobility, since public R & D is largely dominant, the role of mobility - if it exists - will be insignificant, since they will be carried forward only within the same type of institutions, not from -institution.

5. Conclusion

Drawing conclusions from the comparison between South Korea and Kazakhstan, it must be repeated that there is no such thing as a full-scale institutional structure that would include all possible interdependencies between different institutions.

The above approach mainly revealed differences in the characteristics of the two countries. A systematic approach to innovation is established as a useful basis for studying technical changes and their determinants, but one can state whether generalizations can be made and whether Kazakhstan, if it copied the Korean NIS, would have the same success.

We fill in the weaknesses with the map of Chang and Shi. The four fundamental groups proposed by Chang and Shi to capture this abstract functioning of the system either were not documented in the literature (mobility of staff and informal interactions) or did not show great differences (R & D cooperation). Only technological diffusion of foreign knowledge has shown significant differences in the practice of countries, but the spread of innovations created in the respective countries does not have any significant references in the literature. Authors such as Viotti (Viotti 2002) who innovate the templates disprove the usefulness of the NIS concept in the case of technological backwardness when it indicates: "The NIS approach is not suitable for processing the processes of technical changes typical for industrialization of the economy that are very different from the economically industrially developed countries".

However, the fact that only fragmented innovation systems were only empirically discovered in low- and middle-income countries does not mean that the structure of NIS is useless in these conditions. Sagieva and others (Sagieva & Zhuparova, 2013) do not refrain from using the NIS approach, and have weaknesses, it has nevertheless proved to be a useful and astute tool for analyzing South Korean and Kazakhstan NIS. Within our framework, we have analytically discussed ten aspects of the NIS, and we hope that with the help of such studies it will be possible to make wider implications for public policy. Consequently, governments of industrialized countries can learn and improve their economic progress.

References

Adolf, M., Mast, J.L., & Stehr, N. (2013) “The foundations of innovation in modern societies: The displacement of concepts and knowledgeability”, Mind & Society, 12(1), 11–22.

Aghion, P., Howitt, P., 1992 “A model of growth through creative destruction”, Econometrica 60 (2), 323–351.

Ahrweiler, P. (2013) “Cultural and cognitive dimensions of innovation”, Mind & Society, 12(1), 5–10.

Ahrweiler, P., & Keane, M.T. (2013) “Innovation networks”, Mind &Society, 12(1), 73–90.

Alcorta, L. and Peres, W. (1998) “Innovation systems and technological specialization in Latin America and the Caribbean”, Research Policy 26: 857-881.

Allen, R.C., 2009 “The British Industrial Revolution in Global Perspective”, Cambridge University Press, Cambridge.

Arocena, R. and Sutz, J. (2001) “Changing knowledge production and Latin American universities”.

Arrow, K., 1962 Economic welfare and the allocation of resources for invention, In: Groves, H. (Ed.), The Rate and Direction of Inventive Activity: Economic and Social Factors. National Bureau of Economic Research, Cambridge, MA, pp. 609–626.

Beck, U. (1992) Risk society. Towards a new modernity, London, England: Sage.

Beck, U., Bonns, W., & Lau, C. (2003) “The theory of reflexive modernization: Problematic, hypotheses and research program”, Theory, Culture & Society, 20(2), 1–33.

Bottomley, S., 2014 The British Patent System During the Industrial Revolution 1700–1852: From Privilege to Property. Vol. 28. Cambridge University Press.

Bresnahan, T.F., Trajtenberg, M., 1995 “General purpose technologies ’engines of growth’?” , J. Econom. 65 (1), 83–108.

Chung, S. C. (2001) “The Research, Development and Innovation System in Korea”, In Laredo, P. and Mustar, P. (eds.) “Research and Innovation Policies in the New Global Economy”. Economica, Paris. Alcorta and Peres (1998)

Crafts, N.F., 1985 British Economic Growth during the Industrial Revolution, Clarendon

Crafts, N.F., 1995 “Exogenous or endogenous growth? The industrial revolution reconsidered”,

Dahlman, C. and Frischtak, C. R. (1993) National Systems Supporting Technical Adcance in Industry: The Brazilian Experience National Innovation Systems - A comparative analysis, New York, Oxford University Press, 414-450
Etzkowitz, H., & Leydesdorff, L. (2000) "The dynamics of innovation: From national systems and "mode 2" to a triple helix of university industry - government relations", Research Policy, 29(2), 109–123.
European Commission (2000) "Towards a European research area: Science, technology and innovation", Key Figures 2000, Brussels, European Commission.
Forecasting and Social Change 69(7):653-680.
Geels, F.W. (2002) Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. Research Policy, 31(8–9), 1257–1274.
Geels, F.W. (2007) Feelings of discontent and the promise of middle range theory for STS examples from technology dynamics, Science, Technology& Human Values, 32(6), 627–651.
Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994) " The new production of knowledge: The dynamics of science and research in contemporary societies", London, England: Sage.
industrialising economies and evidence from the cases of Brazil and South Korea", Technological
J. Econ. Hist. 55 (4), 745–772.
Kim, L. (1993). "National System of Industrial Innovation: Dynamics of Capability Building in Korea" in Nelson, R.R. (ed.). National Innovation Systems - A comparative analysis, New York, Oxford University Press, P357-383.
Kim, L. and Dahlman, C. J. (1992). "Technology policy for industrialization: An integrative framework and Korea's experience". Research Policy 21:437-452
Klevorick, A.K., Levin, R.C., Nelson, R.R., Winter, S.G., (1995), "On the sources and significance of interindustry differences in technological opportunities", Res. Policy 24 (2), 185–205.
Leydesdorff, L., & Van den Besselaar, P. (Eds.). (1994) Evolutionary economics and chaos theory: New directions in technology studies, London, England: Pinter.
Lundvall, B.-Å., 1985 Product Innovation and User-Producer Interaction, Aalborg Universitetsforlag, Aalborg.
Lundvall, B.-Å., 1988 Innovation as an interactive process: from user-producer interaction to national systems of innovation. In: Dosi, G., Freeman, C., Nelson, R., Silverberg, G., Soete, L. (Eds.), Technical Change and Economic Theory. Pinter, London, pp. 349–369.
Martin, B.R., Nightingale, P., & Yegros-Yegros, A. (2012) Science and technology studies: Exploring the knowledge base, Research Policy, 41(7), 1182–1204.
Mokyr, J., 1990 The Lever of Riches, Oxford Univ. Press, New York.
Mokyr, J., 2002 The Gifts of Athena: Historical Origins of the Knowledge Economy, Princeton University Press, Princeton, N.J.
Mokyr, J., 2009 The Enlightened Economy: An Economic History of Britain 1700–1850,
Nelson, R. R. (1993) National Innovation Systems - A comparative analysis, New York, Oxford University Press.
Nelson, R. R. (1993b). "National innovation systems: A retrospective on a study" in Glaziev S., Schneider C.M. (eds.). Research and Development Management in the transition to a market economy. Laxenburg. Vol. 11ASA:71-101.
Nelson, R.R., & Winter, S.G. (1977) "In search of useful theory of innovation", Research Policy, 6, 35–76.
Nordhaus, W.D., 1969 An economic theory of technological change, Am. Econ. Rev. 59 (2), 18–28.
OECD (1998), Technology, productivity and job creation: Best policy practices. Paris.
OECD (1999). Managing National Innovation Systems. Paris.
Porter, M. E. (1990) The competitive advantage of nations, London, MacMillan.
Powell, W.W., White, D.R., Koput, K.W., & Owen Smith, J. (2005) Network dynamics and field evolution: The growth of interorganizational collaboration in the life sciences, American Journal of Sociology, 110(4), 1132–1205.
Powell,W.W., & DiMaggio, P.J. (Eds.), (1991) The new institutionalism in organizational analysis, Chicago, IL: University of Chicago Press.
Press, Oxford.
Research Policy 30:1221-1234.
Rip, A., Misa, T.J., & Schot, J. (1995) Managing technology in society, London, England: Pinter.
Romer, P.M., 1990 Endogenous technological change, J. Polit. Econ. 98, S71–S102.
Sagieva, R. & Zhuparova, A. (2013) Innovation processes in Kazakhstan. Expert opinion. Sociologicheskie isslidovaniya, 9, 110-111
Schmookler, J., 1962 Economic sources of inventive activity, J. Econ. Hist. 22 (1), 1–20.
Schumpeter, J. (1943) Socialism, capitalism and democracy, London, England: Allen & Unwin.
Schumpeter, J. (1964) Business cycles: A theoretical, historical and statistical analysis of capitalist process, New York, NY: McGraw-Hill. (Original work published 1939.)
Scotchmer, S., 1991 Standing on the shoulders of giants: cumulative research and the patent law, J. Econ. Perspect. 5 (1), 29–41.
Viotti, E.B. (2002) "National Learning Systems: A new approach on technological change in late
von Hippel, E., 1994 'Sticky information' and the locus of problem solving: implications for innovation, Manag. Sci. 40 (4), 429–439.
Yale University Press, New Haven.

Design Thinking as a Methodology for Teaching Entrepreneurial Mindset in Primary Education

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Abstract: This article provides insights into a way to develop creativity, innovation and an entrepreneurial mindset in young people as a universally applicable skill. The research questions were: How did teachers use Design Thinking as a methodology for teaching the entrepreneurial mindset to adolescent students? and What was the context in which the teaching took place, and what factors influenced the completion and outcomes of the projects? A total of 146 seventh and eighth-grade students age 12-14 and 20 teachers, 2 per class, from 10 Slovene schools took part in the study. Teachers used the Design Thinking method to facilitate hands-on student projects. During the course of the project, the participating teachers attended two meetings to present their progress. In addition, one of the study facilitators visited each school several times to discuss the project with the teachers, observe the class and take notes. Both teachers submitted a combined final report of their experience and observations. Reports collected have been coded using NVivo software. Three factors are recognised, the characteristics of the project, the environment in which it was carried out, and the characteristic of the learning and teaching. The study demonstrates that adolescents respond very favourably to an entrepreneurship assignment and that the entrepreneurship exercise builds skills in multiple developmental areas, rendering such a project very useful within existing curricula.

Keywords: adolescent education, innovation, entrepreneurship education, entrepreneurial mindset, elementary school, Design Thinking

1. Introduction

This paper focuses on efforts in education to encourage and develop young people's 'entrepreneurial mindset,' which McGrath and MacMillan (2000 p. 32) defined as 'the ability to sense, act, and mobilize under uncertain conditions.' In 2012, the European Commission released the report Entrepreneurship Education at School in Europe: National Strategies, Curricula, and Learning Outcomes, which outlines strategies to enhance creativity, innovation and entrepreneurship at all levels of education and training among 31 European countries (Bourgeois 2012). The report notes that the Republic of Slovenia's Development Strategy (SDS), adopted by the government in 2005, states, 'entrepreneurial skills at all education levels should be developed, the entrepreneurial spirit of young people should be encouraged and positive notion of entrepreneurship established, training programmes for running small enterprises and entrepreneurial knowledge for young people should be provided' (Bourgeois 2012: 71). In Slovenia the subject of entrepreneurship remains optional for upper secondary school students (schools for university-bound students aged 15-18). However, in primary education (aged 6-14), Slovenia has established learning outcomes associated with 'economic and financial literacy', and entrepreneurship is loosely included in the compulsory subjects of maths, sciences, and technology. However, entrepreneurship education has much room to grow.

1.1 Teaching the entrepreneurial mindset

It is crucial to understand which concepts related to the development of creativity, innovation and an entrepreneurial mindset can be implemented in schools and how. Despite limited research on effectiveness and implementation of entrepreneurship education at the pre-university level, some scholars have argued that childhood and adolescence is the ideal time to teach entrepreneurial skills and foster a positive attitude towards entrepreneurship (Peterman and Kennedy 2003). In his book In the Beginning was Entrepreneurship, Johannisson (2010) suggests that children are born enterprising; however, this characteristic is not encouraged much while growing up. Johannisson (2010) argues that the entrepreneurial mindset must be perceived as a phenomenon constructed by individuals, rather than an external development process. In addition, the pedagogical concept of developing an entrepreneurial mindset and skills is a process in which mentality, sources and people are organised in new patterns. These patterns, however, are a result of the possibilities that were identified during activities and social interactions. Therefore, the following questions become

relevant: could the development of an entrepreneurial mindset and skills in the current school system be realised? Or is it merely a current trend that has accidentally become the focus of education-related research? Over the past decade, at the core of developing an entrepreneurial mindset is an idea of promotion of creative and innovative problem-solving as a universally applicable skill. Several pieces of research have dealt with this position, which emphasises an anthropological and educational focus (Katz 2003; Frese 2009; Neck and Greene 2011; Fayolle 2013). Several authors have proposed a modern paradigm of enterprise education (Rasmussen and Sorheim 2006; Neck and Greene 2011; Sarasvathy and Venkataraman 2011). They argue that classic administration of entrepreneurship education, which focused on the teaching of developing business plans, often fails to foster creativity and innovation in young people, especially elementary school students (Garavan and O'Cinneide 1994; Honig and Karlsson 2004). These scholars suggest that the promotion of creative and innovative problem-solving curricula can provide students a generally applicable skill for personal and professional life that is useful to society (Martin 2007; Kelley and Littman 2005; Meinel and Leifer 2011).

1.2 The Design Thinking method

The change in perception of the entrepreneur solving social problems required different approaches to creative problem-solving in real-life situations. The method of Design Thinking (Figure 1) evolved as a result; it promotes the development of creativity, innovation and an entrepreneurial mindset with a strong focus on understanding the needs and desires of the end user (Rauth et al, 2010). Design Thinking has been taught in several universities for many years, particularly Stanford University, which not only teaches Design Thinking but also conducts research on the use of Design Thinking in compulsory and higher education settings.

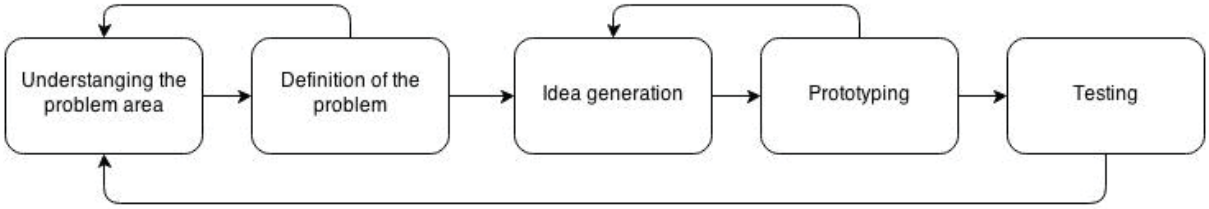

Figure 1: The Design Thinking method; source Brown 2008; Rauth, Köppen et al, 2010

The Design Thinking method involves conducting research with existing and potential users of a product or service to understand their needs and identify product challenges (Brown 2008; Rauth et al, 2010; Meinel and Leifer 2011). This requires the use of various techniques of collecting data about users and their surrounding environment. It is a combination of different methods, which may involve field observation, interviews, focus groups, surveys, experiments, videography and photo diaries, among others. These methods mainly include ethnographic techniques of data collection. In addition, less traditional sources of data may be used, such as talks by experts, Internet discussions and newspaper articles (Carroll et al, 2010). After collecting sufficient information about the users and their problem, the problem is then defined and ideas are generated according to different criteria. Next, the prototyping process involves different methods to visualise, physically create and test the solution to the problem. The process is intended to be cyclical and iterative, as some steps in the process, or the entire process itself, are repeated to continuously improve the product.

2. Methodology

To identify the potential of Design Thinking as a method for teaching the entrepreneurial mindset to young students in Slovenia, we monitored the progress of a Design Thinking project in selected Slovene elementary school classrooms, each with 10 to 20 students and 2 teachers. We also investigated the implementation of the projects in the involved schools, how they were connected to the respective local communities, and whether they enabled the students to learn in real-life situations.

This study used ethnography to examine the experience of teachers in facilitating a Design Thinking project in their classroom. The research questions were:

1. How did teachers use Design Thinking as a methodology for teaching the entrepreneurial mindset to adolescent students?
2. What was the context in which the teaching took place, and what factors influenced the completion and outcomes of the projects?

The project took two hours of classroom time per week for 17.5 weeks (35 hours total). A total of 146 seventh and eighth-grade students age 12-14 and 20 teachers, 2 per class, from 10 Slovene schools (labelled A-J in subsequent text) took part in the study.

To gain training in the Design Thinking method and ethnographic research in preparation for the classroom project, the participating teachers attended a two-day seminar facilitated by the researchers. Teachers were instructed on creativity, the entrepreneurial mindset, current and best practices, and the Design Thinking method. Additionally, they were trained in field observation and note-taking. The teachers were instructed to take regular notes of progress over the course of the project, focusing on the phases of the project. They also had to describe their role and circumstances in managing the project and highlight the issues they encountered. We were interested in the teachers' experience and understanding of the project. During the course of the project, the participating teachers attended two meetings to present their progress. In addition, one of the study facilitators visited each school several times to discuss the project with the teachers, observe the class and take notes. Both teachers submitted a combined final report of their experience and observations. A total of 10 teacher reports and 10 researcher notes from class visits were analysed. The collected information and presentations were compared with the submitted written reports, and no discrepancies were found thus confirming the credibility of the reports.

Using a grounded theory approach (Charmaz 2006), three raters coded the reports using NVivo software. The codes were first categorised according to the Design Thinking phases of the project and additional themes were identified throughout the coding process that were based on repeated or interesting ideas, concepts and keywords. Thirteen additional themes were identified (see Table 1).

3. Results and Discussion

The results presented here are organised according to the Design Thinking phases and other insights, and supported with illustrative excerpts from the teachers' reports.

3.1 Phase 1 & 2: Understanding and defining the problem, and Observation

Each of the classrooms came up with an innovative project idea to address a problem in their school, social circle or community. The classrooms undertook field observations to identify problems, some of which were done in their own school and some in the local community. Some students were also provided the opportunity to return to their field location more than once or make observations in their own free time. School H reported, 'The students had one week to observe their school and its surroundings.' This particular phase of the project supported the intended learning outcome of understanding different ways to observe, compare and analyze people's needs. School D reported, that the students were able to learn about the problems of the locals by interviewing them and were able with the help of teachers to assess the possibilities of solving thereof.

Students appeared to be very enthusiastic, active and creative during the observation phase. School G reported, 'We came up with 240 different answers or problems to draw ideas from.' The observation phase supported the intended learning outcome of developing personal qualities necessary for the successful realization of ideas, such as creativity, self-confidence, enthusiasm, courage, and cooperativeness. Interesting to note is that the students did not have to be coerced into working, since, as school J reports, they volunteered for the jobs connected with observation and data collecting. Following the field observations, the students identified problems to work on.

3.2 Phase 3: Ideation

It appeared that the brainstorming phase was one of the most active ones for students. School C reported, 'The students had so many suggestions, but we had to postpone them until further notice.' During this phase, the classrooms were successful in identifying one feasible project each to work on. For example, in School B, which addressed the problem of an underutilised forest trail, the students decided to organise a science day and install three additional educational displays on the trail. School J, which identified the need for a 'school gift,' chose to create a soap using local ingredients. School I developed an audiobook because a relative of one of the students has dyslexia and the students sought ways to help that relative.

Some of the ideas that children proposed were too complex to be completed without outside assistance or resources, or within the timeframe of the project. However, in some cases, the teachers were able to access

outside assistance, which enhanced the project. In School E, which addressed the problem of their school's poor quality school lockers, the students were able to work with a carpenter to design and build a prototype of a new locker.

An interesting finding was how the teachers helped facilitate the student's negotiation process of choosing a few ideas from many suggestions. School C, which worked on a clothing line, reported, 'We agreed that every group had to incorporate as many ideas as possible into the clothes, even the most unusual and 'crazy' ones.' This particular phase of the process appeared to support the learning outcomes of developing interpersonal communication and learning to take risks, negotiate and compromise.

3.3 Phase 4: Prototyping and testing

Students collaborated with teachers from other subject areas or external partners such as entrepreneurs, designers and university professors, to create their prototypes. School C, which worked on a clothing line, collaborated with a local fashion designer who came to the school and provided mannequins. Because of this collaboration, School C reported, 'Our ideas were slowly becoming applicable; we managed to create prototypes from affordable materials.' The students decided to make women's dresses and handbags using a creative 'collage' technique incorporating metal and materials from seatbelts.

A range of different prototyping approaches was reported, from the use of simple materials that were manipulated by hand (e.g., cloth and wood), to the use of more complex technologies such as 3D modelling. School F, which worked on designing sports equipment, reported, 'The students first sketched their ideas on paper; then they produced 3D models of the cupboards using Google Sketch Up.' The prototyping phase was one of discovery. School J reported, 'The students were surprised by the change in smell and colour of the soap when adding fragrances and spices.' It was also a project highlight for some of the classrooms. School H reported that compared to the other phases of the project, the students were most enthusiastic about their interaction with practical, hands-on work.

Once the prototypes were finished, the students tested them with different users, such as their peers or guests they visited during the field observations or tourists. School D reported, 'We designed a prototype of the [postcard] and asked parents, teachers, our headmaster and visitors to evaluate it.' Certain schools organised multimedia presentations of their products for their users. School E, which developed prototypes of new lockers, reported, 'Each group presented their prototype with a short video and tested its applicability with users.' Some students also changed their prototype during the testing phase to meet users' wishes, thus opening up new possibilities and ideas. School G, which worked on marketing materials for Lipica, reported, 'Test results gave rise to new ideas for upgrading and improving the prototypes.' Some schools also sought feedback from external collaborators on how to present their products to users. School J reported, 'The head of the company Dima Center explained the significance of marketing and added value of a product.'

3.4 Phase 5: Implementation

During the implementation, the schools finalised their projects, presenting them for assessment or in some cases, putting them into actual use. School H, which developed new school lockers, reported that the students presented their entire idea from conception to realisation to the school leadership.

Some schools even presented their results to community leaders. School E reported, 'The students published their results in various media and presented them to municipal representatives.'

Some schools also sold their products at a school bazaar (School D) or other venues. School C, which developed a clothing line, reported, 'We organised a fashion show in the centre of Celje and offered our clothes to be sold at a charity auction.' Some schools found that this activity was one of the best ways to understand users and their needs. School I, which created an audiobook for challenged readers, reported, 'It was nice to assume the role of sellers and see how they [customers] think.'

A positive finding from the study was the numerous examples of schools' on-going relationships with external collaborators after the project. School B, which worked on upgrading a forest trail, reported, 'We will organise guided tours along the educational path for seventh-grade students of neighbouring schools. We will also join forces with the local Tourist Association and the Pensioners' Association.' School F, which developed sports equipment, presented their prototype to a local company and agreed on future cooperation.

3.5 Other findings

Based on the analysis of the reports, which highlight situational and contextual learning, we identified several project factors that contributed to students' entrepreneurial competency over the course of the project.

Table 1: Three factors that contributed to the development of entrepreneurial mindset

Project factors	Environmental factors	Learning and teaching factors
• Field work and the duration of the project • Trained and enthusiastic teachers • Relevant and meaningful problems to work on • Interactive, hands-on projects	• External approval from school, leadership, parents and community members • Opportunities to work with external collaborators in an authentic environment • Adequate infrastructure, including time, resources, and external assistance • Applied use of new tools, resources and technologies in the classroom, particularly prototyping tools • Testing prototypes in the environment	• Student-centered education and including all students in the work • Team work and an interdisciplinary approach • Studying different options and assessing ideas critically • A culture of trust and safety

Results show (Table 1) that the projects on all ten participating schools involved field work. The problems the respective schools highlighted and worked on were closely connected with the lives of their local communities.

Frequently the students sought solutions to their own problems or those of their peers. Some schools transferred the education process into their respective partners' offices or manufacturing halls; some partner firms also invited their own partners to the education process. The students often obtained information needed to complete their projects at home.

The role of the teachers in facilitating the project was critical. First, some schools noted that the teams of two teachers were helpful. School H reported, 'Two mentors working together was an excellent idea.' Second, some indicated that the teacher training for the project was important. Some teachers alluded to the unpredictability of the project. Teachers from School C reported, 'Although we carefully planned the work for the project, the events sometimes took a different turn.'

Also, teachers' enthusiasm for the project and their ability to allow students to lead their own work was critical. A teacher from School J reported, 'We encouraged crazy ideas, playfulness, humour and the feeling of freedom in the group.' Another teacher from School H reported, 'My role as teacher was different [than how I normally teach], because we wanted the students to find the best ideas by themselves.' The second factor, no less important, are the effects of the environment, especially the support of the school leadership, parents, and also the local community. School H reports that they have presented their idea from conception to finalization to their school's management. The schools joined forces and cooperated with a number of external institutions and collaborators. The students and their teachers visited companies and entrepreneurs and worked with local schools and experts. The students of school A presented their prototype to the local community and managed to arrange further collaboration. Collaboration with outside partners and the local community provided the students with many opportunities for discovering new challenges and creating fresh ideas.

Adequate infrastructure is necessary to carry out the project, especially in the prototyping phase. The reports suggested that the schools possessed adequate spatial and material means for the project. In many cases, the students brought some of the necessary equipment and materials from home, while external collaborators

provided the rest. In some of the schools, the educational process took place on the premises of external collaborators

The third decisive factor that meaningfully rounds out the educational environment, suitable for developing an entrepreneurial mindset in primary education, is the teaching and learning methodology. School H reports that the students were most enthusiastic about the practical work. The teams collaborated with outside partners. 'Our ideas that we complemented with those of a fashion designer felt really great,' they wrote in school C. Students explored different options. Students from school D decided to encourage 'each team to implement as many ideas as possible into the clothes-designing process'. The report of school J, which decided to create a new soap, is also very telling. The school reports that 'the students were surprised to witness the fragrance and the colour of the change as they added incenses and spices. They worked in teams and were not afraid of making mistakes'. At the same time all the participating teachers mentioned using teaching methods that are uncommon for regular lessons. However, they agreed that the nature of the project increased their engagement and workload and that training was necessary before taking up the project.

4. Conclusion

Our findings indicate first that an entrepreneurial project such as the one incorporated here meets multiple academic outcomes within the elementary school curriculum and thus can be incorporated seamlessly into existing curricula and lesson plans. Second, the development of creativity and innovation as the basic components of the entrepreneurial mindset and skills in young people requires a systematic and comprehensive approach. Third, implementing high-quality entrepreneurship education calls for a comprehensive framework and the identification of effective practices and support from local and regional bodies. However, as this study suggests, elementary schools can relatively easily incorporate contextualized problem-based teaching practices aimed at developing entrepreneurial competencies on their own, without any major changes at the national or global levels where the chances of significant progress in the near future are unlikely. Initial changes do not need to be made at the upper-most levels, but can be incorporated from the bottom up through teacher education and teacher self-initiative.

Teachers report that the participating students were more focused on the process than they were on the product itself, so their work and learning were to a large extent self-regulated. This means that they were active in a metacognitive, motivational, and behavioural way. Studies show (Elstad and Turmo 2010; Kolovelonis, Goudas and Dermitzaki 2011), that self-regulated students, in contrast to peers who are not self-regulated learners, are highly internally motivated. They are more confident and more involved during classes, and use different learning strategies. They can organise their learning environment well and achieve mere academically. Apart from that, the opportunity for creative work, readiness for risk-taking and putting a lot of effort into work grow through self-regulation, which an entrepreneurial mindset helps offer.

This study has many strengths but also a few limitations. First, we relied upon disparate teacher reports of student behaviour and learning. Different teachers may assess the success of this assignment differently, clouding the results. However, since individual teachers do all of the assessing for their students in all areas of instruction, it is appropriate to rely on teachers as accurate assessors of their students' progress. Second, this assignment was tested on only one age group: 12-14 year-olds. Thus, these results are limited to generalizing within this age group. This limitation provides a logical segue into suggestions for future research however, as future studies can assess the effectiveness of such a program at lower and higher ages. Future research can also assess whether repeating this type of assignment at multiple ages can further entrench this way of thinking, or whether there is an ideal age at which to teach the entrepreneurial mindset to achieve maximum effects.

This study demonstrates that the Design Thinking method is an effective pedagogical approach to teaching entrepreneurship education in elementary schools and developing young students' entrepreneurial mindset. To achieve the desired results in the classroom, it is very important to train teachers and school management teams so that they would, with a 'high degree of certainty' (De Corte, 2013), support and create learning environments and thus gradually alter the positions on and convictions about teaching and learning. As we have shown, entrepreneurialism can very effectively be taught to adolescents, engendering an entrepreneurial mindset in people's formative years and preparing the track for greater entrepreneurialism within society as these students eventually enter the working world.

References

Bourgeois, A. (2012) Entrepreneurship Education at School in Europe. National Strategies, Curricula and Learning Outcomes. Education, Audiovisual and Culture Executive Agency, Brussels.

Brown, T. (2008) "Design Thinking." Harvard Business Review, Vol 86, No. 6, pp 84.

Carroll, M., Goldman, S., Britos, L., Koh, J., Royalty, A., and Hornstein, M. (2010) "Destination, Imagination and the Fires Within: Design Thinking in a Middle School Classroom." International Journal of Art & Design Education, Vol 29, No. 1, pp 37-53.

Charmaz, K. (2006) Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis. SAGE, Thousand Oaks.

De Corte, E. (2013) Zgodovinski razvoj razumevanja učenja. In: Hanna Dumont, David Istance & Francisco Benavides (eds.), The nature of learning: using research to inspire practice. Zavod RS za šolstvo, Ljubljana.

Elstad, E. and Turmo, A. (2010) Students' self-regulation and teacher's influence in science: Interplay between ethnicity and gender. Research in Science & Technological Education, Vol 28, pp 249–260.

European Commission. (2012) Building Entrepreneurial Mindsets and Skills in the EU. How to Support SME Policy from Structural Funds. Directorate-General for Enterprise and Industry, European Commission, Brussels.

Fayolle, A. (2013) "Personal Views on the Future of Entrepreneurship Education." Entrepreneurship and Regional Development, Vol 25, No. 7-8, pp 692-701.

Frese, M. (2009) "Toward a Psychology of Entrepreneurship: An Action Theory Perspective." Foundations and Trends in Entrepreneurship, Vol 5, No. 6, pp 435-494.

Garavan, T. and O'Cinneide. B. (1994) "Entrepreneurship Education and Training Programmes: A Review and Evaluation – Part 1." Journal of European Industrial Training, Vol 18, No.8, pp 3-12.

Honig, B. and Karlsson, T. (2004) "Institutional Forces And The Written Business Plan." Journal of Management, Vol 30, No. 1, pp 29-48.

Johannisson, B. (2010) Part 4: Or none of it? In the Beginning was Entrepreneurship. In: Bill Frederic, Björn Bjerke & Anders W. Johansson (eds.) (De)Mobilizing The Entrepreneurship Discourse: Exploring Entrepreneurial Thinking and Action. Cheltenham: Edward Eigar Publishing, Cheltenham, pp 201-221.

Katz, J., A. (2003) "The Chronology and Intellectual Trajectory of American Entrepreneurship Education 1876 – 1999." Journal of Business Venturing, Vol 18, No. 2, pp 283-300.

Kelley, T. and Littman, J. (2005) The Ten Faces of Innovation: IDEO's Strategies for Defeating the Devil's Advocate and Driving Creativity Throughout Your Organization. Doubleday, New York.

Kolovelonis, A., Goudas, M. and Dermitzaki, I. (2011) The effect of different goals and self-recording on self-regulation of learning a motor skill in a physical education setting. Learning and Instruction, Vol 21, pp 355–364.

Martin, R. (2007) The Opposable Mind: How Successful Leaders Win Through Integrative Thinking. Harvard Business School Press, Boston.

McGrath, R. and MacMillan, I. (2000) The Entrepreneurial Mindset. Harvard Business School Press, Boston.

Meinel, C., and Leifer, L. (2011) Design Thinking Research. In: Hasso Plattner, Christoph Meinel, Larry Leifer (eds.), Design Thinking: Understand – Improve – Apply. Heidelberg: Springer, pp 32-46.

Neck, H. M., and Greene, P.G. (2011) "Entrepreneurship Education. Known Worlds and New Frontiers." Journal of Small Business Management, Vol 49, No. 1, pp 55-70.

Peterman, N. E. and Kennedy, J. (2003) "Enterprise education: Influencing Students' Perceptions of Entrepreneurship." Entrepreneurship theory and practice, Vol 28, No. 2, pp 129-144.

Rasmussen, E. A. and Sorheim, R. (2006) "Action – Based Entrepreneurship Education" Technovation, Vol 26, pp 185-194.

Rauth, I., Köppen, E., Jobst, B. and Meinel, C. (2010) Design Thinking: An Educational Model Towards Creative Confidence. In: Toshiharu Taura & Yukari Nagai (eds.), Proceeding of the 1st International Conference on Design Creativity. ICDC. London: Springer, pp 1-8.

Sarasvathy, S. D. and Sankaran, V. (2011) "Entrepreneurship as Method: Open Questions for an Entrepreneurial Future." Entrepreneurship Theory and Practice, Vol 35, No. 1, pp 113-135.

PhD Research Papers

Formal Institutional Support for Early-Stage Entrepreneurs: Evidence from Saudi Arabia

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Abstract: The aim of this study is to explore the role of government and private institutions in supporting early stage entrepreneurs in Saudi Arabia. Entrepreneurship has attracted a fair amount of academic attention; however, to date, only little empirical work has explored the relationships between regulatory, cognitive and normative dimensions of the institutional profile, support for entrepreneurship and business performance, and specifically, in the context of early stage entrepreneurs in Saudi Arabia. This study takes a two-stage mixed methods approach to data collection. Quantitative data acquired by an online survey of early stage entrepreneurs (117) will inform a subsequent qualitative stage involving interviewing support institution officials and early stage entrepreneurs in order to gain deeper understanding of support agencies' role towards entrepreneurs and to explore how participants view the process of application for support. The online survey results reveal that finance and consultation are the most used forms of support, while entrepreneurial education is the least used. Respondents were predominantly opportunity entrepreneurs; fewer than 10 per cent established businesses out of necessity. Participants perceived cognitive and normative aspects of support favourably, but expressed considerable uncertainty about aspects of legal and financial support. All types of support, but especially regulatory, have positive influence on business performance of start-ups. Implications from the findings are drawn for the forthcoming qualitative investigation.

Keywords: Early Stage Entrepreneurs, Entrepreneurship, Formal Institutional Support, Saudi Arabia

1. Introduction

In many countries in the world, governments have consciously supported entrepreneurship to promote employment and achieve economic diversification, development and welfare (Schumpeter 1934; Acs and Audretsch 1988; Wennekers and Thurik 1999; Baumol 2002; Acs et al. 2008). Accordingly, many institutional frameworks for entrepreneurship have been developed by various countries (Smallbone et al., 2010).

The Kingdom of Saudi Arabia is among those countries that have sought to encourage entrepreneurship, in order to boost economic diversification and create employment for her youths. The country has therefore created a number of institutions to provide various forms of support for start-up of entrepreneurship and small business.

While there has been substantial research on the roles of institutions, their impact on entrepreneurship and small business has rarely been investigated, especially within the context of developing economies in the Middle East (Ahmad, 2012). More specifically, there is limited research in this direction in the Kingdom of Saudi Arabia, a traditional but rapidly-developing society and one of the richest countries in the Middle East and the world (World Bank Report, 2016). It is therefore of interest to evaluate to what extent the institutional policies and practices introduced by the Saudi Arabian government are succeeding in their aim of promoting entrepreneurship among Saudis and supporting small business start-ups and early-stage performance.

This paper presents an ongoing investigation of Saudi of entrepreneurship, with a focus on formal institutional support. It presents initial results from the first (quantitative) phase of the study and draws implications for the forthcoming qualitative phase.

2. Research questions

This section states the research questions. When thinking about research questions, the researcher certainly has begun to think about the purpose of the research (Saunders et al., 2012:138). The purpose of this research is to gain an understanding of the kinds of entrepreneurship support offered to and taken up by early stage entrepreneurs and their impact on the business with a view ultimately to forming recommendations for enhancing this sector.

Accordingly, the main research question is:

What is the role of formal (government and private) institutional support (finance, training and education, consultation, coaching, mentoring, and networking) for early stage entrepreneurs in Saudi Arabia?

The main question is approached via three sub-questions, as follows:

1. What types of institutional support are used by early stage entrepreneurs in Saudi Arabia?
2. What are the most important reasons for starting a business in the context of Saudi Arabia?
3. To what extent do the **regulatory**, **cognitive** and **normative** support dimensions affect early stage entrepreneurship (business) performance?

3. Entrepreneurship

Entrepreneurship has applications in many fields such as economics, history, sociology, anthropology, finance, marketing and management (Kaufmann and Dant, 1999; Acs and Szerb, 2007; Ahmad and Seymour, 2008; Gutterman, 2012). This has posed difficulty in selecting a suitable definition of entrepreneurship (Cunningham and Lischeron, 1991), and research reflects "the absence of a consistent definition" (Gutterman, 2012:1). Hence, scholars have defined entrepreneurship in different ways.

Schumpeter (1934) viewed the entrepreneur as an innovator who makes positive changes in the economy by bringing new products or services to the market. This makes him one of the first to associate entrepreneurship with innovation (Gutterman, 2012). Cunningham and Lischeron (1991: 46) state that entrepreneurship encompasses "a wide range of activities such as creation, founding, adapting, and managing ventures." Then they continue to say, "No single discipline provides the tools for managing an entrepreneurial venture", and they suggest that it is "not surprising that a consensus has not been reached about what entrepreneurship is" (Cunningham and Lischeron, 1991: 46). Johnson (2001) and Nijkamp (2003: 396) viewed entrepreneurship in similar terms, although this simple view does not fully capture the variety and complexity of entrepreneurship.

One approach to entrepreneurship is to focus on the traits supposedly possessed by entrepreneurs (Venkataraman, 1997). For example, Ahmad and Seymour (2008: 5) state that "the concept of entrepreneurship generally refers to enterprising individuals who display the readiness to take risks with new or innovative ideas to generate new products or services". Other approaches view entrepreneurship as a set of behaviours (Vanderwerf and Brush, 1989; Carree and Thurik, 2003) or functions (Carlsson et al., 2013). Recent definitions feature three main themes: wealth creation (Drucker, 2015) innovation (Gutterman, 2012) and exploitation of opportunity (Shane and Venkataraman, 2000). However, it is also recognized that some entrepreneurs are motivated solely by necessity, especially in developing countries (Thurik et al., 2008; Benzing et al., 2009). A recent trend, moreover, is recognition that entrepreneurship depends on the nature of the national institutional framework and culture (Shane and Venkataraman, 2000; Rauch and Frese, 2000).

4. Institutions and entrepreneurship

Institutions are defined as the "rules of the game in a society", comprising "the humanly devised constraints that shape human interaction" (North, 1990: 3). They may be formal (e.g. constitutional, legal, and organizational frameworks) or informal (e.g. codes of conduct, values, and norms) (Welter and Smallbone, 2011; Hopp and Stephan, 2012). However, this paper is more concerned with the formal institutions, since, as Welter and Smallbone (2011) note, "In all countries, the development of entrepreneurship and the behaviour of entrepreneurs are influenced by the appropriateness and operation of formal institutions" (p. 109). As Hopp and Stephan (2012) point out, government support impacts the likelihood of entrepreneurial success; A supportive institutional environment and availability of resources positively affect entrepreneurs' motivation and self-efficacy and promote positive business outcomes. Acs et al. (2008: 219) noted that the environment, defined as the nexus of economic development and institutions, affects the "quality of governance, access to capital and other resources, and the perceptions of entrepreneurs." Hence, differences in the institutional environment explain why entrepreneurial activities' contributions vary so greatly worldwide. Following Scott (1995), institutions are commonly classified into three dimensions, **regulatory**, **cognitive** and **normative**, which constitute the national institutional profile (Kostova, 1997; Busenitz et al., 2000). The **regulatory** dimensions comprises government-instituted laws and systems, such as taxation (Estrin and Mickiewicz, 2010), property rights (Boettke and Coyne, 2003) and capital market development (Hoskisson et al., 2005) that shape opportunities (Welter and Smallbone, 2011). The **cognitive** dimension refers to shared knowledge, such as

information about how to establish a business (Busenitz et al., 2000). The **normative** dimension refers to societal beliefs and values (Veciana and Urbano, 2008) that determine the legitimacy and desirability of courses of action.

5. Methodology

This paper concerns the first stage of a two-stage mixed methods study. Quantitative data was acquired from an online survey based on Busenitz et al. (2000), sent to 447 early stage entrepreneurs who have used support programmes in Saudi Arabia, with a valid response rate of 27 per cent (*n = 117*). 25 per cent of respondents were female. The survey elicited information on types of support accessed by participants, and their motivations for starting a business. It also captured perceptions (measured on 5-point Likert scales from 1: strongly disagree to 5: strongly agree) on features of the three dimensions of the Saudi institutional profile.

Participants were also asked to rate the performance of their business (net profit, sales volume, cash flow and company value) since commencement, relative to expectation. Questions 1 and 2 were answered via descriptive statistics, Question 3 by Pearson product- moment correlation test and correlation coefficients.

6. Results

RQ1 – Types of support
Participants were asked to identify all types of support that they used. Table 1 shows the outcomes; as percentages of all responses.

Table 1: Types of support used by entrepreneurs

Support type	**%**
Finance	45.3
Training	20.5
Education	10.3
Consultation	47.9
Coaching	27.4
Mentoring	22.2
Networking	35.9

The data reveal that finance and consultation were the most use types of support, each being used by almost half the respondents. Networking was also relativity widespread, reported by over a third of respondents. The least used form of support was entrepreneurial education, raising questions as to the availability of such support, or why, if it is available, it is not taken up by entrepreneurs.

RQ 2 - Reasons for starting a business
Participants were asked to identify their main reason for setting up their current business. The responses are reported in Table 2.

Table 2: Most important reason to start-up

Most important reason to start-up	**Percent**
-To take advantage of support provided to entrepreneurs	13.7
-To take advantage of an opportunity	26.5
-No better choice (i.e. Out of necessity. E.g. Unemployment)	9.4
-Combination of the first two options above	20.5
-Employed, but seek additional sources of income	24.8
Others (please state)	5.1
Total	100.0

The responses show that very few respondents were necessity entrepreneurs, setting up a business because they had no alternative or better means of livelihood. The largest concentrations were those who founded a business to take advantage of an opportunity, or to supplement their income, each declared by about a quarter of respondents. Only 13.5 per cent set up a business specifically to take advantage of government support, although this was a contributing factor for a further 20 per cent, who reported a combined motivation. This means that overall, government support was a factor in the business foundation for a third of the entrepreneurs surveyed.

RQ 3 – Relationship between regulatory, cognitive and normative dimensions and early stage business performance

Table 3 shows perceptions of the three dimensions of support. Participants perceived the normative dimension of support favourably, but mean scores below 3.0 for items (4 to 7) and (11 and 12) indicate considerable disagreement with these items; there were high levels of uncertain responses for several of these items.

Table 3: Provision (country profile) of institutional support - Regulatory, cognitive and normative dimensions

Item number	Item	Mean
	The regulatory dimension	
1	Saudi Arabian government sponsors individuals starting their own business	**3.50**
2	In Saudi Arabia, there is sufficient financial support available for new start-ups	**3.32**
3	New and innovative businesses can get easy loans from financial institutions	**3.04**
4	There are sufficient subsidies available from entrepreneurship sponsors for new firms	**2.56**
5	State laws (rules and regulations) are favourable to starting and running a new business	**2.72**
6	The government provides legal protection to most newly-created businesses	**2.72**
7	All property rights are clear and protected by law	**2.82**
	The cognitive dimension	
9	Individuals know how to legally register and protect a new business	**3.43**
10	Those who intend to start a new business know how to manage risk	**3.36**
11	Most people know where to find information about markets for their products	**3.45**
12	University and college education provides adequate entrepreneurship education	**2.34**
13	Universities and other learning institutions provide advisory and development support for a new business	**2.54**
	The normative dimension	
15	Saudi society at large welcomes new venture creation	**3.72**
16	Innovative and creative thinking is viewed as the route to success	**4.21**
17	Entrepreneurs in Saudi Arabia are seen as successful role models	**3.92**

Table 4 shows the mean scores for participants' ratings of their business performance, as worse than, the same as, or better than expected.

Table 4: Business performance

Item number	**Business performance**						
	Item	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Mean**
1	With regard to net profit (Sales minus operational cost) situation is	8	15	47	35	12	**3.24**
2	In regard to development of sales (change or growth in the volume of sales) situation is	2	21	50	36	8	**3.23**
3	In regard to Cash flow (inflows minus outflow of money) situation is	2	27	50	32	6	**3.11**
4	In regard to growth of the company's value (Net Asset) situation is	8	18	40	41	10	**3.23**

The correlations between the regulatory, cognitive and normative dimensions of the institutional profile of Saudi Arabia and the early-stage entrepreneurs' business performance show that both formal and informal institutional support are related positively to the business performance of start-ups. However, the regulatory (formal) dimension is somewhat more influential than the cognitive and normative (informal) dimensions (accounting for 11 per cent and 8 per cent respectively, of the variance in business performance ratings, see table 5).

Table 5: Correlations

Correlations test		Bus_Performance
Regulatory_Dim	Pearson Correlation	.329**
	Sig. (2-tailed)	.000
	N	117
Informal_Dim	Pearson Correlation	.280**
	Sig. (2-tailed)	.002
	N	117

**. Correlation is significant at the 0.01 level (2-tailed).

7. Discussion and Conclusion

Initial data has been reported from a survey conducted as part of an ongoing investigation of formal institutional support for entrepreneurship in Saudi Arabia. The percentage of female participation is promising in the context of Saudi Arabia, and may reflect the role of technology in facilitating the process of starting up and conducting business easier by affording women means of engaging in business despite the cultural constraints preventing direct interaction with men other than relatives.

The results indicate that participants tended to be opportunity rather than necessity driven. Availability of institutional support was a factor in around a third of start-ups. However, the low proportion of respondents using educational support, the high levels of uncertainty regarding many regulatory and education-related items, and the weak relationships between institutional dimensions and business performance raise potential issues for further investigation. Questions arise as to the adequacy of the kinds of support and protection available, and participants' awareness of and confidence in them. Such issues will be explored qualitatively in forthcoming interviews with support organisation officials and early-stage entrepreneurs.

This research contributes to fill a number of gaps in extant literature, particularly with regard to entrepreneurship in a non-Western, developing country context. The insights derived from the under-researched context of Saudi Arabia will help to enrich the entrepreneurship literature and add to understanding of how context-specific institutional factors may influence entrepreneurial success.

References

Acs, Z.J. and Audretsch, D.B. (1988) 'Innovation in large and small firms: an empirical analysis.' The American Economic Review, 78 (4), pp. 678-690.

Acs, Z.J., Desai, S. and Hessels, J. (2008) 'Entrepreneurship, economic development and institutions.' Small Business Economics, 31 (3), pp.219-234.

Acs, Z., and Szerb, L. (2007) 'Entrepreneurship, economic growth and public policy.' Small Business Economics, 28 (2/3), pp. 109–122.

Ahmad, N. and R. G. Seymour (2008) 'Defining Entrepreneurial Activity: Definitions Supporting Frameworks for Data Collection.' OECD Statistics Working Papers, 2008/01, OECD Publishing. http://dx.doi.org/10.1787/243164686763(Accessed 7 February, 2015).

Ahmad, S. Z. (2012) 'Micro, small and medium-sized enterprises development in the Kingdom of Saudi Arabia: Problems and constraints', World Journal of Entrepreneurship, Management and Sustainable Development, 8 (4), pp.217 - 232

Baumol, W.J. (2002) The free-market innovation machine: Analyzing the growth miracle of capitalism. New Jersey: Princeton University Press.

Benzing, C., Chu, H. M., and Kara, O. (2009) 'Entrepreneurs in Turkey: A factor analysis of motivations, success factors, and problems.' Journal of Small Business Management, 47(1) pp. 58-91.

Boettke, P. J., and Coyne, C. J. (2003) 'Entrepreneurship and development: Cause or consequence?.' In Austrian Economics and Entrepreneurial Studies, 6 pp. 67-87.

Busenitz, L.W., Gómez, C., Spencer, J.W., (2000) 'Country Institutional Profiles: Unlocking Entrepreneurial Phenomena,' Academy of Management Journal, 43 (5) pp. 994-1003.

Carlsson, B., Braunerhjelm, P., McKelvey, M., Olofsson, C., Persson, L., and Ylinenpää, H. (2013) 'The evolving domain of entrepreneurship research.' Small Business Economics, 41(4) pp. 913-930.

Carree, M. A., and Thurik, A. R. (2003) 'The impact of entrepreneurship on economic growth.' In Handbook of entrepreneurship research (pp. 437-471). New York: Springer.

Cunningham, B., and Lischeron, J. (1991) 'Defining Entrepreneurship.' Journal of Small Business Management, 29, 1:1991

Drucker, P. F. (2015) Innovation and entrepreneurship: practices and principles. New York: Routledge.

Estrin, S., and Mickiewicz, T. (2010) Entrepreneurship in transition economies: The role of institutions and generational change. IZA discussion paper. 4805.

Gutterman, A. S. (2012) Definitions of entrepreneurship. In organizational management and administration: A guide for managers and professionals. Thomson Reuters/West.

Hopp, C. and Stephan, U. (2012) 'The influence of socio-cultural environments on the performance of nascent entrepreneurs: Community culture, motivation, self-efficacy and start-up success.' Entrepreneurship & Regional Development, 24 (9-10) pp. 917-945

Hoskisson, R. E., Johnson, R. A., Tihanyi, L., and White, R. E. (2005) 'Diversified business groups and corporate refocusing in emerging economies.' Journal of Management, 31 (6) pp. 941-965.

Johnson, D. (2001) 'What is innovation and entrepreneurship? Lessons for large organisations.' Industrial and Commercial Training, 33 (4) pp.135-140

Kaufmann, P.J., and Dant, R.P. (1999) 'Franchising and the Domain of Entrepreneurship Research.' Journal of Business Venturing, 14, pp. 5-16.

Kostova, T. (1997) 'Country institutional profiles: Concept and measurement.' Academy of Management Proceedings, 1, pp. 180-184

Nijkamp, P. (2003) 'Entrepreneurship in a Modern Network Economy.' Regional Studies, 37 (4) pp.395-405.

North, D. C. (1990) Institutions, institutional change and economic performance. Cambridge University Press.

Rauch, A., and Frese, M. (2000) 'Psychological approaches to entrepreneurial success: A general model and an overview of findings.' International Review of Industrial and Organizational Psychology, 15, pp. 101-142.

Saunders, M, Lewis, P., and Thornhill, A. (eds) (2012) Research Methods for Business Students Edinburgh Gate, Harlow, England: Pearson Education Limited.

Schumpeter, J. A. (1934) Capitalism, socialism, and democracy., New York: Harper.

Scott, W. R. (1995) Organizations and institutions: Foundations for organizational science, Thousand Oaks, CA, USA: Sage

Shane, S., and Venkataraman, S., (2000) 'The promise of entrepreneurship as a field of research.' Academy of Management Review, 25 (1) pp. 217-226.

Smallbone, D., Welter, F., Voytovich, A., and Egorov, I. (2010) 'Government and entrepreneurship in transition economies: the case of small firms in business services in Ukraine.' The Service Industries Journal, 30 (5), 655-670.

Thurik, A. R., Carree, M. A., Van Stel, A., and Audretsch, D. B. (2008) 'Does self-employment reduce unemployment?.' Journal of Business Venturing, 23 (6) pp. 673-686.

Vanderwerf, P. A., and Brush, C. G. (1989) 'Achieving empirical progress in an undefined field.' Entrepreneurship Theory and Practice, 14 (2) pp. 45-58.

Veciana, J. M., and Urbano, D. (2008) 'The institutional approach to entrepreneurship research.' Introduction International Entrepreneurship Management Journal, 4 pp. 364-379.

Venkataraman, S. (1997) 'The distinctive domain of entrepreneurship research.' Advances in Entrepreneurship, Firm Emergence and Growth, 3 (1) pp.119-138

Welter, F., and Smallbone, D. (2011) 'Institutional perspectives on entrepreneurial behavior in challenging environments.' Journal of Small Business Management, 49(1) pp. 107-125.

Wennekers, S. and Thurik, R. (1999) 'Linking entrepreneurship and economic growth.' Small Business Economics, 13 (1) pp. 27-56.

World Bank (2016). The World Bank, Saudi Arabia country program. Available: http://www.worldbank.org/en/country/gcc/brief/saudi-arabia-country-program (Accessed: 26 February 2018).

Financial Literacy Importance for Entrepreneurship: A Literature Survey

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Abstract: In this paper we performed a systematically review of literature on the relationship between financial literacy and entrepreneurship as a way to identify research gaps, suggestions for research proposals, and to prepare empirical works to be implemented in the Mozambican context. For its elaboration we resorted to the bibliographical research of several scientific papers, surveys and empirical literature available. Our findings indicate that entrepreneurship plays a leading role in alleviating poverty, creating new employment opportunities, enabling individuals to make goods and services available, improving their well-being, and improving economic growth and development. Additionally, it was also documented that financial literacy enhances the decision-making process of individuals, allowing for appropriate choices on financial issues. Finally, it was found that financial literacy improves entrepreneurs' skills, making them confident in the decision-making process of savings and financial management of their enterprises. For future research, an empirical work in Mozambique is suggested to verify the relationship between financial literacy and entrepreneurship, considering gender, experience, academic level and training area, by entrepreneurs' activity sector in the three regions (North, Center and South) and a comparison of the results with the studies performed in the neighbouring countries. We finish presenting policy directions regarding how financial literacy may be promoted as a way to ensure entrepreneurship survival and maintenance in the market, to ensure economic growth, employment creation and regional development.

Keywords: Financial Literacy; Entrepreneurship; Decision Making; Savings.

1. Introduction

Entrepreneurship is often viewed as the process that allows individuals or groups to integrate resources and competencies to explore opportunities the environment offers, creating and adding value, with results that include new ventures, products, processes, markets, and technologies. Entrepreneurship responds to some current challenges, such as unemployment, and has been recognized as an important key to sustainable economic development (He, Lu & Qian, 2018). According to Li (2008), although there are several studies on entrepreneurship, it is important to map the course of the studies and develop a tool to guide more studies.

Financial Literacy is assumed to be the skills and knowledge that allow the analysis and understanding of the financial principles needed to make informed judgments and make better financial decisions (Atkinson & Messy, 2012; Taylor & Wagland, 2011). It enables people to weigh all the variables and information as possible, so as to profit from these decisions. In a dynamic and uncertain environment, financial literacy is of great importance, as it will enable individuals to better manage financial resources in order to improve their well-being and of their neighbours (Agnew et al., 2013; Arrondel, Debbich & Savignac, 2013).

Entrepreneurs, who often act intuitively, take a number of risks. Sometimes, due to overconfidence and optimism, they do not weigh all the information that comes to them concerning the business they embrace, and can therefore incur in several losses. Financial literacy performs an important role for entrepreneurs as it gives them the skills to make the judgments they need on the information available and make the most appropriate financial decisions. Entrepreneurship and financial literacy are two issues on the international agenda, since it was assumed that they allowed the efficient use of financial resources. Adequate financial education favours the intelligent selection of financial products, based on informed decisions (Betancourt, 2017; Atandi, Bwisa, & Sakwa, 2017).

Several studies on financial literacy and entrepreneurship have already been conducted in several countries [South Africa (Oseifuah, 2010); Nigeria (Wodi, 2012); Swaziland (Brixiová, Ncube, & Bicaba, 2015); Kenya (Atandi et al., 2017); Portugal (Couto, 2013); Romania (Ignat, 2012); Mexico (Betancourt, 2017); Chile (Maldonado et al., 2017); India (Gawali & Gadekar, 2017); China (He et al., 2018); Malaysia (Ayadurai, 2011)].

In this context, the present study seeks to systematically review the literature on financial literacy and entrepreneurship as a way of preparing an empirical work in the Mozambican context.

2. Methodology

According to Vilelas (2009), a bibliographic research is elaborated from already published material, namely, books, papers and other materials. The research in this paper consisted in the review of several papers that address issues related to entrepreneurship, financial literacy and development.

For the accomplishment of this research it was sought (Vilelas, 2009): to know and explore a set of useful bibliographical sources in the area of entrepreneurship, financial literacy and development, with the use of research in scientific journals; to read the papers considered important for the topic in research, with privileged focus in recent papers; collection of the ideas and findings of previous authors, extracting concrete aspects that embody the present research; comparison and intersection of existing information, establishing divergences and similarities, as well as the position of the author; and preparation of conclusions and proposals for future research ideas.

3. Entrepreneurship and development: opportunities

In the 1970s, the European and North American markets experienced moments of saturation, due to the increasing spread of Japanese models. This, combined with the oil crisis and stagflation, contributed to the reduction of jobs, which gave rise to entrepreneurship (Rosas & Sauaia, 2009). Therefore, entrepreneurship emerged as a way of responding to a problem, creating new forms and procedures different from the usual ones (thus crisis and unemployment drive entrepreneurship).

Entrepreneurship was accepted as the fourth factor of production (after land, labour, and capital). Entrepreneurship must be dynamic, resorting to new sales markets, new processes, new production resources, new products and new types of organization (Dogan, 2015). Entrepreneurship concepts vary depending on the approach and area. Some authors emphasize the economic, sociological, and psychological and management view. However, it must be accepted that entrepreneurship is a multidimensional concept (Bula, 2012).

Schumpeter (1934) states that an entrepreneur is an innovator who makes combinations that give rise to new products, markets, production methods, sources of supply or reorganization of the industry. The combinations made include the introduction of new goods or new production methods; opening up new markets or new sources of supply and new organizations. Therefore, the entrepreneur contributes to generate imbalances in the economy, by breaking with the practices assumed as common and normal, introducing new and original practices.

Gries e Naudé (2011) define entrepreneurship as a process in which individuals use the market opportunities for the creation and development of new businesses. In fact, the entrepreneur must seek to take advantage of the opportunities created by a given situation, resulting from the markets dynamics, to implement new practices with a differential in the value chain.

The Schumpeter concept (1934) differs from the others, by highlighting the issue of innovation. The activities to be considered as entrepreneurs need to modify the common way of producing goods and services and to do business by introducing new knowledge that can innovate and improve well-being. This is the perspective taken as the basis for the realization of this work, considering that the modification of traditional forms of production constitute the basis of entrepreneurship. In the Mozambican context, there is a generalized perception, which leads to the consideration of any commercial activity as an entrepreneur. But, based on the evidence element of innovation, it can be assumed that not all commercial activities qualify as entrepreneurs.

Economic growth results in more opportunities for entrepreneurship, which consequently result in great incentives for entrepreneurs to work on them. Entrepreneurship leads to growth, which ultimately results in greater entrepreneurship. For this reason, entrepreneurship is an important determinant of economic growth.

The start-ups of new firms - entrepreneurial activities - facilitate the externalities of knowledge, which enables greater economic growth (Prieger, Bampoky, Blanco & Liu, 2016). Thus, entrepreneurship has a negative correlation with poverty and a positive correlation with development and employment (Coulibaly, Erbao &

Mekongcho, 2018). The increase of entrepreneurship allows the reduction of poverty. This time, entrepreneurship allows (i) the creation of new jobs, which leads to the reduction of unemployment rates in the economy; (ii) increases Gross Domestic Product (GDP) and Gross National Product (GNP); (iii) it improves the social well-being and the standard of living of the people living in the communities; (iv) allows the availability of goods and services at an acceptable rate; and (v) can improve the level of economic growth and development of a country (Wodi, 2012). In the same perspective, Karadag (2016) affirms that entrepreneurship constitutes a vector of socio-economic development, due to its role in GDP growth (increase in employment rates).

In recent decades, entrepreneurship has become an increasingly important generator of economic development. The contribution of entrepreneurship to economic development is greater in developed countries than in developing countries (Lepojević, Đukić & Mladenović, 2016). Entrepreneurship is considered the engine for economic development (Bubou & Okrigwe, 2011). Thus, emerging and developed economies adopt business incubators to boost new business and technology creation and are responsible for the success of more than 80% of new ventures. Consequently, countries' benefit from various effects: knowledge transfer, job creation and wealth creation (Bubou & Okrigwe, 2011).

Based on the Schumpeterian perspective, Ferreira, Fayolle, Fernandes & Raposo (2017) state that development necessarily involves the introduction of new combinations in the economic life cycle: entrepreneurs launch innovative initiatives that can trigger cyclical discontinuities in the economy. The economic function of entrepreneurship has effects on innovation and the holding of the opportunity that can give rise to entrepreneurship and generate jobs. In the same perspective, Aparicio, Urbano & Audretsch (2016) affirm that it is possible to obtain economic growth by encouraging the increase of entrepreneurship. They affirm that institutions play an important role in explaining entrepreneurial activities. Opportunity-based entrepreneurship fosters economic development, so it is important for policymakers to pay close attention to these issues.

Thus, entrepreneurship can be assumed as a factor leading to economic development in Mozambique. The recognition of this role of entrepreneurship for development is the basis for the approval of Decree No. 09/2009, of December 15, establishing the District Development Fund (FDD). According to number 2 of the aforementioned decree, the FDD aims to boost entrepreneurship in meeting the basic needs of local communities by providing loans. Therefore, these are some evidences of the strategies carried out by the Government in order to boost entrepreneurship and, therefore, development. However, the results of the application of these funds are below the desired level.

4. Financial literacy and development: opportunities

Individuals are confronted with complex financial instruments, seeking to increase their financial security, but many are not properly prepared to make financial decisions. This aroused interest in the knowledge of financial literacy levels. Effectively, financial literacy significantly influences financial decision making. To this end, some countries (Portugal, the United Kingdom, New Zealand, the United States of America, Australia, among many others ...) have begun to stimulate knowledge of financial literacy, and in some of these countries this already constitutes a public policy norm (Huston, 2010; Rahmandoust et al., 2011). In this context, governments and non-governmental organizations promote financial education programs in schools as a means to instill financial behaviours that may persist into adulthood. Those who attend these programs, after nine months, exhibit different financial behaviors, for example improving levels of savings (Berry, Karlan & Pradhan, 2017).

Financial literacy is an input to model the need for financial education and explain the variations in financial gain. Therefore, properly defining and measuring financial literacy is essential to understanding the educational impacts and barriers to making a financial decision (Huston, 2010). Financial education is the process by which financial consumers improve their understanding of financial products and concepts through information, instruction and counselling in order to develop the skills to become more aware of financial risks and make choices to find out where to get help and to make other effective choices to improve their well-being (OECD, 2005). Financial literacy is the ability to make informed judgments and make effective decisions about the use and management of money (Taylor & Wagland, 2011). Financial literacy is the combination of financial awareness, knowledge, skills, attitudes and behaviour required to make a sound financial decision

and achieve financial well-being (Atkinson & Messy, 2012). Financial literacy generally refers to a set of skills that allow people to manage their money wisely, with some understanding of essential financial concepts, not simply the trade-off between risk and return. Financial Literacy is not just about markets and investments, but also about economics, budgeting, financial planning, banking basics, and most importantly about being "Financially Smart" (Bendre & Singh, 2017). Therefore, financial literacy must be seen as more than minimizing risk and maximizing returns. It should be seen as the understanding and practice of financial aspects, which make it easier for holders to make better financial decisions.

Training methods and resources for people with low financial literacy should be adequate and understandable (Rahmandoust et al., 2011). To be financially literate, individuals must demonstrate literacy and skills necessary to make financial choices (Huston, 2010). Financial literacy involves the ability to read and understand financial information, including gains, financial statements, and cash flows (Brown et al., 2006; Samkin et al., 2014). It is from this perception that entrepreneurs may be able to separate profit from revenues, for example, to prevent them from diverting all revenues from their investments and jeopardizing their continuity.

Financial literacy is considered an important complement to promoting financial inclusion, consumer protection and ultimately financial stability. The relationship between financial literacy and financial inclusion is critical to enable any individual to understand the needs and benefits of products and services offered by formal financial institutions. Financial literacy is low in adolescents and adults in general (Agnew et al., 2013).

Specifically, financial illiteracy is more noticeable in women, minorities, and people with low income and with low level of schooling. However, high levels of schooling do not guarantee financial literacy. People who demonstrate high financial literacy or high confidence in their math or personal finance skills have higher financial returns: they resort to low interest rates and plan their savings and reforms (Agnew et al., 2013).

Arrondel et al. (2013) conducted a study in which they found that some population subgroups have lower financial literacy: women, young and old, people with low levels of schooling and are likely to present more difficulties when facing fundamental financial concepts such as diversification, inflation and interest compounds. The level of financial literacy differs between rural and urban areas; old people with low educational level also perform poorly on issues related to financial literacy (Beckmann, 2013). Therefore, financial literacy is positively and significantly related to savings and investments. This leads to the realization that entrepreneurs with high levels of literacy can achieve higher returns on their investments.

Oseifuah (2010) states that the financial literacy literature demonstrates the following skills and knowledge: (i) mathematical knowledge and basic knowledge of numbers; (ii) financial understanding of the nature and forms of money, how it is used and the consequences of consumption decisions; (iii) financial skills such as understanding the main characteristics of banking services, attitudes to spend money and savings, understanding financial records, knowledge of the risks associated with financial products and the risk-return relationship; (iv) financial responsibility, which refers to the ability to make appropriate choices on financial matters.

According to Kabakova and Plaksenkov (2018), there are three configurations of factors that affect financial inclusion: high socio-demographic and political factors in the absence of economic development; high social, technological and economic factors in the absence of political development; and political and economic factors in the absence of social and technological development. This design seeks to relate financial inclusion to ecosystem factors. Focusing on the reality that one intends to study - Mozambique - it will be interesting to understand how these diverse factors affect the financial inclusion.

5. Entrepreneurship and financial literacy: cross causalities

Each entrepreneur or manager needs to have a good level of financial literacy (Eniola & Entebang, 2017). Financial awareness of individuals can be measured from financial planning, financial analysis and control, accounting, understanding of sources of finance, business terminology, finance and information skills, and the use of technology. However, entrepreneurs have a low level of financial awareness (Kumar & Naidu, 2017).

Reality dictates that each entrepreneur owns either a micro, small, or medium enterprise. However, not all have an acceptable level of financial literacy (Eniola & Entebang, 2017). Entrepreneurs' success is strongly associated with their financial literacy. Njoroge (2013) shows that business managed by entrepreneurs with high financial literacy tend to have more successes than others. Entrepreneurs should have basic financial knowledge so that they can manage their projects, resources and by using their skills they should take advantage of the environment opportunities. Understanding financial issues allows the individual greater control over the environment and events that may affect him either directly or indirectly, allowing them to make informed decisions about life's problems (Maldonado et al., 2017).

According to Eniola & Entebang (2017), it is proven that financial literacy can increase the company's performance. However, entrepreneurs' financial knowledge and awareness are not the only requirements for the good performance of their ventures. Bosma & Harding (2006) affirm that the lack of financial literacy, the insufficient acuity in the business, compromises the development of the entrepreneurial activities. Dahmen e Rodriguez (2014) conducted a study focused on entrepreneurs facing financial difficulties and rarely looking for financial information. All admitted that they had financial difficulties and avoided financial advice. This association attests to the strong relationship between financial literacy and business success. Moreover, Kimunduu & Erick (2016) conducted a study that revealed a strong and significant positive relationship between financial literacy and financial performance of entrepreneurs. They concluded that high levels of entrepreneurial financial literacy lead to greater financial performance. Therefore, they recommended the creation of a conscience in the entrepreneurs to value financial education.

Many Small and Medium Enterprises (SMEs) tend to go bankrupt or close their doors shortly after their creation. About 1/3 of SMEs close in their first two years and about half will in less than 4 years. Bankruptcy rates are higher when businesses have fewer workers. Financial issues have been at the root of these company closures (Rahmandoust et al., 2011). Nunoo & Andoh (2012), for Ghana, use a direct measure of financial knowledge to conduct an empirical investigation of the relationship between financial literacy and the use of financial services by SMEs. The results revealed a modest level of financial literacy in small and medium entrepreneurs, and that entrepreneurs with the highest levels of financial literacy used financial services.

Some of the entrepreneurs with low levels of financial literacy hire third parties to take care of the financial aspects of their companies, which increase their costs. But, people with high literacy levels understand fairly the financial aspects of their business. Thus, financial literacy enables them to have confidence that their business will continue to have financial successes and generate profits in the future (Samkin et al., 2014).

It is critical that individuals acquire financial literacy to make more informed decisions. A high level of financial literacy favours the development of entrepreneurs' activities. Financial literacy makes them efficient because it enables them to assess the information they need to make decisions that have ramifications or financial consequences (Brown et al., 2006).

For Nunoo & Andoh (2012) financial literacy is the basis for stimulating entrepreneurship. Entrepreneurs with high levels of financial literacy can save more and manage risks better. Since basic education provides the entrepreneur with basic numeracy skills, this has a positive influence on entrepreneurship where managers have high financial education. In the same vein, Gawali & Gadekar (2017) concluded that accounting and financial knowledge, financial information interpretation skills, entrepreneurs' attitudes and their involvement in financial aspects of the business are largely responsible for the success or failure of enterprises.

Cruz (2012) states that entrepreneurship encompasses the most diverse domains, of which the economic and financial environment can be highlighted, which will allow verifying the feasibility of the business opportunity. The preparation of the business plan involves the preparation of budgets, which undoubtedly require financial knowledge. Oseifuah (2010) points out that financial literacy contributes significantly to improve the skills of entrepreneurs. Atandi, Bwisa & Sakwa (2017) found that financial literacy makes entrepreneurs confident in the process of making savings decisions, which allows them to better financial management. Therefore, they propose that training around financial issues should be provided to entrepreneurs before engaging in financial contacts. Betancourt (2017) states that adequate financial education allows for an intelligent selection of financial products, based on informed decisions (see also OECD, 2017).

6. Conclusion

The present research sought to make a systematic review of the literature on financial literacy and entrepreneurship, as a way of preparing an empirical work in the Mozambican context. It was found that entrepreneurs are those who modify the common form of production of goods and services and do business introducing new knowledge that can innovate and improve well-being. However, in Mozambique there is an extension of this concept, being applied to any commercial activity as an entrepreneur. It is seen that entrepreneurship is an important vector for the development of countries, as it contributes to the creation of new jobs, an increase in the availability of goods and services, GDP and GNP, improves social welfare and standard of living of people, alleviates poverty, and improves the level of economic growth and development of a country. These foundations have boosted the Mozambican government to finance entrepreneurship through FDD since 2009.

It was found that financial literacy presupposes the ability to read, analyze, manage and discuss financial issues that allow economic well-being to the individual. It ensures the understanding and practice of financial aspects, which make it easier for individuals to make better financial decisions. Therefore, financial education should be considered as a long-term and repetitive process. Financial education is a means of empowering individuals with financial literacy.

Entrepreneurs should have basic financial knowledge so that they can manage their projects, resources and by using their skills they should take advantage of the opportunities of the environment. Financial literacy makes entrepreneurs confident in the process of making savings decisions, which allows them to perform better financial management.

Given these findings, it would be interesting to create public policies conducive to the massification of financial literacy in formal education and to entrepreneurs. These policies would ensure the development of skills that enable understanding of key financial concepts, namely, markets, investments, economics, budgeting, financial planning, banking basics, which will allow wise money management. By way of this it would be possible to contribute to the improvement of the well-being of individuals and the reduction of poverty.

It is suggested to carry out research that tries to attest to the tripartite relationship: entrepreneurship, financial literacy and innovation. From the literature review it was not possible to find research that relates, simultaneously and directly, these three variables. Equally, it would be interesting to measure the level of financial literacy of entrepreneurs in Mozambique and compare it with those of neighbouring countries and to map the main financial problems in order to allow a concrete plan of action (policies) to be developed that would minimize these problems. For this study it would be important to analyse the influence of gender, experience, academic level and training area, activity sector and regional differences (North, Center and South). It would also be interesting to understand how ecosystem factors affect financial inclusion.

References

Agnew, J. R., Bateman, H., & Thorp, S. (2013). Financial Literacy and Retirement Planning in Australia. Numeracy, 6(2).

Aparicio, S., Urbano, D., & Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship and economic growth: panel data evidence. Technological forecasting and social change, 44(102), 0–46.

Arrondel, L., Debbich, M., & Savignac, F. (2013). Financial Literacy and Financial Planning in France. Numeracy, 6(2).

Atandi, F. G., Bwisa, H., & Sakwa, M. (2017). Improving Savings Mobilization of Micro and Small Enterprises through Entrepreneurial Financial Literacy. International Journal of Academic Research in Business and Social Sciences, 7(2), 386–403.

Atkinson, A., & Messy, F. (2012). Measuring Financial Literacy: Results of the OECD/International Network on Financial Education (INFE) Pilot Study (No. 15) (Vol. 15).

Ayadurai, S. (2011). Corporate Entrepreneurship Engagement In Corporate Organisations In. Business and Management Review, 1(5), 17–23.

Beckmann, E. (2013). Financial Literacy and Household Savings in Romania. Numeracy, 6(2).

Bendre, A., & Singh, V. (2017). Financial Literacy Paving way for Financial Inclusion in India. International Journal of Engineering Technology Science and Research, 4(12), 359–370.

Berry, J., Karlan, D., & Pradhan, M. (2017). The Impact of Financial Education for Youth in Ghana. World Development, 102, 71–89. Betancourt, I. O. (2017). Entrepreneurial Culture and Financial Education Between Students of the Veracruzana University , Veracruz Region, 9563(2008), 64–70.

Bosma, N., & Harding, R. (2006). Global entrepreneurship monitor: GEM 2006 summary results. London.

Brixiová, Z., Ncube, M., & Bicaba, Z. (2015). Skills and Youth Entrepreneurship in Africa: Analysis with Evidence from Swaziland. World Development, 67(204), 11–26. https://doi.org/10.1016/j.worlddev.2014.09.027

Brown, R. B., Saunders, M. N. K., & Beresford, R. (2006). You Owe It To Yourself: The Financially Literate Manager. Accounting Forum, 30(2), 179–191.

Bubou, G. M., & Okrigwe, F. N. (2011). Fostering Technological Entrepreneurship for Socioeconomic Development: A Case for Technology Incubation in Bayelsa State, Nigeria. Journal of Sustainable Development, 4(6), 138–149. Bula, H. O. (2012). Evolution and Theories of Entrepreneurship: A Critical Review on the Kenyan Perspective. International Journal of Business and Commerce, 1(11), 81–96.

Coulibaly, S. K., Erbao, C., & Mekongcho, T. M. (2018). Economic globalization, entrepreneurship, and development. Technological Forecasting and Social Change, 127(September 2017), 271–280.

Couto, F. M. G. (2013). Literacia Financeira e Empreendedorismo em Portugal. Universidade do Porto.

Cruz, A. I. B. da. (2012). Inter-relação empreendedorismo e literacia financeira: contributos para o desenvolvimento regional (No. 14). Setúbal.

Dahmen, P., & Rodriguez, E. (2014). Financial Literacy and the Success of Small Businesses: An Observation from a Small Business Development Center. Numeracy, 7(1), 1–12.

Dogan, N. (2015). The Intersection of Entrepreneurship and Strategic Management: Strategic Entrepreneurship. Procedia - Social and Behavioral Sciences, 195, 1288–1294.

Eniola, A. A., & Entebang, H. (2017). SME Managers and Financial Literacy. Global Business Review, 18(3), 559–576.

Ferreira, J. J., Fayolle, A., Fernandes, C., & Raposo, M. (2017). Effects of Schumpeterian and Kirznerian entrepreneurship on economic growth: panel data evidence. Entrepreneurship and Regional Development, 29(1–2), 27–50.

Gawali, R. B., & Gadekar, A. (2017). Financial Management Practices in Micro, Small and Medium Enterprises-An Exploratory Analysis with the help of Literature Review. International Journal of Research in Finance and Marketing (IJRFM), 7(6), 45–59.

Gries, T., & Naudé, W. (2011). Entrepreneurship and human development: A capability approach. Journal of Public Economics, 95, 216–224.

He, C., Lu, J., & Qian, H. (2018). Entrepreneurship in China, (December 2017).

Huston, S. J. (2010). Measuring Financial Literacy. Journal of Consumer Affairs, 44(2), 296–316.

Ignat, R. (2012). Premises and Challenges of Entrepreneurship in Romanian Rural Areas. Economia. Seria Management, 15(2), 1–13.

Kabakova, O., & Plaksenkov, E. (2018). Analysis of factors a ff ecting fi nancial inclusion : Ecosystem view, (June 2017).

Karadag, D. H. (2016). The Role of SMEs and Entrepreneurship on Economic Growth in Emerging Economies within the Post-Crisis Era: an Analysis from Turkey. Journal of Small Business and Entrepreneurship Development, 4(1), 22–31.

Kimunduu, G., & Erick, O. (2016). A Study On The Influence Of Financial Literacy On Financial Performance Of Small And Medium Enterprises In Ruiru Town , Kiambu County , Kenya. International Journal of Economics, Commerce and Management, IV(11), 416–433.

Kumar, A. A., & Naidu, K. (2017). Financial Literacy awareness among SME ' s in Western Division of Fiji. International Journal of Educational Research, 1(3), 12–27.

Lepojević, V., Đukić, M. I., & Mladenović, J. (2016). Entrepreneurship and Economic Development: a Comparative Analysis of Developed and Developing Countries. Economics and Organization, 13(1), 17–29.

Li, L. (2008). A review of entrepreneurship research published in the hospitality and tourism management journals. Tourism Management, 29, 1013–1022.

Maldonado, J. S., Coria, M. D., Calderón, L. O., Criado, N., Mendoza, J., Salazar, P., & Yung, G. (2017). Personal EntrepreneUrial Characteristics and Economic Literacy: a Comparison between University Students of Southern Chile. Interdisciplinaria, 34(1), 107–124.

Njoroge, R. M. (2013). Relationship between Financial Literacy and Entrepreneural Sucess in Nairobi - Kenya. University of Nairobi.

Nunoo, J., & Andoh, F. K. (2012). Sustaining Small and Medium Enterprises through Financial Service Utilization: Does Financial Literacy Matter? Agricultural & Applied Economics Association's 2012 AAEA, 12(14).

OECD. (2017). Financial education for micro, small and medium-sized enterprises in Asia.

OECD. (2005). Improving Financial Literacy: Analysis of Issues and Policies. Paris, France.

Oseifuah, E. K. (2010). Financial literacy and youth entrepreneurship in South Africa. African Journal of Economic and Management Studies, 1(2), 164–182. https://doi.org/10.1108/20400701011073473

Prieger, J. E., Bampoky, C., Blanco, L. R., & Liu, A. (2016). Economic Growth and the Optimal Level of Entrepreneurship. World Development, 82, 95–109. https://doi.org/10.1016/j.worlddev.2016.01.013

Rahmandoust, M., Shah, I., Norouzi, M., Hakimpoor, H., & Khani, N. (2011). Teaching Financial Literacy to Entrepreneurs for Sustainable Development. International Journal of Sustainable Development, (2), 61–66.

Rosas, A. R., & Sauaia, A. C. A. (2009). Modelo Conceitual de Decisões no Estágio de Criação de um Negócio : Base para Construção de um Simulador para Jogos de Empresas. Revista de Administração Contemporânea - RAC, 13(4), 663–682. Obtido de www.anpad.org.br/rac

Samkin, G., Pitu, E., & Low, M. (2014). Identifying the Financial Literacy Skills Necessary to Run a Small New Zealand Business. e-Journal of Business Education & Scholarship of Teaching, 8(1), 44–66.

Schumpeter, J. A. (1934). The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle. Cambridge: Mass: Harvard University Press.

Taylor, S., & Wagland, S. (2011). Financial Literacy : A Review of Government Policy and Initiatives Financial Literacy : A Review of Government Policy and Initiatives. Australasian Accounting Business and Finance Journal, 5(2), 101–125. Obtido de

Vilelas, J. (2009). Investigação: O Processo de Construção do Conhecimento. Lisboa: Edições Sílabo.

Wodi, S. W. (2012). Global Economic Crisis : A Challenge to the Entrepreneurship Development of Technical Vocational Education and Training in Oil and Gas Sector of the Nigerian Economy. International Journal of Academic Research in Business and Social Sciences, 2(4), 1–28.

Entrepreneurial Capability Versus Entrepreneurial Propensity: Why Take the Non-Actors Even More Seriously?

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Abstract: Scholars have moved beyond the view that entrepreneurs are born as entrepreneurs (Gartner, 1988) and the antecedents of entrepreneurial propensity and capability have been broadly researched. Still policymakers are seeking measures (European-Commission, 2013) to develop more entrepreneurs with ambitious, high-growth potential, aiming beyond the mere creation of more entrepreneurs. If not enough suitable candidates respond to this call, then one can wonder why this is the case. It's interesting to note that a group of potential entrepreneurs is possibly being overlooked. As Ramoglou (2011) argued, individuals who possess entrepreneurial abilities might decide not to engage in entrepreneurial behavior even if opportunities and a favorable environment are present. The literature, however, does not provide quantitative data to assess whether passivity of the capable non-actor can be considered to be an exception or not. As a first step to address this issue, this article reviews previous research on the antecedents of entrepreneurial propensity and capability and outlines the number of factors that have similar effects on these both constructs in comparison to the number of factors that have opposite effects on entrepreneurial propensity and capability. We have found a disproportional number of factors that have opposite effects on both constructs. We conclude that an individual who has entrepreneurial capabilities should not be expected to automatically aspire to a career as a founder of a new organization. This is a paradoxical conclusion for some, as they see initiative-taking capacity as an important antecedent of entrepreneurial capability. Our conclusion suggests that this unexploited source of entrepreneurial capability is more sizeable than expected and therefore continued research on the factors that govern the entrepreneurial propensity of entrepreneurially capable individuals is recommended. We close by calling for research to expand existing models on entrepreneurial career transitions in order to explain this paradox.

Keywords: Entrepreneurial capability, Entrepreneurial propensity, Entrepreneurial career transitions.

1. Introduction

"Reigniting the entrepreneurial spirit in Europe" and "Our challenge – More entrepreneurs for Europe" are the title and subtitle of the European Commission's Entrepreneurship 2020 Action Plan (European-Commission, 2013). Striving for more entrepreneurs aligns with entrepreneurial propensity, a first dimension we define in this study as how close an individual is to becoming an active entrepreneur. Qualitatively this dimension ranges from being non-interested, to having different levels of favorable orientations, dispositions, attitudes and desires, and to intending and displaying the actual entrepreneurial behavior. Quantitatively this can be operationalized by the probability that one will become active as an entrepreneur in the coming 5 or 10 years (Kennedy, Drennan, Renfrow, & Watson, 2003).

Together with the call for more entrepreneurs consensus is growing that actions promoting entrepreneurial activity should aim beyond the mere creation of more entrepreneurs (Blanchflower, 2004; Burke, FitzRoy, & Nolan, 2000; Shane, 2009; van Praag & van Stel, 2013). Shane (2009) stresses the need for focusing on start-ups with high growth potential. He recommends that policy makers focus support at fewer but better start-ups, aiming for high entrepreneurial venture performance. However, venture performance is undefined before the venture is founded and certainly, before the entrepreneurial opportunity is identified. As the call for more entrepreneurs addresses individuals before they have started as an entrepreneur, we define entrepreneurial capability as the subset of entrepreneurial performance that is fully attributable to the individual even in the absence of any entrepreneurial opportunity, propensity or activity. Therefore, if one pursues more high performance entrepreneurship, it seems reasonable to call for the activation of non-entrepreneurs who are positioned high on the entrepreneurial capability dimension. Baum, Locke, and Smith (2001) report on the capabilities of ventures' CEOs as direct and indirect predictors of venture growth.

If not enough suitable candidates respond to this call to found a new business, then one can wonder why this is the case. The literature, however, does not provide quantitative data to assess whether passivity of the capable non-actor can be considered to be an exception or not. As a first step to address this issue, this article

reviews previous research on the antecedents of entrepreneurial propensity and capability and investigates which antecedents have similar effects on both constructs and which antecedents have opposite effects on both constructs.

2. Methodology

In order to determine the most researched antecedents related to entrepreneurial capability and propensity, we searched for literature review papers on entrepreneurship research in the Web of Science and the Business Source Premier databases (July 2015). We identified the 4 meta-analytic reviews that provide the longest lists with researched items related to entrepreneurial capability and propensity (Jain & Ali, 2013; Jain, 2011; Rauch & Frese, 2007; Unger, Rauch, Frese, & Rosenbusch, 2011). These four papers report on 41, 18, 51 and 42 items respectively. We used the longest list by Rauch and Frese (2007) with 51 personality antecedents as a starting point and then we added experience and education from the review of Unger et al. (2011). This meta-analytic review of human capital and entrepreneurial success shows that education and experience subjects are the most frequently researched items (20 out of 42 items). Finally, we cross-checked with the lists published by Jain and Ali (2013) and Jain (2011) and we added social networking, social intelligence, family background, venture teaming, ability to raise financial capital and utility. Utility covers the needs for money/wealth, social security, recognition and respect. We also combined 6 factors in other items as they are similar or antonyms (Table 1: items 3, 7, 8). We disregarded factors that are not attributable to the individual, like legislation, infrastructure and environmental dynamism. All this resulted in the 53 items in Table 1. In March 2018 we carried out a topic search in the Web of Science database with these 53 items as keywords, each in combination with the search term “entrepren*”. In the third column of Table 1 we recorded how many documents were returned by the Web of Science database. Figure 1 shows a scree plot of the number of documents obtained per item.

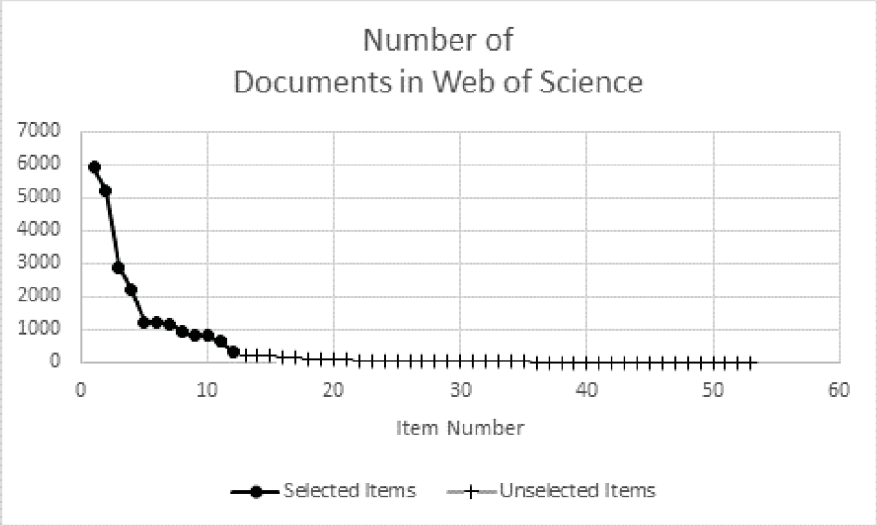

Figure 1: Scree plot of number of documents in Web of Science per antecedent.

As of item 13 the number of documents returned was less than 5% of the number of documents which were returned by the first item. Therefore we selected the first 12 items for further investigation in this study as they cover more than 92% of the returned documents.

Table 1 : Number of documents in Web of Science per antecedent
(1) from (Rauch & Frese, 2007), (2) from (Unger et al., 2011),
(3) from (Jain & Ali, 2013), (4) from (Jain, 2011)

Item Factor Antecedent Nr.	Keywords used combined with "entrepren*" in a topic search in Web of Science (WOS)	Number of documents in WOS (March 2018)	Item Factor Antecedent Nr.	Keywords used combined with "entrepren*" in a topic search in Web of Science (WOS)	Number of documents in WOS (March 2018)
1	Education (2)(3)	5924	28	Extraversion (1)(3)(4)	41
2	Experience (2)(3)	5190	29	Conservatism (1)	34
3	Innovativeness (1)(3)(4) or Originality (1)	2890	30	Goal orientation (1)	28
4	Dominance or Power (need for ... (1))	2183	31	Trustworthy (1)	27
5	Team (venture teaming (3))	1235	32	Neuroticism (1)	24
6	Creativity (1)(4)	1214	33	Endurance (1)	21
7	Self-efficacy (1)(3)(4) and self-confidence/overconfidence and optimism/sceptisism	1162	34	Practicality (1)	19
8	Flexibility or Rigidity or Discipline (1)	946	35	Tenacity (1)	19
9	Independence or Autonomy (need for .. (1) (4))	821	36	Benevolence (1)	15
10	Risk-taking (1)(3)(4)	818	37	Future orientation (1)	14
11	Achievement (need for ... (1)(3)(4))	635	38	Emotional stability (1)	12
12	Utility (need for money/wealth, social security, recognition and respect (4))	331	39	Gratification (delay of (1))	10
13	Ambiguity (tolerance for ... (1)(3)(4)	228	40	Humility (1)	9
14	Openness (to experience (1))	195	41	Expediency (1)	8
15	Passion (for work (1))	192	42	Social intellgence (4)	8
16	Proactiveness (1)	180	43	Stress tolerance (1)	5
17	Finacial capital (abilityyto raise ... (3))	170	44	Type-A behaviour (1)	2
18	Locus of control (internal (1)(3)(4))	121	45	Dogmatism (1)	1
19	Affiliation (need for ... (1))	115	46	Impulsiveness (1)	1
20	Enthusiasm (1)	95	47	Sobriety (1)	0
21	Social networking (3)	92	48	Forthrightness (1)	0
22	Self-esteem(1)	69	49	Shyness (1)	0
23	Aggressiveness (1)	68	50	Tough-mindedness (1)	0
24	Conformity (1)	54	51	Protestant work ethic beliefs (1)	0
25	Self-reliance (1)	46	52	Higher order need strength (1)	0
26	Family background (3) (4)	44	53	Norm orientation (1)	0
27	Conscientiousness (1)	44			

Using these 12 antecedents, we reviewed previous research with specific attention for work that attributes opposite effects with respect to entrepreneurial propensity and entrepreneurial capability. When earlier research was identified as showing an opposite effect, we considered this factor as an antecedent with the potential to explain a paradoxical effect without making quantitative claims on the frequency or size of this effect.

3. Results

In the result section, we summarize the conclusions from our literature review and we infer for every antecedent whether we did or did not find potential for opposite effects.

3.1 Education

Plural literature review papers are available on the effects of education on entrepreneurial propensity and capability. Bae, Qian, Miao, and Fiet (2014) conclude that the research on entrepreneurship education in view of entrepreneurial intentions has yielded mixed results and after controlling for pre-education entrepreneurial intentions, the relationship between entrepreneurship education and post-education entrepreneurial intentions was not significant. Unger et al. (2011) present a meta-analytical review of human capital research in entrepreneurship. They found a small but significant relationship between human capital and success. They report that the relationship is stronger for the outcomes of human capital investments (knowledge / skill) than for the investments themselves (education / experience). Van Praag, Witteloostuijn, and Van der Sluis (2009, p. 2) express the results of their research on a US longitudinal sample with 66,000 person-year observations as follows:

> *"We show that education affects people's decisions to become an entrepreneur negatively. We show furthermore that entrepreneurs have higher returns to education than employees (in terms of the comparable performance measure 'income')".*

We deduce that education shows an opposite effect. Education can be a factor that works against entrepreneurial propensity, but it provides positive effects on entrepreneurial capability

3.2 Experience

According to the meta-analytic review of Unger et al. (2011), experience is an investment in human capital and shows a moderate but favorable effect (r = 0.07) on firm performance. Additionally, task related investments, like start/up, owner, industry specific and management experience, show a higher effect on firm performance (r= 0.11). This is in line with Chandler and Jansen (1992, p. 234), who conclude carefully: "Marginal evidence suggests that a business education and experience in general managerial positions may help to lay the groundwork for a successful entrepreneurial career". However, with respect to entrepreneurial propensity, Zouhar and Lukeš (2013, p. 12) report and explain an opposite effect of industry experience on the chances of starting an operational business: "People with higher industry experience may eventually start only businesses with a higher chance of success and disengage from efforts with low success probability". We conclude that experience can have an opposite effect on entrepreneurial propensity and capability.

3.3 Innovation, need for innovativeness

Frese and Gielnik (2014) show correlations between innovativeness and business creation effects and between innovativeness and business performance effects of respectively r = 0.24 and r = 0.27. Innovativeness is consistently described as an important entrepreneurial ability but also as a reason for starting a business (Jain, 2011). We conclude that innovativeness is an important antecedent for entrepreneurial capability as well as for entrepreneurial propensity. We have not found any research showing an opposite effect.

3.4 Dominance, need for power

Since McClelland (1975), the need for power (nPower), defined as the need to have control over others to influence their behavior, has consistently been seen as a motivator and as an antecedent for entrepreneurial intent (Oosterbeek, van Praag, & Ijsselstein, 2010; Ramsay, Pang, Ho, & Chan, 2017; Van Gelderen & Jansen, 2006). De Vries (1977) analyzes the entrepreneurial personality and covers the link between nPower and entrepreneurial performance. He concludes that optimal performance is to be expected when nPower is moderate (McClelland, 1975) as cited in (De Vries, 1977, p. 39): "High nPower … with ... lack of inhibition or self-control limits their effectiveness as large institution builders in spite of their success in inspiring people in the initial stage of growth of the organization". Van Gelderen and Jansen (2006) add that nPower as driver for autonomy is favorable for setting high growth objectives and performance, but also that nPower acts against delegation and empowerment of personnel. We conclude that high nPower has a favorable effect on entrepreneurial propensity but can have an opposite effect on entrepreneurial performance.

3.5 Entrepreneurial Teams

Ensley, Hmieleski, and Pearce (2006, p. 228) show empirical evidence that shared leadership outperforms vertical leadership of the lone founder CEO. This conclusion is based on the study of more than 200 startups in the USA:

> *"Within this context, the explanatory value of shared leadership goes above and beyond that of vertical leadership. This suggests that high profile cases of prodigal entrepreneurs, whose individual creativity and charisma have led them to fame and fortune, are more myth than reality. If nothing else, the leadership of the principal founder is only part of the story behind most successful startups. It takes the leadership of an array of talented individuals to develop and grow new ventures. This highlights the great importance in selecting and developing top management teams, rather than simply attracting a superstar CEO: It is time to move beyond the moribund myth of the heroic entrepreneur as the sole leader of the firm."*

Cooney (2005) in his editorial on entrepreneurial teams and Klotz, Hmieleski, Bradley, and Busenitz (2014) in their literature review, they agree that on average entrepreneurial teams outperform the lone entrepreneur. However, they also stress the complexity of forming the right team adequate for an entrepreneurial endeavor.

With respect to entrepreneurial propensity and the formation of a founding team Fadul Ramirez (2016, p. 2) concludes: "… that the Founding Team formation process is a highly complex, lengthy, dynamic, random and sequential one". This leaves us with the paradoxical conclusion that entrepreneurial teams perform better but start slower.

3.6 Creativity

In their book "Creativity and Entrepreneurial Performance" Mcmullan and Kenworthy (2016) conclude that creativity correlates positively with entrepreneurial intention, behavior and performance. They underline the robustness of their conclusions with more than 80 references to earlier research, which shows practical and statistical significance across different methods and measurements. Their creativity measures include innovativeness and openness to experience. We conclude that creativity is an important antecedent for entrepreneurial capability as well as for entrepreneurial propensity. We have not found any research showing an opposite effect.

3.7 Self-efficacy, self-confidence, over-confidence and optimism

In their meta-analytic findings Frese and Gielnik (2014) report the highest correlation r = 0.38 between self-efficacy and business creation. This aligns with a high level of convergence in the literature that self-efficacy and perceived behavioral control (Ajzen, 1991) are important antecedents explaining entrepreneurial intent (Boyd & Vozikis, 1994; Chen, Greene, & Crick, 1998; Rauch & Frese, 2007). Although self-efficacy is undoubtedly a strong predictor for entrepreneurial propensity, scholars address the issue that self-efficacy is not necessarily a guarantee of actual entrepreneurial capability. Bayon, Vaillant, and Lafuente (2015) measure perceived and actual entrepreneurial ability in a group of 26,388 respondents in Spain and they report a significant but low correlation of 0.12 between perceived and actual entrepreneurial ability. This illustrates the proposition made earlier by Chen et al. (1998, p. 298): "There may be many individuals who shun entrepreneurial activities not because they actually lack necessary skills but because they believe they do."

More specifically Koellinger, Minniti, and Schade (2007) researched self-confidence and over-confidence. They determine positive correlations $r > 0.50$ ($p<0.01$) between self-confidence and the percentage of established entrepreneurs. This confirms that self-efficacy is a strong predictor for entrepreneurial behavior across countries. However, Koellinger et al. (2007) find negative correlations $r < -0.25$ ($p<0.01$) between self-confidence and the ratio between established and nascent or new entrepreneurs. This ratio is used as a proxy for entrepreneurial performance and underlines that self-confidence can have opposite effects on entrepreneurial propensity and capability. In this respect we also highlight the research of Hmieleski and Baron (2009) on optimism and performance of the entrepreneur. Their study analyzes about 1,000 young firms in the USA and reports negative correlations between optimism of the entrepreneur and firm performance. We conclude that self-efficacy, optimism and self-confidence correlate positively with entrepreneurial propensity, but paradoxically, they are not a guarantee of entrepreneurial capability.

3.8 Flexibility, rigidity and discipline

Even if these key words return 554, 38 and 354 documents respectively from the Web of Science database (March 2018), the number of publications that relate to entrepreneurial propensity and capability is very limited. Various authors agree that the ability of the entrepreneur to adapt to changing conditions, has a positive effect on venture performance (Bingham, Furr, & Eisenhardt, 2014; Bird, 1988). However, we find arguments that this flexibility should go together with an optimal amount of structure, perseverance, rigidity and discipline and that the correlation between structure and performance has an inverse U-shape (Bradley & Cowdery, 2004; Crilly, 2018; Davis, Eisenhardt, & Bingham, 2009). In relation to opportunity selection, too much flexibility can lead to opportunistic entrepreneurial activity. This can be seen as a positive correlation with entrepreneurial propensity as high flexibility increases the chance that an individual will pursue an opportunity. Furthermore, Bingham et al. (2014) explain that more focus and rigidity at opportunity selection in combination with higher flexibility in the execution phase are expected to give the best results. They call this "The opportunity paradox".

3.9 Autonomy, independence

In their meta-analytic study Frese and Gielnik (2014) report a correlation of 0.31 between autonomy and business creation effects and according to Hessels, Van Gelderen, and Thurik (2008, p. 325) "Autonomy or independence is one of the most cited pull factors for starting a business." In their editorial Caliendo and Kritikos (2011) express that "A main driver of entrepreneurship is the need for autonomy". Over the years this

has consistently been supported by multiple authors (Blanchflower, 2004; Sexton & Bowman, 1986). However, there are less favorable conclusions about the link between the need for autonomy and entrepreneurial capability. Mcmullan and Kenworthy (2016, p. 120) explain how the need for independence can hinder the collaborative ability of an entrepreneur:

> *"Collaborative ability. Shane (2003 , p. 99) indirectly suggests that entrepreneurs tend to be disagreeable, difficult people: 'The evidence supports the proposition that people who are friendly, socially conforming, compliant, flexible, trusting, cooperative, forgiving, tolerant, softhearted and courteous are likely to be less entrepreneurial.' He (2003 , pp. 106–107) also indicates that a, '…desire for independence tends to be associated with the likelihood of self-employment.' Interestingly, '…people who have a greater desire for independence actually perform worse at entrepreneurial activities' (Shane 2003, p. 108). It would appear then, that successful entrepreneurs are rather prickly people who happen to know how to act interdependently. It appears that a strong spirit of independence is needed to launch a promising venture, but it may be potentially toxic once the venture is launched. These countervailing tendencies of the independent entrepreneurial personality might be labeled the independence paradox."*

Van Gelderen and Jansen (2006) also address paradoxical effects related to the autonomy motive depending on the underlying sources for the need for autonomy: resistance to bosses and rules; the need to set self-congruent goals; or the need for power and control. These underlying motives can be incongruent with firm growth. We conclude that the need for independence and autonomy is an antecedent that can have opposite effects on entrepreneurial propensity and capability.

3.10 Risk propensity

Risk tolerance is broadly reported as an antecedent for entrepreneurial propensity (Beugelsdijk & Noorderhaven, 2004; Hao, Seibert, & Lumpkin, 2009). The link between risk-taking propensity and entrepreneurial capability and performance is much less clear. Hao et al. (2009) measure an insignificant effect of risk-taking on entrepreneurial performance. They even expect based their study of the literature (p.389) a negative effect on firm performance:

> *"In our view, an 'appetite' for risk propels one to undertake an entrepreneurial venture, but this same proclivity to take risks may be detrimental after the launch of the new venture. This is because, after the initial stage of new venture founding, entrepreneurs are typically required to manage risk very carefully to maximize profitability and preserve the new venture's limited resources. A strong propensity for risk may lead the entrepreneur to gamble firm resources on new and untested products, technologies, markets, or strategies when persistent exploitation of a known competitive advantage would be more effective. Thus, although we expect risk propensity to be positively related to entrepreneurial intentions, we expect it to be negatively related to firm performance."*

Begley and Boyd (1988) also find an insignificant correlation between risk propensity and entrepreneurial performance, however, their data prove a curvilinear effect, showing that maximum return on assets is associated with moderate risk-taking. Delmar (1996, p. 105 110) reports that successful entrepreneurs are capable of managing risk and seem to exercise a certain degree of caution and he concludes that success of a business is attributable to a combination of risk adversity and high motivation to expand the business, which is never without risk. We conclude that risk-propensity is a proven antecedent of entrepreneurial propensity.

However, the effect on entrepreneurial capability can be negative or has at least an inverse U-shape.

3.11 Need for achievement

Since McClelland (1961) discovered that entrepreneurs score high on need for achievement (nAch), scholars have confirmed that nAch is an antecedent of entrepreneurial propensity (Begley & Boyd, 1988; Beugelsdijk & Noorderhaven, 2004; De Vries, 1977). With respect to entrepreneurial capability and entrepreneurial performance scholars also report a positive correlation with nAch (Collins, Hanges, & Locke, 2004; Johnson, 1990; Lee & Tsang, 2001) as cited in (Jain, 2011). We conclude that nAch correlates positively with both entrepreneurial propensity and capability, although the cited literature claims there is a stronger effect on entrepreneurial capability and performance (Collins et al., 2004).

3.12 Utility, need for money/wealth, social security, recognition and respect

Scholars have argued that entrepreneurial choice includes a utility maximizing decision process (Campbell, 1992; Kautonen, van Gelderen, & Tornikoski, 2013; Monsen, Patzelt, & Saxton, 2010; Poschke, 2013). However Van Praag and Versloot (2007, p. 985) find that non-tangible utilities must play a role in order to explain the preference for self-employment as the mean income is not higher than the mean income of employees.

Hartog, Van Praag, and Van Der Sluis (2010) elaborate on this point further and conclude that:

> *"The same individual has a 30% higher return to general ability when active as an entrepreneur than when working as an employee. Nevertheless, the results suggest that the expected earnings levels in entrepreneurship relative to wage employment are higher only for the upper echelon of the general ability distribution. This is due to the fact that, for the average individual, the expected earnings levels in spells of entrepreneurship are lower than in wage employment."*

This shows that the instances of higher entrepreneurial income go together with higher entrepreneurial capability and that the less capable individuals opt for an entrepreneurial career for reasons other than financial reasons. In conclusion this provides another indication that entrepreneurial propensity does not necessarily go together with high entrepreneurial capability and performance.

4. Conclusion

We reviewed the 12 most studied factors related to entrepreneurial propensity and entrepreneurial capability. For three of these factors: need for achievement; innovativeness; and creativity, we did not find references to opposite effects on entrepreneurial propensity and entrepreneurial capability. For the other nine factors, we found research indicating opposite effects on entrepreneurial propensity and capability. This study of the literature does not provide a quantitative proof of significantly negative correlation coefficients. However, if factors like the need for independence, 'self-efficacy, optimism and overconfidence', risk propensity, the need for power, education, experience, teamwork, financial utility, and flexibility all can have opposite influences on entrepreneurial propensity and capability, then it seems reasonable to conclude that entrepreneurial propensity and entrepreneurial capability do not go together automatically. On the contrary, we should expect the opposite: individuals who engage into entrepreneurial activity might possess antecedents that work against optimal entrepreneurial capabilities, whereas individuals who score high on the entrepreneurial capability dimension probably possess antecedents that counteract their intention to choose for active entrepreneurship. Therefore we presume that the passivity of the capable non-actor is not an exception, and that this passivity, which Ramoglou (2011) says should be respected, is not just a choice, it is upheld by the mechanisms that govern entrepreneurial propensity and capability.

5. Discussion and further research

This opposite relationship between entrepreneurial propensity and capability justifies the existence of a considerable group of individuals who miss either capabilities or propensity factors. The less capable active entrepreneurs have been sufficiently caricatured in literature.

> *"Sometimes the same creative energy that drives an entrepreneur has its source in destructive internal needs that can ruin a career or a company. … Many entrepreneurs are misfits who need to create their own environment." (Kets de Vries, 1985).*

However, the group of capable non-actors, should get more attention in further research. Our conclusions support the view that this group are more sizeable than expected and their entrepreneurial capabilities are by definition antecedents of ventures with ambitious high growth potential, which are the kind of entrepreneurial ventures policy makers seek to promote.

Therefore, we call for research into what governs entrepreneurial propensity among individuals who possess strong entrepreneurial capabilities and we call for research on how theory can be extended in order to explain and understand why the same antecedents often have an opposite effect on propensity and capability.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The Relationship Between Entrepreneurship Education and Entrepreneurial Intentions: A Meta-Analytic Review. *Entrepreneurship Theory and Practice, 38*(2), 217-254. doi: 10.1111/etap.12095

Baum, J. R., Locke, E. A., & Smith, K. G. (2001). A Multidimensional Model of Venture Growth. *The Academy of Management Journal, 44*(2), 292-303. doi: 10.2307/3069456

Bayon, M. C., Vaillant, Y., & Lafuente, E. (2015). Initiating nascent entrepreneurial activities: The relative role of perceived and actual entrepreneurial ability. *International Journal of Entrepreneurial Behavior & Research, 21*(1), 27-49.

Begley, T. M., & Boyd, D. P. (1988). Psychological characteristics associated with performence in entrepreneurial firms and smaller businesses. *Journal of Business Venturing, 2*(1), 79-93.

Beugelsdijk, S., & Noorderhaven, N. (2004). Entrepreneurial attitude and economic growth: A cross-section of 54 regions. *The Annals of Regional Science, 38*(2), 199-218. doi: 10.1007/s00168-004-0192-y

Bingham, C. B., Furr, N. R., & Eisenhardt, K. M. (2014). The opportunity paradox. *MIT Sloan Management Review, 56*(1), 29.

Bird, B. (1988). Implementing entrepreneurial ideas: The case for intention. *Academy of management review, 13*(3), 442-453.

Blanchflower, D. G. (2004). Self-Employment: More may not be better. *National Bureau of Economic Research Working Paper Series, No. 10286*. doi: 10.3386/w10286

Boyd, N. G., & Vozikis, G. S. (1994). The influence of self-efficacy on the development of entrepreneurial intentions and actions. *Entrepreneurship Theory and Practice, 18*(4), 63-77.

Bradley, D., & Cowdery, C. (2004). Small business: causes of bankruptcy. *Small Business Advancement National Center, University of Central Arkansas, College of Business Administration, Research Paper*.

Burke, A. E., FitzRoy, F. R., & Nolan, M. A. (2000). When Less is More: Distinguishing Between Entrepreneurial Choice and Performance. *Oxford Bulletin of Economics and Statistics, 62*(5), 565-587. doi: 10.1111/1468-0084.00190

Caliendo, M., & Kritikos, A. (2011). Searching for the entrepreneurial personality: New evidence and avenues for further research.

Campbell, C. A. (1992). A decision theory model for entrepreneurial acts. *Entrepreneurship: Theory and practice, 17*(1), 21-28.

Chandler, G. N., & Jansen, E. (1992). The founder's self-assessed competence and venture performance. *Journal of Business Venturing, 7*(3), 223-236.

Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? *Journal of Business Venturing, 13*(4), 295-316.

Collins, C. J., Hanges, P. J., & Locke, E. A. (2004). The relationship of achievement motivation to entrepreneurial behavior: A meta-analysis. *Human performance, 17*(1), 95-117.

Cooney, T. (2005). What is an entrepreneurial team?

Crilly, N. (2018). 'Fixation'and 'the pivot': balancing persistence with flexibility in design and entrepreneurship. *International Journal of Design Creativity and Innovation, 6*(1-2), 52-65.

Davis, J. P., Eisenhardt, K. M., & Bingham, C. B. (2009). Optimal structure, market dynamism, and the strategy of simple rules. *Administrative Science Quarterly, 54*(3), 413-452.

De Vries, M. F. R. K. (1977). THE ENTREPRENEURIAL PERSONALITY: A PERSON AT THE CROSSROADS. *Journal of Management Studies, 14*(1), 34-57. doi: 10.1111/j.1467-6486.1977.tb00616.x

Delmar, F. (1996). *Entrepreneurial behavior and business performance*: EFI.

Ensley, M. D., Hmieleski, K. M., & Pearce, C. L. (2006). The importance of vertical and shared leadership within new venture top management teams: Implications for the performance of startups. *The leadership quarterly, 17*(3), 217-231.

European-Commission. (2013). Entrepreneurship 2020 Action Plan: Reigniting the Entrepreneurial Spirit in Europe: European Commission Brussels.

Fadul Ramirez, E. M. (2016). Team Entrepreneurship: How do Entrepreneurial Founding Teams Form? An Exploration of the Role of Intuition in Entrepreneurial Founding Team Formation.

Frese, M., & Gielnik, M. M. (2014). The Psychology of Entrepreneurship. *Annual Review of Organizational Psychology and Organizational Behavior, 1*(1), 413-438. doi: 10.1146/annurev-orgpsych-031413-091326

Gartner, W. B. (1988). Who is an Entrepreneur? Is the Wrong Question. *American Journal of Small Business, 12*(4), 11-32.

Hao, Z., Seibert, S. E., & Lumpkin, G. T. (2009). The Relationship of Personality to Entrepreneurial Intentions and Performance: A Meta-Analytic Review. *Journal of Management, 36*(2), 381-404. doi: 10.1177/0149206309335187

Hartog, J., Van Praag, M., & Van Der Sluis, J. (2010). If you are so smart, why aren't you an entrepreneur? Returns to cognitive and social ability: Entrepreneurs versus employees. *Journal of Economics & Management Strategy, 19*(4), 947-989.

Hessels, J., Van Gelderen, M., & Thurik, R. (2008). Entrepreneurial aspirations, motivations, and their drivers. *Small Business Economics, 31*(3), 323-339.

Hmieleski, K. M., & Baron, R. A. (2009). Entrepreneurs' optimism and new venture performance: A social cognitive perspective. *Academy of Management Journal, 52*(3), 473-488.

Jain, R., & Ali, S. W. (2013). A Review of Facilitators, Barriers and Gateways to Entrepreneurship: Directions for Future Research. *South Asian Journal of Management, 20*(3), 122.

Jain, R. K. (2011). Entrepreneurial Competencies: A Meta-analysis and Comprehensive Conceptualization for Future Research. *Vision: The Journal of Business Perspective, 15*(2), 127-152. doi: 10.1177/097226291101500205

Johnson, B. R. (1990). Toward a multidimensional model of entrepreneurship: The case of achievement motivation and the entrepreneur. *Entrepreneurship Theory and Practice, 14*(3), 39-54.

Kautonen, T., van Gelderen, M., & Tornikoski, E. T. (2013). Predicting entrepreneurial behaviour: a test of the theory of planned behaviour. *Applied Economics, 45*(6), 697-707. doi: 10.1080/00036846.2011.610750

Kennedy, J., Drennan, J., Renfrow, P., & Watson, B. (2003). *Situational factors and entrepreneurial intentions.* Paper presented at the 16th annual conference of small enterprise association of Australia and New Zealand.

Kets de Vries, M. F. (1985). The dark side of entrepreneurship.

Klotz, A. C., Hmieleski, K. M., Bradley, B. H., & Busenitz, L. W. (2014). New venture teams: A review of the literature and roadmap for future research. *Journal of Management, 40*(1), 226-255.

Koellinger, P., Minniti, M., & Schade, C. (2007). "I think I can, I think I can": Overconfidence and entrepreneurial behavior. *Journal of Economic Psychology, 28*(4), 502-527. doi: 10.1016/j.joep.2006.11.002

Lee, D. Y., & Tsang, E. W. (2001). The effects of entrepreneurial personality, background and network activities on venture growth. *Journal of Management Studies, 38*(4), 583-602.

McClelland, D. C. (1961). *The achieving society*: Princeton, N.J. : Van Nostrand, [1961].

McClelland, D. C. (1975). *Power: The inner experience*: Irvington.

Mcmullan, R. W. E., & Kenworthy, T. P. (2016). *Creativity and entrepreneurial performance*: Springer.

Monsen, E., Patzelt, H., & Saxton, T. (2010). Beyond Simple Utility: Incentive Design and Trade-Offs for Corporate Employee-Entrepreneurs. *Entrepreneurship Theory and Practice, 34*(1), 105-130. doi: 10.1111/j.1540-6520.2009.00314.x

Oosterbeek, H., van Praag, M., & Ijsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. *European Economic Review, 54*(3), 442-454. doi: 10.1016/j.euroecorev.2009.08.002

Poschke, M. (2013). Who becomes an entrepreneur? Labor market prospects and occupational choice. *Journal of Economic Dynamics and Control, 37*(3), 693-710. doi: 10.1016/j.jedc.2012.11.003

Ramoglou, S. (2011). Who is a 'non-entrepreneur'?: Taking the 'others' of entrepreneurship seriously. *International Small Business Journal, 31*(4), 432-453. doi: 10.1177/0266242611425838

Ramsay, J. E., Pang, J. S., Ho, M.-H. R., & Chan, K. Y. (2017). Need for power predicts career intent in university students. *Journal of Career Assessment, 25*(3), 389-404.

Rauch, A., & Frese, M. (2007). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology, 16*(4), 353-385. doi: 10.1080/13594320701595438

Sexton, D. L., & Bowman, N. (1986). The entrepreneur: A capable executive and more. *Journal of Business Venturing, 1*(1), 129-140.

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small Business Economics, 33*(2), 141-149. doi: 10.1007/s11187-009-9215-5

Unger, J. M., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta-analytical review. *Journal of Business Venturing, 26*(3), 341-358. doi: http://doi.org/10.1016/j.jbusvent.2009.09.004

Van Gelderen, M., & Jansen, P. (2006). Autonomy as a start-up motive. *Journal of Small Business and Enterprise Development, 13*(1), 23-32.

Van Praag, C. M., & Versloot, P. H. (2007). What is the value of entrepreneurship? A review of recent research. *Small Business Economics, 29*(4), 351-382.

van Praag, M., & van Stel, A. (2013). The more business owners, the merrier? The role of tertiary education. *Small Business Economics, 41*(2), 335-357. doi: 10.1007/s11187-012-9436-x

Van Praag, M., Witteloostuijn, A. v., & Van der Sluis, J. (2009). Returns for entrepreneurs versus employees: The effect of education and personal control on the relative performance of entrepreneurs vis-à-vis wage employees.

Zouhar, J., & Lukeš, M. (2013). No Experience? No Problem–It's All about Yourself: Factors Influencing Nascent Entrepreneurship Outcomes. *Ekonomický časopis*(09), 934-950.

Digital B2B-Platforms and How to Find the Right One

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Abstract: Digital platforms have been reshaping the structure of whole industries. While previous developments mainly have taken place within the B2C- or C2C-market, the B2B-market is at the edge of the so-called platform economy. Leading companies are stepping out of their core business and develop their own platforms. Additionally, agile start-ups begin to build platform solutions and services for digital platforms. For most of the SMEs in the machine building industry the development of digital platforms is not a suitable option as it exceeds their know-how and resources by far. These companies tend to participate in existing platforms instead of developing their own platform. The paper at hand presents a methodology that enables companies 1) to analyse which of their products and services are suitable for digital platforms 2) to find fitting digital platforms 3) to evaluate these platforms and 4) to develop an actual platform business model. The findings presented in the paper are the result of various projects with companies of the machine building industry and of over 40 interviews with management personalities within this segment. The results show that the intensity of the transaction and the individualization of products and services determine their suitability for digital platforms. We recognised distinct characteristics that can be used to evaluate platforms and we developed a role model which is the key to design a platform business model. The characteristics can be used within an identified softwaretool to search for suitable platforms. The findings will be of use for leading personalities within the machine building industry. Companies within this industry are put in a position to develop strategies for an advantageous positioning in the future platform economy. Furthermore the findings add a new approach to the well-established methodology toolbox of strategic planning.

Keywords: Digital Platforms; Platform Business Models; Machine Building Industry; B2B-Markets; Platform Economy; B2B-Platforms

1. Digital Platforms and B2B-Markets

The concept of digital platforms or IT-platforms has been the subject of a veritable hype in recent years (Engels et al., 2017). Nowadays, the majority of the biggest companies in the world are platform enterprises or so-called matchmakers (Evans and Schmalensee, 2016). Former well-established enterprises are now dominated by platform enterprises. This change took place in various industries, e.g. the hotel industry. While the previous developments mainly have taken place within the Business-to-Consumer (B2C) or Consumer-to Consumer-market (C2C), the Business-to-Business-market (B2B) is at the edge of the so-called platform economy. Leading companies are stepping out of their core business and develop their own platforms.

Additionally, agile start-ups begin to build platform solutions and services for digital platforms (Libert et al., 2016). Well-known examples are 365FarmNet and ADAMOS. Figure one shows some examples for the historical development of digital platforms in B2C/C2C and B2B-markets.

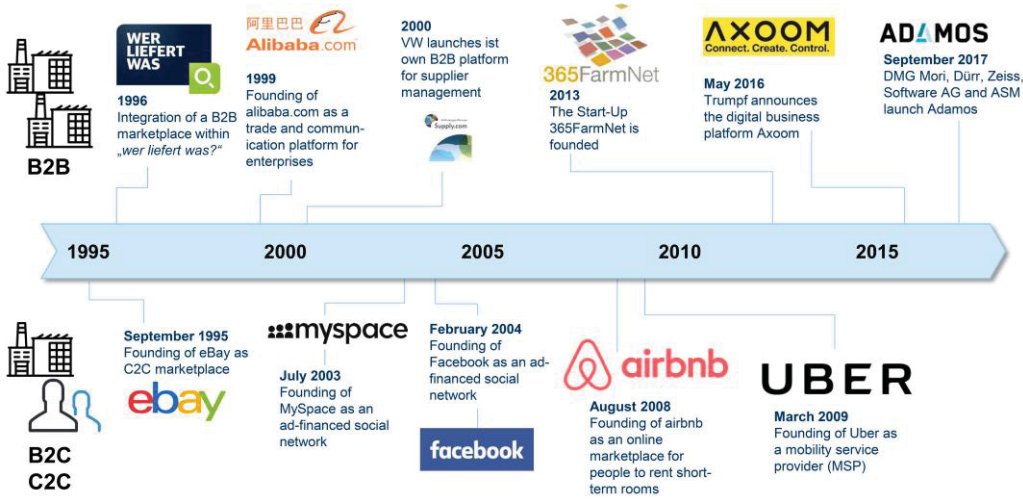

Figure 1: Historical development of digital platforms in B2C/C2C and B2B-markets

The key for the success of digital platforms is the so-called network effect (Alstyne et al., 2016). The network effect describes how the customer value of a product changes when the number of customers of the same product or complementary products changes. A distinction is made between a direct and an indirect network effect. The direct network effect was described in 1986 by Katz and Shapiro and states that a products value changes with the total number of consumers of that product (Katz and Shapiro, 1986). Often referred examples for this effect are telephones and fax machines. Within the context of digital platforms the direct network effect occurs, e.g. on social media platforms such as Facebook. The indirect network effect occurs when the value of a product changes as soon as the number of consumers of another product changes without a direct relationship between these products (Shapiro and Varian, 1998). The indirect network effect is characteristic for two- or multisided markets. Thereby, an increased number of participants on the one side of the market tends to increase the number of participants on the other side of the market. This effect is the driving force behind digital platforms. Positive network effects are the foundation for digital platforms. Thus, the more users a platform has the more attractive it becomes for other users. This is the reason why for each market only a very limited number of platforms can economically exist (Eisenmann et al., 2006).

But what exactly is a digital platform? We define digital platforms as a two- or multi-sided market in which the various players are brought together by an intermediary. Figure two represents the assembly of roles within a digital platform. If the number of producers increases, the platform becomes more attractive for consumers and vice versa. This is referred to as self-reinforcing “chain reactions” which – once initiated – lead to the rapid growth of a digital platform (Eisenmann et al., 2006).

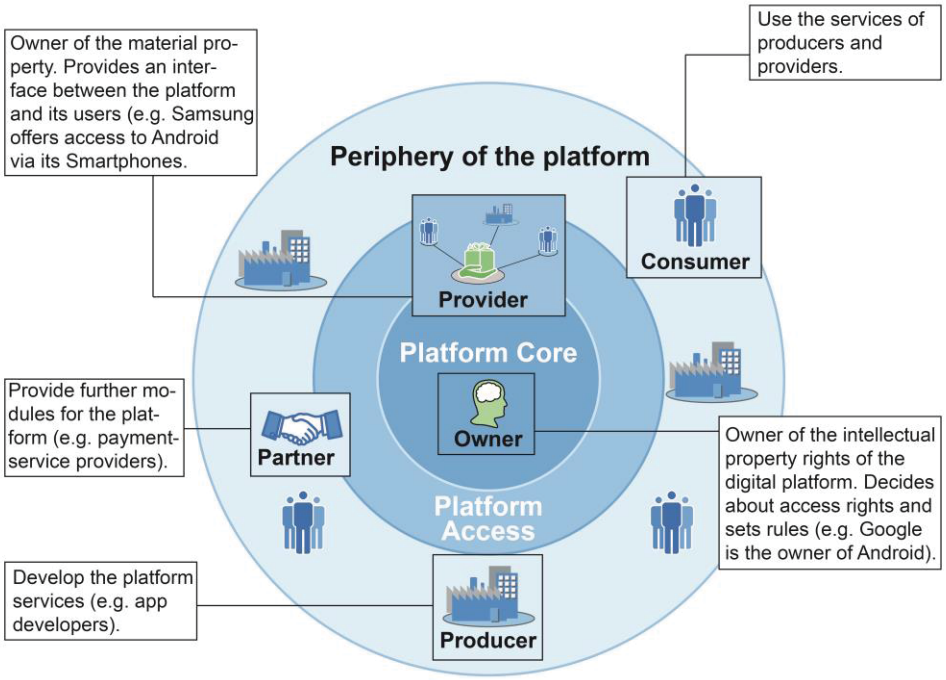

Figure 2: Arrangement of roles within a digital platform (according to Drewel et al., 2017)

The challenges to design such a network effects-based platform are often underestimated by the management (Choudary, 2015). For most of the small and medium enterprises (SMEs) within the machine building industry the development of digital platforms is therefore not a suitable option as it exceeds their know-how and resources by far. These companies tend to participate in existing platforms instead of developing their own platform (Engels et al., 2017). Moreover the majority of new platforms will fail (Morvan et al., 2016) which is not a suitable option for most SMEs. This raises various questions that are discussed within this paper:

1. Which products or services are suitable for digital platforms?
2. Which platforms exist and how can companies find them?
3. How can platforms be evaluated in terms of suitability for access?
4. How can companies develop a business model for digital platforms? In the following chapter a methodology for a strategic entry into digital platforms is presented which helps to answer the four questions above.

2. Methodology for a strategic entry into digital platforms

The paper at hand presents a methodology that consists of four phases, as presented in figure three. In the following, the methodology is going to be presented in detail. The methodology has been validated in projects with a medium-sized German machine-building company (called M.B.C. in the following). However, a project with the German National Academy of Science and Engineering is the foundation for the methodology. Within this project we conducted over 40 interviews with management personalities within the machine building industry. We identified distinct characteristics that can be used to evaluate platforms and we developed a role model which is the key to design a platform business model (Engels et al., 2017). The findings presented in the following chapters will be of use for leading personalities within the machine building industry and enables them to participate in digital platforms. Furthermore the findings add a new approach to the well-established methodology toolbox of strategic planning.

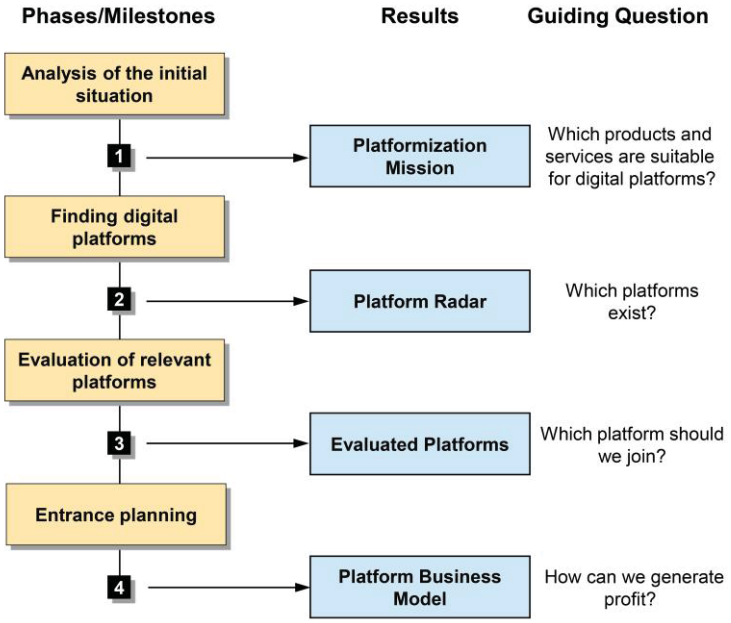

Figure 3: Methodology for a strategic entry into digital platforms

2.1 Analysis of the initial situation

The first step for a strategic entry into digital platforms is an analysis of the initial situation of an enterprise.

Therefore the company's product portfolio needs to be analysed in terms of applicability for a digital platform business model. Our survey revealed that one of the main barriers to enter digital platforms is that companies don't know how to transform their current existing business model into a platform business model. Moreover thinking barriers prevent companies from transforming their business model (Engels et al. 2017). We found that the *Business Model Transformation Board* by Linz et al. can be applied to analyse a company's current dominating business model type. Following Linz et al. the inclusiveness of the transaction and the customization of the offering can be used to differentiate business models. Four business model types can be differentiated: 1) Products, 2) Projects, 3) Solutions and 4) Platforms. If a company wants to transform the business model of one of its offerings it can chose between four different transformation paths (Linz et al., 2017):

1. **Enhancement:** Instead of offering not just a single product, but a comprehensive and integrated offering, companies can enhance their inclusiveness, e.g. by creating a stream of continuous revenue.
2. **Focusing:** To transform a business model from platforms and solutions to products and projects, companies can focus on single products or projects, e.g. by creating unique selling points within single products and solely focus on these products.
3. **Personalization:** Companies can use the personalization-path to tap into new market segments which they cannot serve with their existing mass-produced goods, e.g. by developing the ability to flexibly handle and implement customer requirements.

4. **Standardization:** The transformation towards a standardized business model can make sense once a standard has formed in the market and price competition prevails. This requires some new abilities, e.g. a scalable production.

Figure four shows the results of a project with the above mentioned SME in the machine building industry. We used the *Business Model Transformation Board* to rate the suitability of the current business models within the SME.

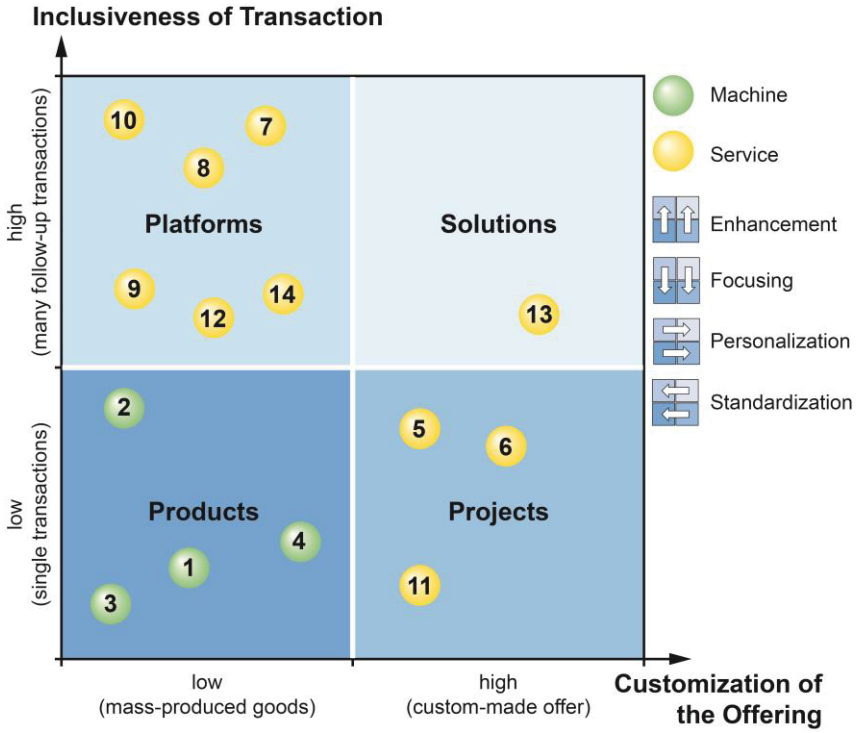

Figure 4: Business Model Transformation Board (according to Linz et al., 2017)

We elaborated that six of the services of M.B.C. are already suitable for a platform business model. Moreover, one machine of the company can be transformed from a product- to a platform business model by slightly enhancing the inclusiveness of transaction. Therefore the company needs to offer not just a single product, but a comprehensive and integrated one. The platformization misson in figure 5 shows the resulting demand for action.

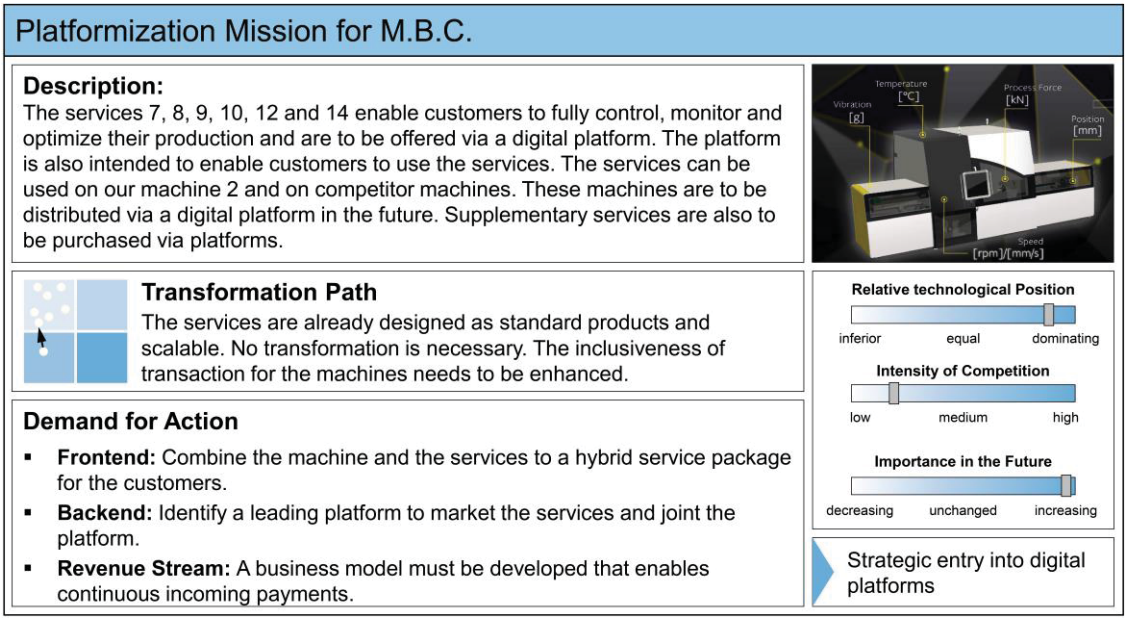

Figure 5: Example for a platformization mission for M.B.C.

The analysis of the initial situation shows that a strategic entry into digital platforms is the most favoured option for M.B.C. Therefore the company needs to adjust the frontend and backend as well as the revenue stream of its machine and services. The following chapter answers the question which suitable platforms exist.

2.2 Finding digital Platforms

A search request needs to be defined to find suitable platforms. Referring to Markides the search request should answer the following three questions which are the structuring elements for this chapter (Markides, 1999):

1. Who is looking for a digital platform?
2. What is the ideal solution?
3. Where can the ideal solution be found?

The **first question** can easily be answered for the presented example. The project team of M.B.C. is looking for a digital platform. In general the competencies of these teams need to fit the task at hand. A detailed description of how a project team is put together is not given here; this can be read at Echterhoff 2014, for example. In our case employees from hardware- and software-development, sales, marketing and in particular the management were involved.

Second question: To focus the search on a digital platform that fits the needs of a searching company it is necessary to know what a company is looking for (Ries, 2011). Therefore digital platforms need to be differentiated by distinct characteristics. While conducting over 40 interviews with management personalities within the machine building industry we found nine features that can be used to differentiate digital platforms, e.g. *Openness*, *Coverage* or *Competition*. Each feature has between two and four characteristics. The *Openness* of a digital platform is determined by the existing balance of power within the platform. *Coverage* addresses the markets that are covered by the platform, e.g. *National*, *European* or *International*. The interviewees revealed, that the presence of a company's *competitors* is a crucial feature for the suitability of a digital platform. While some interviewees stated that they would only enter a platform where their competitors are not involved, others declared that they especially would enter platforms where competitors are participating (Engels et al., 2017). Table one shows an excerpt of the features and characteristics we found. The highlighted characteristics are favoured by M.B.C.

Table 1: Favoured characteristics of digital platforms for M.B.C. (excerpt)

Feature	Characteristic			
Openness	Open	Half-Open	Closed	
Coverage	National	European	International	
Hosting	German-Hosting	European-Hosting	International-Hosting	Own-Hosting
Expandability	None	Low	Medium	High
Type of Platform	Transaction	Innovation	Integrated	Meta
Competition	Should be available	Can be available	Must not exist	

Third Question: The features and characteristics can be applied to search for suitable platforms. The search can be conducted in various ways (desk research, personal contacts, IT-tools). We decided to use the IT-tool KNIME (**K**o**N**stand **I**nformation **M**in**E**r). KNIME is used for data and text mining and is developed by KNIME.com and the Chair for Bioinformatics and Information Mining at the University of Konstanz (KNIME, 2018). Certain terms and their synonyms need to be considered to find suitable solutions, e.g. "digital platform", "IoT-Platform", "Connected Devices", "Smart Services" and so on. The search revealed more than 100 platforms which we than characterized by the features and characteristics presented in table 1. We used some of the features as KO criterions to eliminate inadequate solutions. M.B.C. would for example only choose a platform that is hosted in Germy. This lead to 33 remaining digital platforms which are considerd for an strategic entry.

These remaining platforms are classified in a multidimensional scaling (MDS) by using the features and characteristics mentioned above. The MDS makes it possible to classify platforms into a two-dimensional overview. The favoured characteristics of M.B.C. represent the ideal solution – the so called target platform which doesn't exist in most cases.The distances between the remaining 33 platforms are determined so that similar platforms are close to each other. The goal is to see which remaining platforms are close to the ideal solution. These are the so called relevant platforms (see figure six).

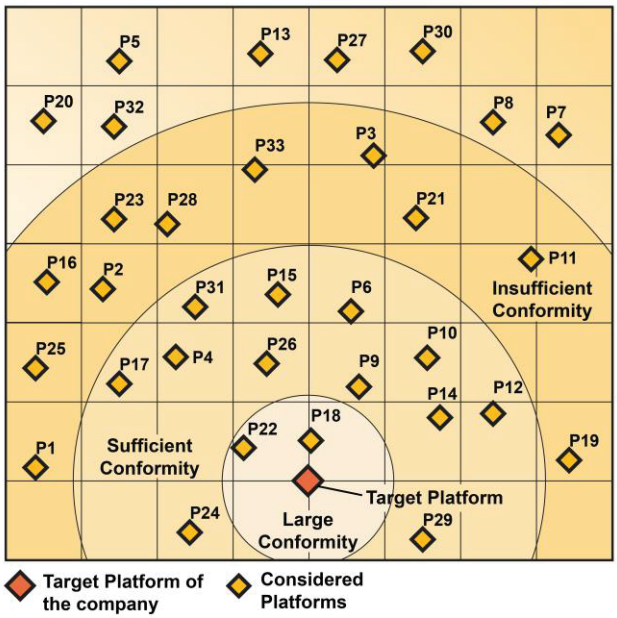

Figure 6: Multidimensional scaling of the remaining digital platforms for M.B.C.

The multidimensional scaling shows that 14 platforms have a large or at least a sufficient conformity to the ideal solution. These relevant platforms are evaluated in the following phase.

2.3 Evaluation of relevant platforms

Once, the relevant platforms are found they need to be evaluated. Therefore the **reachability**, **attractiveness** and the **strategic fit** of the remaining platforms are calculated. This answers the question: *"Which platform should we join?"* Figure 7 shows the result of the evaluation of relevant platforms for the exemplary project.

Reachability: The reachability determines how easily a company can enter a certain digital platform. We found various barriers that prevent companies from entering digital platforms. We use these barriers to evaluate the reachability of platforms. The most significant barrier is the *lack of know-how for platform business models*.

Furthermore, *general uncertainties* and the resulting *fears* are regarded as strong barriers. This was often associated with *thinking barriers* in the workforce and a *restrained approach to acceptable risks*. However, a lack of *willingness to invest* is seen by few experts as an obstacle. *Technological hurdles* are also considered to be of secondary importance. A comprehensive collection of barriers is presented by Engels et al., 2017. First the general importance of the barriers is evaluated, then the expected impact of each barrier for each platform is rated. For example, the lack of know-how for platform business models has a lower impact for a platform that provides a distinct business model for its participants than for a platform that leaves it to its participants to develop their own platform business model. Within our projects we provide a distinct set of barriers to evaluate the reachability. However, for certain cases it can be necessary to evaluate further criterions, e.g. direct costs of using a platform or the organisational expenditures to implement the platform.

Attractiveness: The attractiveness describes the potential market growth for the entering company triggered by the platform. It is crucial to rate the attractiveness by using distinct criterions because for most companies the estimation of how attractive a platform is, is simply not possible (Engels et al., 2017). We use the *market penetration*, *revenue* and *number of participants* of the potential platform as well as the resulting *competitive differentiation* caused by the platform to evaluate the attractiveness.

Strategic fit: We define the strategic fit of a platform as the conformity of entering a certain platform to the corporate strategy. Following Gausemeier and Plass the elements of a corporate strategy are: *corporate mission statement, core competencies, strategic business segments, strategic programs and the corporate culture* (Gausemeier and Plass, 2014). The conformity of entering a certain platform to each element of the corporate strategy is rated to evaluate the strategic fit of the platform.

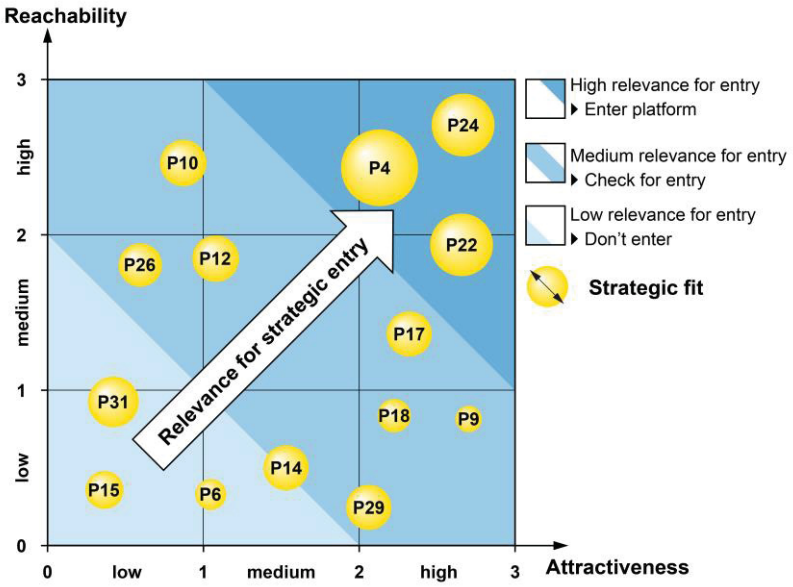

Figure 7: Evaluation of relevant platforms

The evaluation reveals that three platforms have a high relevance for entry. At this point the question whether a company wants to join one platform or more than one platform needs to be answered. M.B.C. decided to join platform 4 and wants to keep platform 22 and 24 in mind for future decisions.

2.4 Entrance planning

Following the evaluation of relevant platforms the actual entrance needs to be planned. Within platforms cooperation is more important than competition (Parker et al., 2016). Therefore, the relations between the various players in the target platform need to be pointed out. Figure 8 represents the arrangement of exemplary players within platform 4.

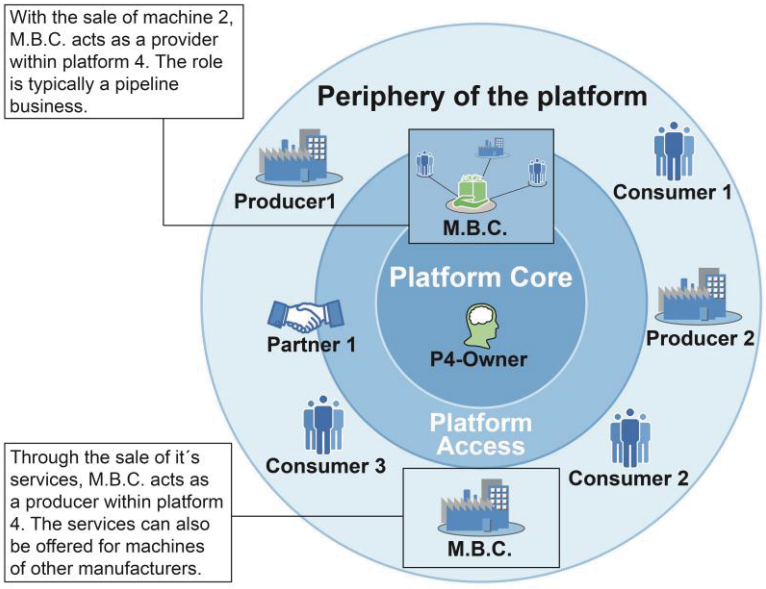

Figure 8: Arrangement of exemplary players within platform 4 for M.B.C.

M.B.C. has the opportunity to continue its historical pipeline business by selling machine 2 as a provider for the platform. Moreover, M.B.C. acts as a provider for the platform by selling services 7, 8, 9, 10, 12 and 14. The services can also be offered for machines of other providers. This enables M.B.C. to implement a complementary platform business model besides it´s currently existing pipeline business model.

As Choudary states a robust business architecture is necessary for a scalable and sustainable platform business model (Choudary, 2015). We therefore propose that once the business architecture is designed (see figure 8) the platform business model needs to be defined. The well established and widely used business model canvas, as provided by Osterwalder and Pigneur (Osterwalder and Pigneur, 2010), is the right tool for representing a pipeline business model, but quickly reaches its limits when visualizing platform business models (Libert et al., 2016). In a pipeline business model, goods are processed along the value chain and sold to one or more customers. However, a digital platform acts as an intermediary between several producers and consumers, as is the case in the example. If these relationships are to be represented in a business model canvas, it often becomes confusing or very superficial. To avoid this, the visualization of M.B.C.s business model is based on Drewel et al. (Drewel et al., 2017). The platform business model, as shown in Figure 9, contains four shells. These are divided into four areas according to the four roles on a digital platform without it´s partners. The outermost level contains the respective players within the roles. The platform's promise of benefit to the players is shown on the third shell. It shows that all players benefit from the platform and is essential for the willingness to join the platform. The recurring exchange of values between the platform and the players can be found on the second shell. This distinguishes between values that flow from the platform to the players and values that flow from the players to the platform. The inner shell contains the core components of the platform.

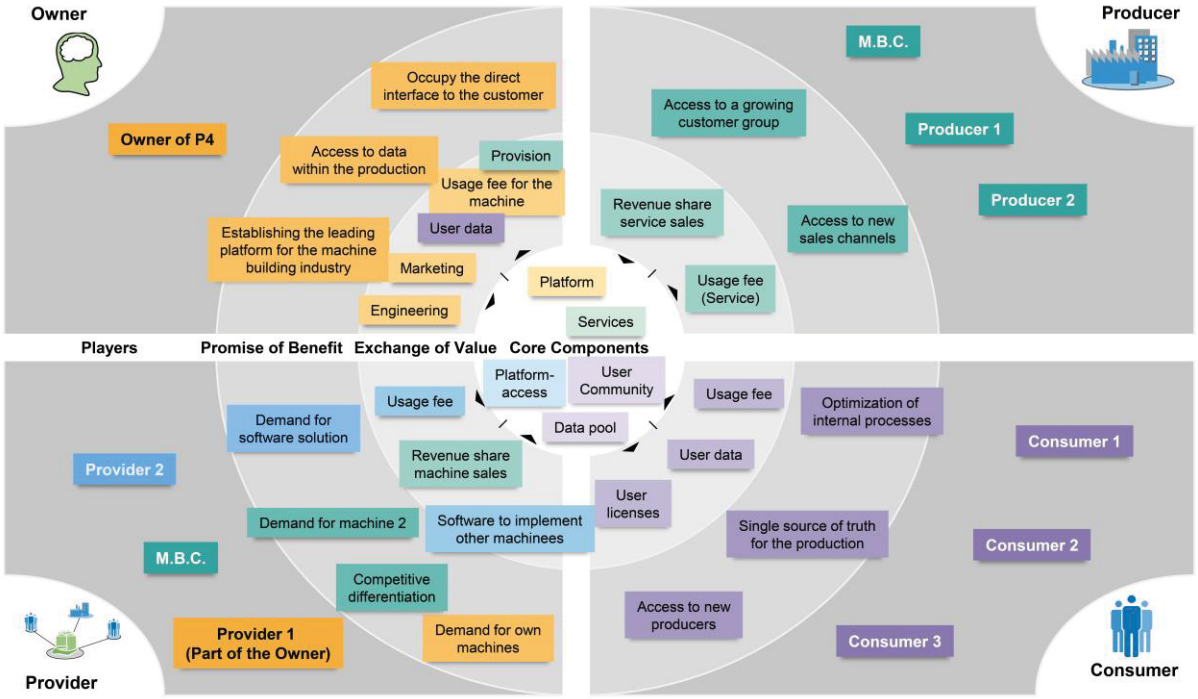

Figure 9: Business model of M.B.C. for platform 4

3. Discussion and Conclusion

The findings represent the results of various projects with companies of the machine building industry and of over 40 interviews with management personalities within this segment. The results show that the intensity of the transaction and the individualization of products and services determine their suitability for digital platforms. We identified distinct characteristics that can be used to evaluate platforms and we developed a role model which is the key to design a platform business model.

The findings will be of use for leading personalities within the machine building industry and enable them to participate in digital platforms. Furthermore the findings add a new approach to the well-established toolbox of strategic planning. However, additional research is necessary to identify approaches to actually build platforms instead of joining existing platforms.

References

Alstyne, M. W., Parker, G. and Choudary, S. P (2016): „Pipelines, Platforms, and the New Rules of Strategy“, Harvard Business Review, April 2016, pp 54-60.

Choudary, S. P. (2015): Platform Scale – How a new breed of startups is building empires with minimum investment, Platform Thinking Labs.

Drewel, M., Gausemeier, J., Kluge, A. and Pierenkemper, C.: „Erfolgsgarant digitale Plattform – Vorreiter Landwirtschaft“, Wissenschafts- und Industrieforum 2017: Intelligente Technische Systeme (WinTeSys), Volume 329, pp 53-67.

Eisenmann, T., Parker, G. and Alstyne, M.: „Strategies for Two-Sided Marktes“, Harvard Business Review, October 2006, pp 92-101.

Engels, G., Plass, C. and Rammig, F.-J. (2017): “IT-Plattformen für die Smart Service Welt“, acatech DISKUSSION, Utz Verlag, München.

Evans, D. S. and Schmalensee, R. (2016): Matchmakers – The New Economics of Multisided Platforms, Harvard Business Review Press, Boston.

Gausemeier, J. and Plass, C. (2014): Zukunftsorientierte Unternehmensgestaltung, Carl Hanser Verlag, München.

Katz, M. and Shapiro, C. (1986): “Product Compatibily Choice in a Market with Technological Progress”, Oxford Economic Papers, Volume 38, pp 146-165.

KNIME (2018): “KNIME® Analytics Platform”, [online], KNIME Web site. https://www.knime.org/knime.

Libert, B., Beck, M. and Wind, J. (2016): The Network Imperative, Harvard Business Review Press, Boston.

Markides, C.C. (1999): All the Right Moves: A Guide to Crafting Breakthrough Strategy, Harvard Business Review Press, Boston.

Morvan, L., Hintermann, F. and Vazirani, M. (2016): Five Ways to Win with Digital Platforms, Accenture Research, Dublin.

Parker, G. G., van Alstyne, M. W. and Choudary, S. P.: Platform Revolution: How Networked Markets are Transforming the Economy--and How to Make Them Work for You, Norton & Company, New York.

Ries, E. (2011): The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Crown Business, New York.

Shapiro, C. and Varian, H.-R. (1998): Information Rules: A Strategic Guide to the Network Economy, Harvard Business Review Press, Boston.

Mindfulness Embedded in Entrepreneurial Wisdom

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Abstract: They say "your inner world is what creates your outer world". In this regard we tried to investigate the relation between mindfulness and entrepreneurial alertness. Alertness is a foundational concept in current understandings of the spotting and exploitation of entrepreneurial opportunities. Its two broad aspects from psychology have been explored and a model has been generated; reflecting the hierarchical relation between alertness aspects and mindfulness factors. Results show that mindfulness mediates the relationship between alertness and novelty creation. We used Interpretive Structure Modelling (ISM) to create the model of entrepreneurial alertness and mindfulness. The model is generated on the basis of the experts' votes. Ten experts who have the experience and knowledge about one or both of these topics were interviewed. They voted the mutual relation of the elements. The results showed that alertness fosters mindfulness, which then leads to the creation of novel things. This also shows that mindfulness deserves more investigation for its potential role in other parts of entrepreneurial process.

Keywords: Mindfulness, Entrepreneurial Alertness, Intrinsic Alertness, Phasic Alertness, ISM

1. Introduction

Finding ways to foster different aspects of entrepreneurial process have always been of interest among entrepreneurship scholars. Entrepreneurial alertness (EA) is a foundational concept in current understandings of the spotting and exploitation of entrepreneurial opportunities. Yet, despite the increasing use of cognitive psychology approaches in the field of entrepreneurship, the broader psychological basis of the entrepreneurial alertness construct has somehow been neglected. In the general cognitive psychology literature, "alertness" is considered as an aspect of attention that includes both intrinsic and phasic aspects (Sturm and Willmes 2001).

Intrinsic alertness can be considered as a person's endogenous cognitive control over their wakefulness. It is defined as the internal control of arousal without needing any external cue (Sturm et al. 1999; Sturm and Willmes 2001; Sturm et al. 2004). In contrast, phasic alertness can be considered as increasing readiness in response to exogenous cues (Sturm and Willmes 2001). It is the ability to increase readiness for response in a shortest time after an external cue or warning (Posner 1978), or the ability to heighten attention for a given warning stimulus (Sohhlberg and Mateer 1987). Despite having its roots in psychology and cognitive science, the development of the entrepreneurial alertness construct by entrepreneurship scholars has not fully reflected this original conception. Researchers of EA have mostly limited their efforts towards exploring the cognitive roots of the concept. By borrowing a variety of theoretical lenses from cognitive science, such as pattern theory (Baron 2006), schema theory (Gaglio and Katz 2001; Valliere 2013), regulatory focus theory (Tang 2009), signal detection theory (Baron 2004), and attention theories (Valliere 2013), scholars have started to map out the entrepreneurial implications of phasic alertness. Following the alertness theory of Israel Kirzner (Kirzner 1973), which was a phasic perspective on alertness, scholars started to explore phasic alertness and its components (Yu 2001; Tang et al. 2012). But the potential implications of intrinsic alertness remain unexplored.

2. Literature Review

2.1 Entrepreneurial Alertness and Mindfulness

Our understanding of the phasic aspects of EA has its roots in the objective view of opportunities. When Kirzner defines entrepreneurial alertness as "the ability to notice without search opportunities that have hitherto been overlooked" (Kirzner 1979), he implies that opportunities objectively exist in the outer world and that the reason they have been overlooked lies in a lack of alertness on the part of the entrepreneurs; entrepreneurs must prime themselves to stay alert in order to detect any opportunities that surround them.

Following on this, the majority of EA scholars have since worked from this same assumption as the foundation for their theorizing, and have investigated the factors that might boost the phasic alertness of entrepreneurs for detecting external opportunities.

But relying solely on this view runs counter to more recent thinking associated with the creativity view of the nature of entrepreneurial opportunities, a view in which opportunities are endogenously created through purely abductive processes (Sarasvathy et al. 2003; Alvarez and Barney 2007). Opportunities do not exist independent of entrepreneurs. Rather, "they are created, endogenously, by the actions, reactions, and enactment of entrepreneurs exploring ways to produce new products or services" (Alvarez and Barney 2007).

The essence of EA in this subjective perspective is comparable to the intrinsic alertness concept in cognitive psychology. From this perspective, there is no external cue to be apprehended and reacted to. Rather, entrepreneurs have executive control over their internal cognitive mechanisms and, by exercising them deliberately, can enhance their intrinsic EA and become able to create novel opportunities from pre-existing objective conditions. However, it may not be easy for individuals to have good control over their internal cognitive mechanisms and their emotional or sensational systems. In fact, it is considered to be one of the important issues in current psychological studies. There exist several theories in psychological sciences related to the intrinsic and metacognitive mechanisms of individuals, including mindfulness theory, metacognitive awareness theory, self-regulation theory and others.

Among all these theories, mindfulness theory has been chosen in this article to address the lack of an intrinsic aspect of alertness in the entrepreneurial context. There are two approaches toward mindfulness theory: the Eastern approach and the Western approach.

2.2 Eastern view

The Eastern view of mindfulness is embedded in Buddhist philosophy. In Theravada Buddhism mindfulness is associated with two different meanings: a) to remember and b) to develop a lucid awareness. According to the first view, mindfulness is related to memory and so mindfulness enhances one's ability to remember past experiences. In the second view, mindfulness is related to what is happening in the present moment (Khoury 2017). Within Buddhist thought a key reason for practicing mindfulness is long-term spiritual development and reduction of suffering that comes from attachment and grasping, rather than just symptomatic relief of stress.

2.3 Western view

Ellen Langer is a leading theorist for the Western view of mindfulness. According to her mindfulness is considered as containing components of (a) openness to novelty, (b) alertness to distinctions, (c) sensitivity to different contexts, (d) implicit, if not explicit, awareness of multiple perspectives, and (e) orientation in the present (Langer 1992).

In this research, Langer's theory of mindfulness (1992) has been applied. The overall components of mindfulness in her theory are well-compatible with alertness theories.

3. Method

Interpretive Structure Modelling (ISM) is a comprehensive methodology which is used for exploring and theorizing relationships within complex issues. In this research, in order to create a graphical representation of complex interaction between the specific elements of alertness and mindfulness (Khan et al. 2017), the ISM methodology has been used. In the following section, the ISM process used in this research is explained.

4. Analysis

4.1 Identify issues

Based on the literature review that we did on mindfulness and alertness, we generated constructs for a model that is aimed to reflect the relationship between alertness and mindfulness. This is the first step in the ISM process. According to the roots of alertness in cognitive psychology, both intrinsic alertness and phasic alertness are included. In addition, four constructs of mindfulness were selected based on the Langer (1992) theory of mindfulness. These constructs are: sensitivity to context, awareness of multiple perspectives, novelty seeking, and novelty producing.

4.2 ISM type

Warfield (1994) has classified several types of ISM modelling types or approaches, which are shown in table 1. As the aim of this research is to explore the interrelation between mindfulness and entrepreneurial alertness

factors, the intent structure is the best approach to be used because we want to understand the mutual influence between the elements of any model.

Table 1: Types of ISM

Type of structure	Element class	Relation type	Examples
Intent	Interrelation between objectives, goals and intentions	Influence	"would help to achieve", "supports"
Priority	Rank a number of items in order of priority	Comparative	"is of equal or higher priority", "is equal or higher value than", "is more important than"
Attribute enhancement	interrelations between a set of factors, problems or opportunities	influence	"strongly contributes to"
Solution sequence or process	Unknown variables	Influence, temporal	"is a function of", "should be computed before"
Complementary	Any	Any	"is a complement of"

4.3 Participants

ISM requires participants with specific knowledge of the domain of interest and the expression of influence among elements. In this research the participants were categorized as follows:

- *Experts in the field*: These participants were the experts who have the necessary content knowledge related to the issue of entrepreneurship, mindfulness, or both. We invited eight experts to participate in our study.
- *Stakeholders:* These participants are the people who are affected in some way by the outcome of the investigation. Three of our participants were technology entrepreneurs who were also mindfulness practitioners.
- *Modellers and Facilitators:* The research team for the study did the facilitating and modelling activities.

4.4 Elements Set

The elements of the model have already been mentioned. Four elements were representative of mindfulness, being sensitivity to different context, awareness of multiple perspectives, novelty seeking, and novelty producing. We also included intrinsic alertness and phasic alertness as two aspects of general alertness. In this stage a worksheet to capture the mutual relationships among the elements was prepared. We then asked the experts and entrepreneurs to opine on these relationships in the ISM session (i.e., which elements have influence on which others). After individual voting, the experts and the entrepreneurs were informed of the other votes and worked together to produce a consensus on the relationships among the constructs.

4.5 Interactions

Based on the votes that we obtained from the ISM session, we generated the structural self-interaction matrix (SSIM). In order to demonstrate the relationship between the constructs we examined each pair of constructs and used the following coding symbols for the relationships:

V: factor *i* will help achieve factor *j*
A: factor *j* will help achieve factor *i*
X: factors *i* and *j* will help achieve each other
O: factors *i* and *j* are unrelated.

Based on the relationships the SSIM is developed as shown in table 2:

Table 2: Structural self-interaction matrix (SSIM)

	STC	AMP	NS	NP	IA	PHA
STC		X	A	X	A	X
AMP			A	X	X	X
NS				V	A	X
NP					A	A
IA						V
PHA						

4.5.1 Reachability matrix

After the SSIM was made, it was transformed into a reachability matrix by changing the information in each entry of SSIM into 1s and 0s. The substitution of 1s and 0s were made per the following rules:

1. If (*i*, *j*) entry in the SSIM is V, then (*i*, *j*) entry in the reachability matrix becomes 1 and the (*j*, *i*) entry becomes 0.
2. If (*i*, *j*) entry in the SSIM is A, then (*i*, *j*) entry in the reachability matrix becomes 0 and the (*j*, *i*) entry becomes 1.
3. If (*i*, *j*) entry in the SSIM is X, then (*i*, *j*) entry in the reachability matrix becomes 1 and the (*j*, *i*) entry also becomes 1.
4. If (*i*, *j*) entry in the SSIM is O, then (*i*, *j*) entry in the reachability matrix becomes 0 and the (*j*, *i*) entry also becomes 0.

The resulting reachability matrix is shown in table 3. The values shown in in the Driving column of each factor illustrates its overall influence or "power" over the other factors. The value in the Dependence row of each factor signifies the degree to which it is influenced by other factors.

Table 3: Reachability matrix

	STC	AMP	NS	NP	IA	PHA	CR	Driving
STC	1	1	0	1	0	1	0	4
AMP	1	1	0	1	1	1	1	6
NS	1	1	1	1	0	1	0	5
NP	1	1	0	1	0	0	0	3
IA	1	1	1	1	1	1	0	6
PHA	1	1	1	1	0	1	0	5
CR	0	0	1	1	0	0	1	3
Dependence	6	6	4	7	2	5	2	32

4.6 Level Partitions

From the reachability matrix, reachability and antecedent sets are developed for each factor. The reachability set includes the factor itself and the other factors that it impacts. The antecedent set consists of the factor itself and the others that have an impact on it. The intersection of the reachability and antecedent sets will signify factors where both impact each other. The constructs with fewer factors in the reachability and intersection sets are assigned to the higher level of an ISM hierarchy. In fact, the top level factors are the ones which do not lead to any other factors. At each level of this hierarchy, the top-level factors are successively identified and removed from the table in an iterative fashion, as shown in table 4. The ISM model is then constructed on the basis of these emergent levels.

Table 4: Iterations

Level	Variable	Reachability	Antecedents	Intersection
I	1	1,4	1,2,3,5,6	1
	2	1,2,3,4,5,6	1,2,3,5,6	1,2,3,5,6
	3	1,3,4,6	3,5	3
	4	**4**	**1,2,3,4,5,6**	**4**
	5	1,2,3,4,5,6	5	5
	6	1,3,4,6	3,5,6	3,6
II	**1**	**1**	**1,2,3,5,6**	**1**
	2	**1,2,3,5,6**	**1,2,3,5,6**	**1,2,3,5,6**
	3	1,3,6	3,5	3
	5	1,2,3,5,6	5	5
	6	1,3,6	3,5,6	3,6
III	3	3,6	3,5	3
	5	3,5,6	5	5
	6	**3,6**	**3,5,6**	**3,6**
IV	**3**	**3**	**3,5**	**3**
	5	3,5	5	5
V	**5**	**5**	**5**	**5**

Boldface highlights the variables that were removed in each iteration. 1 = Sensitivity to Context, 2 = Awareness of Multiple Perspectives, 3 = Novelty Seeking, 4 Novelty Producing, 5 = Intrinsic Alertness, 6 = Phasic Alertness

4.6.1 Driving and Dependence

In order to analyze and the factors based on its driving power and dependence, we conducted a MICMAC analysis. MICMAC is a graphical approach in which driving power is plotted along the X-axis and dependence along the Y-axis, as in figure 1. In MICMAC analysis, factors are classified as follows:

1. Autonomous enablers: The factors with weak driving power and weak. They are almost not related to any other factors.
2. Dependent enablers: The factors with weak driving power but strong dependence. They are strongly affected by many other factors.
3. Linkage enablers: The factors with both strong driving power and strong dependence. These factors affect other factors and are also affected by other factors.
4. Driving variables: The factors with strong driving power but weak dependence. They have strong influence over many factors. (Vinodh et al. 2016).

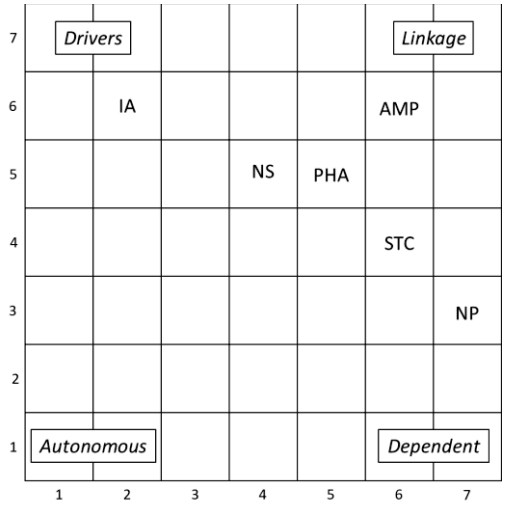


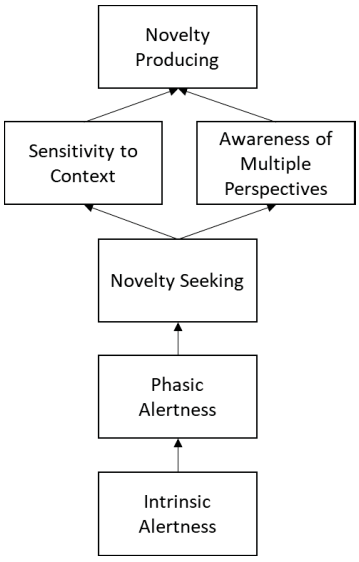
Figure 1: Driving power and dependence (MICMAC analysis)

4.7 Proposed Model

The iterations presented in table 4 have identified the corresponding hierarchy level for each variable or construct within the model. For example, in the level I iteration the Novelty Production construct (variable 4) was removed, indicating that it represents the ultimate dependent factor among all the constructs.

Conversely, the Intrinsic Alertness construct (variable 5) survived until the final level V iteration, indicating that it represents the ultimate antecedent factor among all the constructs. On this basis, the model shown in figure 2 can be said to capture the full range of influences that were implicit in the opinions of the participating experts and entrepreneurs.

Figure 2: Model of factor influences among EA and mindfulness constructs



5. Discussion

The model of alertness and mindfulness developed here and provided in figure 2 suggests that intrinsic alertness is a major driver of innovation and novelty production, which in an entrepreneurial setting may manifest as opportunity spotting. This driving force is mediated by dimensions of mindfulness, as represented in Langer's Western theory. But this major driver of entrepreneurial alertness is completely neglected in the entrepreneurial literature. As currently conceived, entrepreneurial alertness rests in phasic alertness alone.

This view appears to be incomplete, both from the perspective of our experts and from the perspective of current cognitive science. Intrinsic alertness appears to have a role to play too.

Expert opinions captured in this study revealed that it is important for people to have intrinsic alertness and be alert to their inner thoughts, emotions and sensations if they want to enhance their alertness toward external cues and entrepreneurial opportunities. This initial model is addressing a crucial factor which is considered as a major antecedent of entrepreneurial ability to be alert to opportunities, and the tendencies of entrepreneurs toward seeking and producing novel things or ideas. A review of the psychology literature on the issue of entrepreneurial alertness suggested that the intrinsic aspect of alertness has been neglected in entrepreneurial research, and that scholars need to pay more attention to it.

This study has also revealed the important mediating role of mindfulness. Especially so when viewing entrepreneurial opportunity spotting from the "creation" perspective. Being mindful can now be considered as an essential linkage from the alertness of entrepreneurs to their tendency to create opportunities (rather than discovering or recognizing them). Intrinsic and phasic alertness create the conditions for increased mindfulness; mindfulness provides the sensitivity and internal awareness necessary for the creation of entrepreneurial opportunities that do not simply exist in the objective environment.

This research has its own limitations and weaknesses. Most significantly, this is just an initial model which needs to be empirically tested with data from a representative population of entrepreneurs. In addition, this study used only a Western mindfulness theory in order to address the gap of intrinsic alertness. There are several theories in psychological sciences that deal with the intrinsic aspects of human cognitions and emotions. This is a new stream of research in entrepreneurial cognition which we believe can lead to major results in entrepreneurship studies.

References

Alvarez, S.A. and Barney, J.B. (2007), "Discovery and creation: Alternative theories of entrepreneurial action", Strategic Entrepreneurship Journal, Vol. 1 No. 1-2, pp. 11-26.

Baron, R.A. (2004), "The cognitive perspective:: A valuable tool for answering entrepreneurship's basic "why" questions", Journal of Business Venturing, Vol. 19 No. 2, pp. 221-239.

Baron, R.A. (2006), "Opportunity recognition as pattern recognition: how entrepreneurs"connect the dots"to identify new business opportunities", Academy of Management Perspectives, Vol. 20 No. 1, pp. 104-119.

Gaglio, C.M. and Katz, J.A. (2001), "The psychological basis of opportunity identification: entrepreneurial alertness ", Small Business Economics Vol. 16 No. 2 pp. 95-111.

Khan, N.H.A.L., Ghazali, Z., Abdullah, M.R.T.L. and Isha, A.S.N. (2017), "Rationale and application of Interpretive Structural Modeling (ISM) in Safety Management Research", Global Business and Management Research: An International Journal, Vol. 9 No. 1, pp. 505-515.

Khoury, B.a.A., Knäuper, B.c, Pagnini, F.bd, Trent, N.b, Chiesa, A.ef, Carrière, K.c (2017), "Embodied Mindfulness", Mindfulness, Vol. 8 No. 5, pp. 1160-1171.

Kirzner, I.M. (1973), "Competition and Entrepreneurship", Vol. No.

Kirzner, I.M. (1979), Perception, opportunity and profit: Studies in the Theory of Entrepreneurship., The University of Chicago Press, Chicago.

Langer, E.J. (1992), "Matters of mind: Mindfulness/mindlessness in perspective", Consciousness and cognition, Vol. 1 No. 3, pp. 289-305.

Posner, M.I. (1978), Chronometric explorations of mind, Oxford University Press, New York.

Sarasvathy, S.D., Dew, N., Velamuri, S.R. and Venkataraman, S. (2003), "Three views of entrepreneurial opportunity", (Ed.), Handbook of Entrepreneurship Research, Springer, USA, pp. 141-160.

Sohhlberg, M.M. and Mateer, C.A. (1987), "Effectiveness of an attention-training program", Journal of Clinical and Experimental Neuropsychology Vol. 9 No. 2, pp. 117-130.

Sturm, W., Longoni, F., Fimm, B., Dietrich, T., Weis, S., Kemna, S., Herzog, H. and Willmes, K. (2004), "Network for auditory intrinsic alertness: a PET study", Neuropsychologia, Vol. 42 No. 5, pp. 563-568.

Sturm, W., Simone, A.d., Krause, B.J., Specht, K., Hesselmann, V., Radermacher, I., Herzog, H., L.Tellmann, H-W.Müller-Gärtner and Willmes, K. (1999), "Functional anatomy of intrinsic alertness: evidencefor a fronto-parietal-thalamic-brainstem network in theright hemisphere", Neuropsychologia, Vol. 37 No. 7, pp. 797-805.

Sturm, W. and Willmes, K. (2001), "On the functional neuroanatomy of intrinsic and phasic alertness", Neuroimage, Vol. 14 No. 1, pp. S76-S84.

Tang, J. (2009), "Exploring the constitution of entrepreneurial alertness: The regulatory focus view", Journal of Small Business & Entrepreneurship, Vol. 22 No. 3, pp. 221-238.

Tang, J., Kacmar, K.M.M. and Busenitz, L. (2012), "Entrepreneurial alertness in the pursuit of new opportunities", Journal of Business Venturing, Vol. 27 No. 1, pp. 77-94.

Valliere, D. (2013), "Entrepreneurial alertness and paying attention", Journal of Enterprising Culture Vol. 21 No. 1, pp. 1-17.

Valliere, D. (2013), "Towards a schematic theory of entrepreneurial alertness", Journal of Business Venturing, Vol. 28 No. 3, pp. 430-442.

Vinodh, S., Ramesh, K. and Arun, C.S. (2016), "Application of interpretive structural modelling for analysing the factors influencing integrated lean sustainable system", Clean Technologies and Environmental Policy, Vol. 18 No., pp. 413-428.

Warfield, J.N. (1994), Science of generic design: Managing complexity through systems design., Iowa State Press.

Yu, T.F.-L. (2001), "Entrepreneurial Alertness and Discovery", The Review of Austrian Economics, Vol. 14 No. 1, pp. 47-63.

Reframing Social Innovation and other Neighbouring Phenomena from a Qualitative Cases Analysis

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Abstract: We can affirm that social innovation is a frequently used (and abused) term but also that not all those who use it refer to the same things. It might seem that social innovation is the sum of the meaning of two words: innovation and social; but, as I will show with some examples, not everything that is innovative is social, nor all that is social is innovative. Until recently the term social innovation has been a catch-all in which there was room for almost everything that was innovative and social, however those of us who believe that social innovation has a specific weight in the future of humanity, we are convinced that it is time to homogenize this term. During the years 2013-2018, and for the research of my doctoral thesis, I have identified, compiled, codified, compared and analyzed thousands of data related to social innovation and social innovation in Spain. From this qualitative analysis, conducted following the Grounded Theory, hundreds of social innovation case studies emerged that allowed me, among other things, to determine a new framework for social innovation, a new definition of the term social innovation, as well as its distinction from other phenomena adjoining, such as CSR, ICT, social entrepreneurship and the world of patents and inventions. This paper aims to fill the existing void in the absence of a unique and updated definition of what is meant by social innovation.

Keywords: Social innovation concept, Spanish social innovation, Social innovation and neighbours, Qualitative research, Grounded Theory

1. Background

During the years 2013-2018 I developed the research of my doctoral dissertation trying to unravel and understand social innovation in Spain: its management, triggers, good practices and frequent mistakes. I carried out my research following the principles of the Grounded Theory and so, I identified, compiled, codified, compared and analyzed thousands of data related to social innovation and social innovation in Spain. The first surprise was to realize that there was no single definition of social innovation but that it was, and is nowadays, a concept under construction.

For the analysis to be as rigorous as possible and the conclusions of scientific evidence rooted in the data, the corpus of the research has been considerable. Thus, I compared more than 3,000 entries on social innovation, of which more than 500 were cases or examples, which allowed me, among other things, to determine a new framework for social innovation, a new definition of the term social innovation, as well as its distinction from other neighbouring phenomena, such as Corporate Social Responsibility (from now on, CSR), Information and Communication Technologies (from now on, ICT), social entrepreneurship and the field of patents and inventions

Therefore, it is important, first, to make a brief reference to the Grounded Theory, to explain how, through the collection, coding, comparison, saturation and analysis of thousands of data, a substantive theory, related to social innovation in Spain, has been generated and validated by them.

Secondly, I will describe the work of constant comparison between the different definitions of social innovation in space and time, and I will propose a concept that surpasses the previous ones, which represents its multidimensional nature.

Thirdly, and based on the empirical study of more than 500 cases of social innovation and 50 cases of Spanish social innovation, —in accordance with the proposed definition— I will make a distinction between this concept and what I have called other *neighbouring phenomena*.

This document aims to fill the existing gap in the absence of a single and updated definition of what is meant by social innovation, a definition rooted in the data that distinguishes the phenomenon from the others. This distinction may seem banal, but, on the contrary, ambiguity subtracts the power of a true weapon of social transformation.

2. The Grounded Theory at a glance and how I applied it in this research

The sociologists Barney Glaser and Anselm Strauss (1967), in their work *The discovery of Grounded Theory: Strategies for qualitative research,* propose the basic principles of Grounded Theory as a method of approaching and analysing social reality, whose main objective is to generate theory from the data, resulting in a theory grounded in the data.

Hereafter I will make a brief reference to the principles of the Grounded Theory as it was enunciated and define the key concepts that it proposes, and how I applied them specifically in this investigation.

- **Construction of theory versus verification:** Unlike other methodologies used in social sciences, it does not place emphasis on verifying pre-existing theories or demonstrating preconceived hypotheses, but on constructing and systematizing the theory that emerges from the analysis and the constant comparison of the data. "Our basic position is that generating grounded theory is a way of arriving at the theory suited to its supposed uses. We shall contrast this position with theory generated by logical deduction from a priori assumptions, that generating grounded theory is a way of arriving at the theory suited to its supposed uses" (Glaser and Strauss, 1967, p 2).
- **Generation of theory as a process**: The generation of a theory implies a research process. Likewise, the generation of a theory from the data means that most hypotheses and concepts come from the data, systematically worked in the course of the investigation. "Our strategy of comparative analysis for generating theory puts a high emphasis on theory as process, that is, theory as an ever-developing entity, not as a perfected product" (Glaser and Strauss, 1967, p 32).
- **Importance of the data:** the theory must be anchored in the data, comes from the data and originates from them.
- **All data are susceptible to generate theory**: "Although the emphasis on qualitative data is strong in our book, most chapters also can be used by those who wish to generate theory with quantitative data, since the process of generating theory is independent of the kind of data used" (Glaser and Strauss, 1967, p 18).
- **The accumulation and analysis of the data must be done simultaneously***:* "In the beginning, one's hypotheses may seem unrelated, but as categories and properties emerge, develop in abstraction, and become related, their accumulating interrelations form an integrated central theoretical framework, the core of the emerging theory. The core becomes a theoretical guide to the further collection and analysis of data. […] When generation of theory is the aim, however, one is constantly alert to emergent perspectives that will change and help develop his theory. These can easily occur even on the final day of study or when the manuscript is reviewed in page proof: so the published word is not the final one, but only a pause in the never-ending process of generating theory. When verification is the main aim, publication of the study tends to give readers the impression that this is the last word" (Glaser and Strauss, 1967, p 40).
- **The importance of comparative analysis**: "In discovering theory, one generates conceptual categories or their properties from evidence; then the evidence from which the category emerged is used to illustrate the concept. The evidence may not necessarily be accurate beyond a doubt (nor is it even in studies concerned only with accuracy), but the concept is undoubtedly a relevant theoretical abstraction about what is going on in the area studied. Furthermore, the concept itself will not change, while even the most accurate facts change. Concepts only have their meanings re-specified at times because other theoretical and research purposes have evolved" (Glaser and Strauss, 1967, p 21 f.).
- **Theoretical sampling**: "Theoretical sampling is the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges. This process of data collection is controlled by the emerging theory, whether substantive or formal" (Glaser and Strauss, 1967, p 45).

So, I did not start this research based on an a priori definition of social innovation or trying to demonstrate what its relationships with other phenomena are that are close to it, on the contrary, I started collecting what the self-described social innovators understood as social innovation.

This is when I realized that social innovators referred to different things when they talked about social innovation: sometimes they were social entrepreneurs (but not necessarily innovative), sometimes they were inventors, but not necessarily social, etc. The same thing happened when I looked for more or less academic

definitions of social innovation, although very similar, there was no single or generally accepted definition, but we could definitively infer is that social innovation is a dynamic phenomenon and a dynamic concept too.

As data compilation, codification, and comparison is essential, we must talk about the corpus of research in figures, namely: more than 3,000 entries, which have been codified, compared, analysed and saturated, during more than 5 years (2013-2017) and more than 500 social innovation examples and 50 Spanish social innovation case studies.

3. Towards a New Concept of Social Innovation

3.1 Social Innovation: first approach

It might seem that social innovation is the sum of the meaning of two words: innovation and social; but, as I will show with some examples, not everything innovative is social, nor all that is social is also innovative.

To better explain the topic of the thesis, what is covered and what is not, I propose a series of three examples having something in common: the food.

- On October 10, 2014, the famous chef FerranAdrià was awarded the prize for disruptive innovation at the South Summit 2014 ("FerranAdriàpremio a la InnovaciónDisruptiva" 2014), an event that "connects the most innovative entrepreneurs with the most important investors in the world and corporations that seek to improve their global competitiveness through innovation" ("Who is behind the South Summit?", n.d.), for their creativity in cooking and gastronomy.
- It is undeniable that Adrià is a great innovator in his field, gastronomy, and that has been, even, disruptive, in the sense that he opened a gap in the pre-existing market and created something totally new. However, despite being one of the precursors of deconstruction, decontextualizing this concept of the art world (consisting of isolating the various ingredients of a dish, generally typical, and reconstructing it in an unusual way, so that the appearance and texture are completely different while the flavour remains unchanged), of the foams (created using siphons), of the spherification (use of alginates to form small balls of liquid content), as well as the use of liquid nitrogen, etc., we can not to say that we are dealing with a social innovator or that these contributions, although very innovative, are about social innovations.
- In the same way, social canteens for people without resources, despite having considerably increased their presence and number of people assisted in Spain during these past years of crisis, are imminently social, but they are not innovative, given that they represent assistance measures dating from the 18th century.

We could find numerous examples in both fields, the innovative and the social, and we would not be talking about social innovation.

Therefore, in reality, social innovation is not the sum of innovation and social, but it is about researching the examples where these two concepts merge and operate as one.

- The Solidary Fridge initiative from Bilbao (NeveraSolidaria,n.d.) refers to a refrigerator placed on the street (surpassing all legal requirements, such as the use of public land, safety, health and food consumption requirements), so that those people who have prepared food can deposit it into the fridge, and people who need or want homemade food can take it: here, we can clearly face a case of social innovation. And a social innovation with capital letters: it is a new idea that fights against a social problem. Never before it had been proposed an action as simple as bold and innovative, to put a fridge in the street, to fight locally against the waste of food and against the hunger of the excluded people. Needless to say, The Solidary Fridge is part of the case studies of this research.

This research, then, collects, analyzes and compares this type of examples, where the innovative and the social are intrinsically linked.

Social innovation is not only the sum of two elements, the new and the social, but it is about finding, "the space in which both concepts meet and merge".

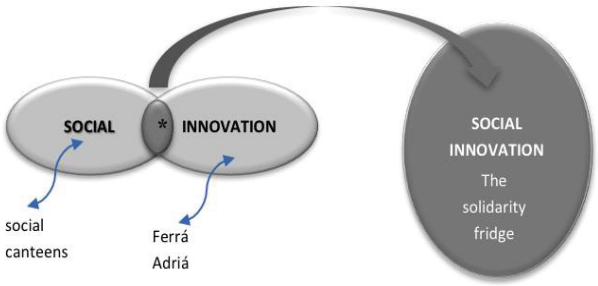

Figure 1: What we mean by social innovation

(Source: Herrero de Egaña, forthcoming)

3.2 Social Innovation: key elements

Although the expression social innovation is frequently used, it is convenient to define the basic elements of it, innovation and social.

By making a basic exegesis of the two parts of the expression, I refer in the first place to innovation, which I define in its most open and generous sense: it is not necessary that it be an invention or a patent; to be innovative, it is not necessary that we have never seen or heard anything like it, it is enough to include some novel element.

Thus, for example, Mohamed Yunus, founder of the Grameen Bank, awarded the Nobel Peace Prize of 2006 "for his efforts to encourage social and economic development from below," (Yunus,n.d.) is understood by many as the quintessential social innovator.

Yunus was the promoter of microcredits and although credit as we know it today exists since the 12th century, he is a great innovator who has generated a great social change by including in a pre-existing institution —the credit— a novel element —the guarantee solidarity— that has revolutionized society in Bangladesh and other parts of the world, allowing the poor, without theoretical repayment capacity, access to credit and with it their development and social, labour, productive and human inclusion.

Therefore, a pre-existing idea, project or activity that includes a variation, however small it may be —the geographical space, the social group to which it is directed, etc.— may be an innovation. Paradoxical as it may seem, a source of innovation can be found in the past and in what is not new.

Obviously, it is inherent in the idea of "new" or "novel" that is more effective, efficient or that produces a greater impact. Recall here the aforementioned definition of Mulgan, Tucker, Ali and Sanders (2007, p 8) as "new ideas that work".

Analyzing the second term of the expression, "social", I will show that it comprises three necessary dimensions to understand in all its depth what social innovation is.

Indeed, with the expression "the social" I mean three vectors that must be given at the same time to qualify and qualify social innovation.

These developments must, first, respond to a relevant social challenge (RSR) or a problem that matters to society as a whole and whose solution is a priority challenge for it. I have already mentioned (and in this chapter I will explain in depth) how the research itself and the methodology used to carry it out determine the relevant social challenges (RSR) for Spanish social innovation.

Phills Jr., Deiglmeier, and Miller (2008) define social innovation as "a novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals". In this definition, the second dimension of the social aspect begins to emerge: not only has to be good for society, but also from society.

It is interesting to dwell a moment on this nuance "from and for society", because it leads us to reflect on the agents of social change or social innovation, which is also one of the contributions of this thesis, and which I will develop next.

Mulgan, Tucker, Ali and Sanders (2007, p 8) define social innovation as “innovative activities and services that are motivated by the goal of meeting a social need and that are predominantly developed and diffused through organisations whose primary purposes are social.”

Phills Jr., Deiglmeier& Miller (2008) make an important contribution by pointing out that social innovation dissolves borders and promotes a dialogue between the public, private and non-profit sectors.

As pointed out by Murray, Caulier-Grice and Mulgan (2010, p 3), social innovation is defined as “new ideas (products, services and models) that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society’s capacity to act.”

Therefore, the social is as much in the process, the how and the why of the social objectives and of the society that is desired to reach and also strengthens or generates the relations between the different social agents: the individual, the crowd, the private and the public, the organizations and movements of civil society and large multinational companies.

The characteristics inherent to social innovation are:

- New, novel (and better than previous ones)
- Social,from society
- Social, for society (faces social challenges relevant to society)
- Social because it generates new social relations or strengthens existing ones.

Going back to the content of that “space in which its founding the innovative and the social” in figure 2 reflects how social innovation has to be made up of a proportion of these four elements.

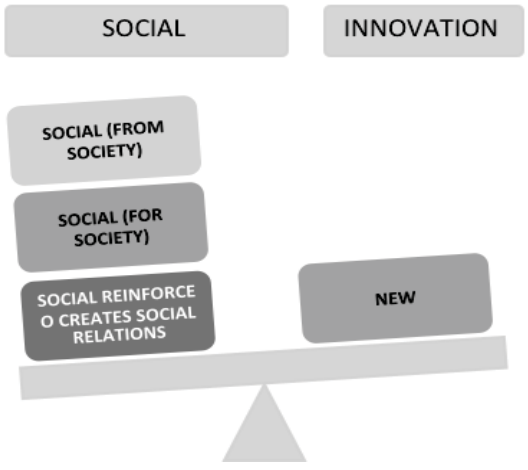

Figure 2: Social Innovation: Key elements

(Source: Herrero de Egaña, forthcoming)

3.3 Social innovation: definitions comparison and new definition

Naturally, there are definitions of social innovation, but the debate about the concept is not banal, since there is no clear and univocal definition.

In their publication *Social Innovation. What it is, Why it Matters and How It Can Be Accelerated,* Mulgan, Tucker, Ali and Sanders (2007, p 8) say “innovation is new ideas that work”; thus, social innovation would be new ideas that work to solve or manage a social problem.

In 2010, the European Commission, in the communication entitled Emblematic Initiative of Europe 2020. Union for innovation, defines social innovation as something desirable, in order

> *to find new ways of meeting social needs which are not adequately met by the market or the public sector (… or) to bring about the behavioural changes which are needed to tackle the major societal challenges (… and therefore to) empower people and create new social relationships and models of collaboration. They are thus innovative in themselves and good for society's capacity to innovate* (European Commission, 2011, p 23).

According to the report Social innovation and cooperatives: the social impact of cooperatives and socially innovative experiences,

> *Facing the task of establishing a concept on Social Innovation is a job not lacking in difficulties. In fact, if we consult the latest research conducted by the European Commission, it can be seen how sometimes researchers have rejected the idea of making a 'static' definition of the concept, preferring to use different "notions" and interpretations, clarifying that the concept of social innovation is not used to describe or explain social reality but "social innovation must be recognized as a particular mode of action and social change", thus defining "Social Innovation as a changing and adaptive process to social change"* (FAECTA, 2014, p 16; my translation).

Indeed, in the report *Social innovation research in the European Union Approaches, findings and future directions Policy Review* (2013b), three definitions are gathered from among many, chosen to cover more aspects and nuances of it:

- Social innovations are new solutions that simultaneously meet a social need and lead to new or improved capabilities and relationships and better use of assets and resources. In other words, *social innovations are good for society and enhance society's capacity to act.* (Tepsie [= The Theoretical, Empirical and Policy Foundations for Building Social Innovation in Europe])
- *Social innovation must be structurally aimed at meeting social need* (social challenge); must involve a new or significantly improved product, process, marketing method, and/or organizational model. (Selusi [= Social entrepreneurs as lead users for service innovation])
- *Social innovation is a process* where civil society actors develop new technologies, strategies, ideas and/or organizations to meet social needs or solve social problems. (SPREAD [= Social platform on sustainable lifestyles 2050])

Many authors consider it necessary to talk about innovation in general before talking about social innovation. In the paper "Social innovation as a solution to the crisis: towards a new paradigm of development", it is pointed out that

> *It is mandatory to talk about innovation in general as a previous step to refer to social innovation. The concept of innovation has been gaining weight over the years, becoming a fetish concept in vogue since the 60s (E. Rogers 1962, R. Nelson / E. Phelps 1966). However, it was Schumpeter who introduced the relevance of the concept and its analysis, emphasizing that "innovation is a process through which new products and techniques are introduced into the economic system" (Schumpeter, 1947). Schumpeter's perception of innovation as a process of "creative destruction" was confined to the business world, the market and technology. In any case, we must recognize that parallel in time, when Schumpeter described innovation as an eminently economic process, Kallen (1949), did so in terms of "cultural changes or social processes", extending its reach beyond the economic prism and technological (Hochgerner, 2009). And the economic future itself was confirming this fact.*
>
> *The Meadows report in 1972 already set the limits to exponential growth by saying that the use of technology, which it did not oppose, did not solve the most pressing problems in the world, but could in some cases intensify them and generate collateral effects and social problems. This highlighted the need for "another economy". The United Nations Conference in Rio de Janeiro in 1992 took that witness when talking about sustainable development from an ecological, social and economic point of view. More recently, it has been observed that neither technology nor the paradigm of industrial society are*

> *sufficient to achieve the Millennium Development Goals, but rather through the stimulation of social innovation* (ZSI 2008, p.28) (Fernández Fernández, Montes Pineda and AsiánChaves, 2012, pp 1086 f.).

In any text or document of those mentioned up to now and practically in any other material on social innovation, reference is made to a definition of the term social innovation, precisely because there is no unambiguous concept accepted by all.

At the beginning of this section I mentioned that of Mulgan, Tucker, Ali and Sanders, because one could say that they are authors, in a way precursors of the practical discourse on social innovation. Some years later, Murray, Caulier-Grice &Mulgan in the publication *The open book of social innovation* (2010) specify and extend the previous definition:

> *Our interest is in innovations that are social both in their ends and in their means. Specially, we define social innovations as new ideas (products, services and models) that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society's capacity to act* (Murray, Caulier-Grice &Mulgan, 2010, p 3).

In the *Guide for Social Innovation*, social innovation is defined as

> *the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations. It represents new responses to pressing social demands, which affect the process of social interactions. It is aimed at improving human well-being* (European Commission, 2013a, p 6).

In addition, it contains the somewhat more specific definition of the BEPA(Bureau of European Policy Advisors, n.d.) report which outlines the following three key approaches to social innovation:

- Social demand innovations which respond to social demands that are traditionally not addressed by the market or existing institutions and are directed towards vulnerable groups in society (European Commission, 2013a, p 6).
- The societal challenge perspective focuses on innovations for society as a whole through the integration of the social, the economic and the environmental (European Commission, 2013a, p 7).
- The systemic change focus, the most ambitious of the three and to an extent encompassing the other two, is achieved through a process of organizational development and changes in relations between institutions and stakeholders(European Commission, 2013a, p 7).

Most recently we have found another definition which defines four key dimensions: «Social Innovation must share the following key dimensions: (1) be oriented towards the common good, aiming to satisfy or solve social problems; (2) be a participatory / collaborative process involving different stakeholders or stakeholders; (3) imply an improvement over previous solutions (greater efficiency, science and / or sustainability); and (4) suppose an effective transformation in social behaviours and practices at the micro, meso and macro levels» (Álvarez-González et al, 2017).

The combination of these elements, the new and the social, both in the media and in the ends, leads us to a new definition of social innovation as "*new or innovative ways that society has to face the relevant social challenges (RSR), which are more effective, more efficient and more sustainable or that generate greater impact than the preceding ones and that contribute to making it stronger and more articulated*" (Herrero de Egaña, forthcoming) that synthesizes all the fundamental elements of social innovation and overcomes the previous definitions, representing a timeless definition of what social innovation is.

3.4 Social innovation and other neighbouring phenomena

Under the term *neighbouring phenomena* I refer to fields that have a lot to do with social innovation but that many times are not social innovation. As I mentioned before, there are four characteristics that constitute the notes inherent in social innovation: they must be present, to a greater or lesser extent, in all cases. In this process, in which I compared cases and examples that were labelled a priori as social innovation, I identified some of them which did not always comply with the four essential characteristics of social innovation determined by the research itself and that are part of the proposed definition mentioned above.

These concepts or phenomena, which I have called *neighbouring*, may have a "new" or "novel" high component, or a high "social" component (in one or more of its three dimensions) but may miss one or more of them. I´m talking about:

1. Information and Communication Technologies (or ICT), before new technologies (or NNTT)
2. Patents or inventions
3. Corporate Social Responsibility (or CSR)&
4. Social entrepreneurship.

This distinction may seem vain but nevertheless weakens the true social innovation, as we have previously defined it and its differentiation is fundamental to denoting social innovation and generating strategies for its diffusion.

As we can already see from the name of the phenomena themselves, the weight of the preponderant element is appreciated; thus, in the first two the innovative element is almost inherent and in the second one a social component is inferred (in its meaning for society). Figure 3 shows how far or close are theseneighbouring phenomena from social innovation but the best way to explain it is through the examples, which I analyzed and which are precisely those that gave me the clue that there was a field, or some fields, that were "neighbors" or adjoining and that it was worth defining and delimiting in order to know more precisely what we are talking about when we talk about social innovation, which, being a flexible concept, is not a "tailor's drawer" in which everything fits.

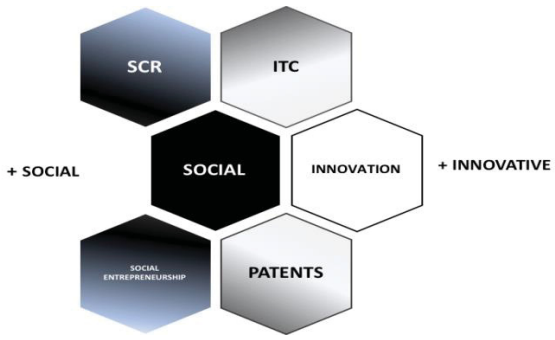

Figure 3: Social Innovation and other Neighbouring Phenomena

(Source: Herrero de Egaña, forthcoming)

So we could mention many APP platforms and applications (such as Meetic, "one of the most recommended network for singles" (Meetic, n.d.) or Gaydar "one of the main dating sites for gay and bisexual men. Millions of guys like you, looking for friendships, dating and relationships" (Gaydar, n.d.) both are innovative but they are not social as they do not respond to problems that are considered priority for society as a whole) or patents (like the mop, the lollipop or the botijo. They are Spanish patents, that had, at the time, a high innovative component, and although it is evident that they have also reverted for the benefit of society, we cannot affirm that they fit with the definition of social innovation that we propose in this work.) that are technically innovative but not social and, some CSR or social entrepreneurship projects which are eminently social but not innovative.

3.5 Social entrepreneurship is one of the most confusing areas

In fact, In the Guide for Social Innovation, the differences between Social Innovation, Social Entrepreneurship and Social Economy are established (European Commission, 2013a, p.12), that is to say, that one begins to try to distinguish between social innovation and other phenomena or concepts.

According to the aforementioned project Social Innovation and Cooperatives: the social impact of cooperatives and socially innovative experiences:

> *This differentiation of the concepts can be interpreted following the popular phrase "neither are all who count, nor count all who are." In other words, there is a clear intention from the European Commission*

> *that the concept is not monopolized by any sector or social tendency, but rather to establish a broad framework of action for the development of Social Innovation (FAECTA, 2014, p 16 my translation).*

However Ashoka organization that defines itself as the largest organization in the world in social entrepreneurship, confuses or uses both concepts indistinctly. Mohamed Yunus, Ashoka social innovator by antonomasia points out:

> *"A social business is a company with a social mission at its core. Set up to solve a specific problem to the benefit of poor or disadvantaged members of society, social businesses operate exactly like normal companies except for a few small differences. Unlike a charity, a social businesses generates profit and aims to be financially self sustaining. Removing the need for fundraising allows social businesses to re-invest profits back into generating sustainable social impact. A social business is a company that either creates income for the poor or provides them with essential products and services like healthcare, clean water or clean energy. 100 % of the company profits are reinvested in continuing the company's social mission» ("What is social business?",n.d.).*

Of all the data analyzed, a high percentage is connected with one or several of these 4 phenomena, whether or not they are social innovation.

As we can see in Figure 4, 45% of the 50 Spanish social innovation cases are connected to ICT, 29% to CSR, 22% to social entrepreneurship and 4% to patents or inventions.

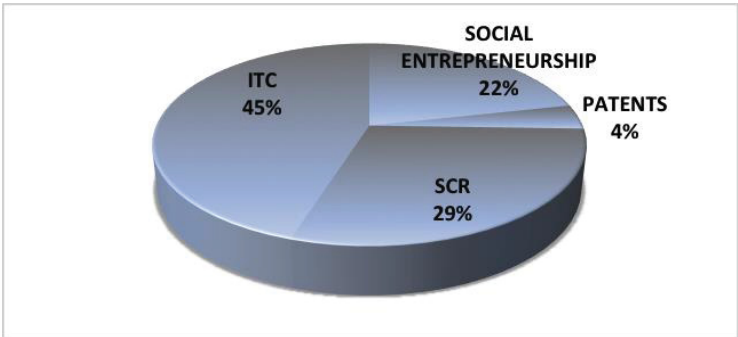

Figure 4: Percentage in which the analyzed cases are connected with neighbouring phenomena.

(Source: Herrero de Egaña, forthcoming)

4. In conclusion

In conclusion, in my research I was able not only to discover that there was not a single concept of social innovation, but also to propose a definition that surpassed the previous ones, which allowed at the same time, to distinguish what is social innovation from other phenomena with which it can share elements, but they are not exactly the same.

Knowing and spreading the common elements and the differences between these neighboring phenomena, helps to identify the true cases of social innovation and therefore to disseminate, promote and scale them.

This definition and proposal of differentiation, based on the data, allows progress towards the consolidation of the phenomenon and ultimately towards the construction of a better, more just and more human world.

References

Álvarez-González et al (2017) "Análisis multidimensional del concepto de innovación social en las organizaciones no lucrativas españolas. Evidencias prácticas", Revista Española del Tercer Sector, No. 36, p 27, [online], https://www.accioncontraelhambre.org/sites/default/files/documents/revista_rets_n36.pdf.

Bureau of European Policy Advisers (BEPA)(n.d.) "Open Yearbook. A Service of the UIA", UIA (Union of International Associations),[online], https://uia.org/s/or/en/1122274918.

European Commission (2011)Europe 2020 Flagship Initiative Innovation Union. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the

Regions, Publications Office of the European Union, Luxembourg, [online], https://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication-brochure_en.pdf.
European Commission (2013a) Guide to Social Innovation, European Commission, [online], http://s3platform.jrc.ec.europa.eu/documents/20182/84453/Guide_to_Social_Innovation.pdf.
European Commission [= Jenson J. and Harrisson D.] (2013b) Social innovation research in the European Union Approaches, findings and future directions.Policy Review, Publications Office of the European Union,Luxembourg,[online], http://www.net4society.eu/_media/social_innovation.pdf.
"Ferran Adrià premio a la Innovación Disruptiva" (16/10/2014) Luisannet Arte y Tecnología,[online], http://www.luisan.net/blog/marketing/ferran-adria-recibio-premio-la-innovacion-disruptiva.
Gaydar (n.d.) [dating site for gay and bisexual men], Gaydar, [online], https://www.gaydar.net/.
Glaser, B.G. and Strauss, A.L. (1967 [2006]) The Discovery of Grounded Theory Strategies for Qualitative Research, Aldine Transaction, New Brunswick – London.
Herrero de Egaña, Blanca (forthcoming) Social innovation in Spain: backbone axes from Grounded Theory, Tesis doctoral,Universidad Pontificia de Comillas, Madrid.
Meetic (n.d.) [dating site], Meetic, [online], https://www.meetic.es.
Mulgan, G., Tucker, S., Ali, R. y Sanders, B. (2007) Social Innovation. What it is, why it matters and how it can be accelerated. Oxford: Said Business School, [online], http://youngfoundation.org/wp-content/uploads/2012/10/Social-Innovation-what-it-is-why-it-matters-how-it-can-be-accelerated-March-2007.pdf.
Murray, R., Caulier-Grice, J. and Mulgan, G. (2010). The Open Book of Social Innovation.The Young Foundation / Nesta, [online], http://youngfoundation.org/wp-content/uploads/2012/10/The-Open-Book-of-Social-Innovationg.pdf.
Nevera Solidaria (n.d.) [Social project web portal to fight against food waste],NeveraSolidaria, [online], http://neverasolidaria.org/.
Phills Jr., J. A., Deiglmeier, K. and Miller, D. T. (10/2008) "Rediscovering Social Innovation", Stanford Social Innovation Review, Vol 6, No. 4, [online], https://ssir.org/articles/entry/rediscovering_social_innovation.
"What is social business?" (s.f.) Yunus Centre, [online], http://www.yunussb.com/about/.
"Who's Behind the South Summit?" (n.d.) South Summit, [online], https://www.southsummit.co/about.
Yunus, Mohamed. (n.d.) "Professor Muhammad Yunus", [online], https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Biography%20Professor%20Muhammad%20Yunus.pdf

On Ethereal Grounds: Cultural Resources and Innovation Success

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Abstract: This paper examines impacts that cultural resources have on the success of innovation-promotion efforts. We explore how cultural structures can imbue messages with different cognitive, affective, and behavioural qualities, bridging gaps resulting from uncertainty and ambiguity, and improving the chances of innovation success. We examine how increasingly innovative (more complex, more ambiguous) products benefit more from being associated with certain cultural resources. A process of flow from the 'culturally-loved' resource to the innovation alters responses, and is mediated by a number of variables we explore. We validate this by employing a web-administered experiment that considers varying innovativeness and examines the mediating variables.

Keywords: Innovation, Cultural Resources, Brands, Associations, Excess Meaning.

1. Cultural Resources and Innovations

Many consumer decisions regarding innovations are made under circumstances of incomplete information, where ambiguity and uncertainty pervade the decision process. How decisions are made in such situations, and the behavioural outcomes of these encounters with innovation, are the subjects of increasing importance in an age of relentless innovation.

With incomplete information, individuals might move further from the purely cognitive and analytical route, and resort to other sources of legitimation and validation. Those might include affect, heuristics, and mental shortcuts (Kahneman and Tversky, 1982; Darke et al, 2006).

Here, relatively stable cognitive structures that reflect hidden values and assumptions, cultural resources, come into the picture (Schein, 1984). This paper presents a specific modeling of cultural differences, the Cultural Resource Set, to understand processes by which such resources can cause cognitive, affective, and behavioural impacts on consumer responses to innovation (Kebir and Crevoisier, 2008; Swidler, 1986).

1.1 Cultural resource sets: relevance and theory

Among the popular approaches for modeling culture relevant to management today are those by Hofstede (1983) and House et al (2002), representing cultures by behavioural/value variables. These have been criticized by opponents as light on the context and content inclusion dimensions and their possibly economic, not cultural, underlying denominators (Jackson, 2011; Baskerville, 2003; Tang and Koveos, 2008). Other scholars have called for more dynamic (time and context dependent) and robust frameworks (Patel and Rayner, 2012) arguing for the importance of representing contexts, content, and variability more richly (e.g. Gannon, 2005).

Based on the above conversation, we have selected 'Cultural Resource Sets' to model cultural differences. This model is flexible and robust, and it fits closely with our focus on the 'markets' perspective. It is accommodating of a number of characteristics that can be inferred as 'necessary' based on the going conversation on the modeling of cultural differences. These characteristics include the fact that individuals' have multiple and complex identities, cultural differences are dynamic and varying with time and contexts, they are content-rich and can have diversely different origins (as opposed to being mostly national), and are more accurately represented by a 'set' of elements rather than a 'value' or a 'dimension'.

1.2 Cultural resources and excess meaning

Cultural resource sets are sets of elements (cultural resources) that include artefacts possessing 'excess meaning'. This 'excess meaning' links the different elements within the resource set together and with the culture's value themes. Although it can mean very little to individuals with no link to a specific culture, it can – by connecting to other elements (to whichever level in the hierarchy proposed by Schein (1984) they belong: artefacts, values, or assumptions) within the 'Cultural Set' – lead to various cognitive, affective, and behavioural impacts in individuals identifying with that specific culture.

People identifying with the American national culture for example will recognize and react in specific ways when encountering artefacts and symbols representing this culture as they respond to the excess meaning contained in them. They will likely think differently and experience a different set of feelings. Seeing the statue of liberty, or the flag, might for example, in addition to being recognized more extensively, bring to memory other elements and symbols belonging to the cultural set, or even values that are thematic of this culture like liberty or individualism.

1.3 Innovations and the continuum of radicalness

Innovations, defined as ideas, practices, or artefacts, perceived as new by the relevant unit of adoption, can be considered to constitute a continuum whose distribution is captured by the degree of radicalness. Radical innovations represent fundamental and revolutionary departures from the existing practice, while incremental ones only represent minor departures. An increased new knowledge component and higher risk are associated with the radical side of this continuum (Dewar and Dutton, 1986). There are specific needs in innovation communication and persuasion contexts (product, service, or even social) for extra cognitive clarity, affective influences, and behavioural impacts. These needs, intended to offset the inherent increases in complexity and ambiguity, are expected to increase as we move to the 'radical' side of the continuum.

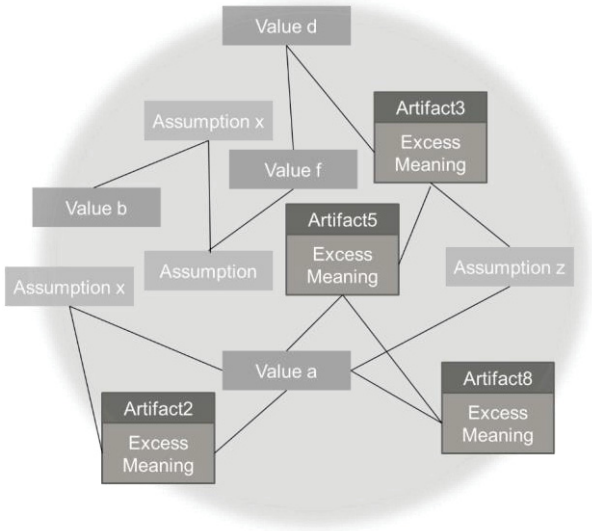

Figure 1: A Model of a Cultural Resource Set

2. Mechanics: Innovation Dilemmas and Affect, Cognition, Behaviour

"Cultural Resource Sets" are templates on which actors can build to construct meanings and novel actions, and this is where our modeling particularly contributes to the innovation discourse. It is our argument that this cultural set will be able to imbue messages on which it is invoked with affective and cognitive traces, leading to behavioural impacts. The 'meaning transfer' process (from the cultural resource, to the message, to the message subject), mediated by excess meaning, happens through the use of certain literary devices, like metaphors, analogies, allegories, and stories, and through general mechanisms by which meanings and affect move from one context to another (Nanaka, 1991; Boje, 1999; Hirschman, 2000; Holt, 2002; Morris & Waldman, 2011). The cultural resource sets model focuses on 'visible' (or 'audible') elements that can be communicated and expressed explicitly, while carrying 'excess meaning' that isn't explicitly represented. This enables the model to give an insight into the role of communication devices in loading messages with this extra meaning.

2.1 Cultural resources and affective gains

In the absence of enough information and structured detailed analysis, individuals can be expected to respond quickly to novel situations by invoking emotionally grounded responses (Kahneman and Tversky, 1982). Increases in uncertainties within the innovation adoption process thus can lead to increasing reliance on affective and emotional dimensions.

Values, which are higher-level cultural components (Schein, 1984), invoked by excess meaning contained in cultural resources, frequently serve as criteria to justify personal actions and decisions, and to evaluate people and events (Byrne and Bradley, 2007). Moreover, culturally-driven improvements in socio-political (Suchman, 1995) or cultural legitimacy (Archibald, 2004) of certain actions can affect these evaluations.

Cultural integration changes the expressive potential of an innovative item, and assists in the formation of personal narratives including it, improving the overall affective evaluation of a novelty, and increasing the consumer's level of involvement (Petty & Caccioppo, 1979). A 'more positive' affective attitude towards innovations framed in relation to cultural resource sets, especially when these innovations are more radical (and thus more uncertain) and uncovers some mediators of this effect (namely legitimacy, expressiveness, and involvement).

All this is supported by Polegato and Bjerke's (2009) description of the relation between overall liking of an ad, and liking a specific element-component within it.

2.2 Cultural resources and cognitive gains

Cultural resources can form cognitive structures that can inform decision making and action (Emirbrayer & Goodwin, 2008). According to the Elaboration Likelihood Model (Petty & Caccioppo, 1979) a higher level of involvement and more content-based processing can be expected for messages related to more 'personally significant' products and messages. We can expect the integration of cultural resources to increase the perceived personal relevance of a message/product since it invokes personally meaningful ideas. Cultural Resources have been demonstrated to contribute to adding a layer of meaning (familiarity) to otherwise-commoditized products (Kebir and Crevoisier, 2008). The 'familiar' aspect within the included cultural resource can provide a starting unambiguous island within an otherwise complex message.

Cognitive fluency, defined as the ease of ongoing conceptual and perceptual cognitive responses, leads to judgments of frequency, correctness, fame, among other factors, when experienced (Unkelbach, 2006). Because of the familiar links within a positively valued set of cultural resources (by definition), we expect higher fluency for processing these messages to result.

Integration of cultural resources in innovation-promoting is expected to have a positive cognitive effect by better integrating the product within an existing cognitive system.

2.3 Cultural resources and behavioral gains

The functions of understanding, reaction, legitimation, and potential action demarcate how culture constitutes the world by supplying it with meaning (McCracken,1986). Culture can, according to Noordegraaf and Vermeulen (2011), be 'actualized strategically to achieve results'. Cultural resources can be utilized as such in different situations to construct action strategies (Swidler, 1986). The role of cultural resources as a tool for mobilization and motivated action becomes more evident as it creates resonance by combining the cognitive and affective, while providing the legitimate and contextually-valid action route. The previously discussed gains, on the cognitive and affective dimensions will be expected to contribute to making the behavioural response (willingness to act) more pronounced.

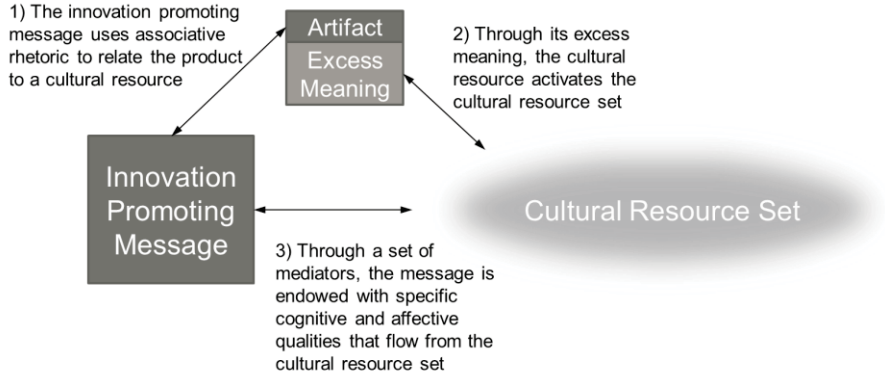

Figure 2: Cultural Resources and the flow of meaning

3. Hypothesis Statements

Based on the above discussion, we present the three sets of Hypotheses that describe the expected responses of consumers to different types of innovation-promoting messages:

H1C (H2C, H3C): Innovation-promoting messages, integrated with favourable cultural resource sets, correspond to affective (cognitive, behavioural) gains when compared to:

1. A : similar ads not integrated with those resources, and,
2. B: enhanced ads focusing on cognitive and behavioural (affective and behavioural, affective and cognitive) responses.

H1G (H2G, H3G): Innovation-promoting messages, integrated with cultural resource sets, correspond to a more favourable affective (cognitive, behavioural) ad outcomes when the cultural resource is more positively-valued.

H1I (H2I, H3I): Messages with higher uncertainty, ambiguity, and complexity [corresponding to more radically innovative products] will be associated with higher affective (Cognitive, Behavioural) gains when integrated with favourable cultural resources.

H1M: Affective gain on the evaluation of innovations (due to cultural resources) is partially mediated by increased legitimacy, expressiveness, and involvement.

H2M: The cognitive gain on the evaluation of innovations (due to cultural resources) is partially caused by increased cognitive fluency and elaboration likelihood.

H3M: The behavioural gain on the evaluation of innovations (due to cultural resources) is partially caused by increased legitimacy, and improved cognitive and affective outcomes.

4. Experiment and Results

4.1 Experiment description

A randomized 3x2 between groups web experiment was used to validate the hypotheses. One of fourteen ads is randomly shown to test subjects, and their assessment and responses are recorded afterwards. The ads belong either to a radically innovative product, or to an incrementally innovative one (less complexity, more certainty). For each product, there are three types of ads. Plain Ads contain a basic explanation of the products. Enhanced Ads are three ads containing improvements beyond the plain ads, including celebrity endorsement, promotion, and extra explanation. Cultural Ads are three ads that contain and utilize elements belonging to one of three cultural resource sets: A national culture (US), an occupation-related culture (IT), and one originating from cultural industries (Superhero).

The dependent variables (affective outcome, cognitive outcome, and behavioural outcome), and the mediators (legitimacy, elaboration likelihood, involvement, expressiveness, narrative…), were self-reported and measured using instruments previously used in the marketing and consumer behaviour literature. The independent variables were the existence and degree of cultural affiliation, which was measured determining cultural salience, cultural love, and cultural identification.

4.2 Summary of findings

Almost all the hypotheses are supported and significant (5%), with the exception of H1CB, H2CB, H3CB, which were only partially supported (10% significance). This is mainly attributed to Enhanced/Explanation ads performing better than expected, where their cognitive improvements extended to the affective and behavioral dimensions as well. We can say based on our experiments that:

1. General: Inclusion of a Cultural Resource Set can significantly modify the affective, cognitive, and behavioral outcome of the innovation-promoting message containing it.
2. Quantitative generalization: a more favorably viewed cultural resource set has a greater its ability to improve affective, cognitive, and behavioral outcomes of an including ad.

3. Innovativeness: The impact of Cultural Resources is moderated by the degree of innovativeness. The 'familiarity' of cultural resources fills in the gap and compensates for increases in ambiguity and complexity, causing more obvious gains in cases where a product is seen as more radical.
4. Mediation: The mediation analysis describes the routes by which different dimensions of impact happen. It was done following the methodology proposed by Hayes (2013). Legitimacy, expressiveness, involvement, and elaboration likelihood are found to mediate the impact of cultural resource sets on outcomes.

5. General Discussion

The paper presents a practical and applied modeling of cultural variables, particularly suited for understanding their effect in cases of increased complexity and uncertainty (innovation). The model of the Cultural Resource Set, integrates different levels of understanding, starting from visible artefacts, to the underlying network of meanings and values that is accessed by the 'excess meaning' component. The effects of inclusion in innovation promoting messages are projected into three dimensions: affective, cognitive, and behavioural. The latter is achieved partly due to the effects of the prior two, and the overall effect happens through a set of mediators that are explored and validated.

The fact that gains on evaluation outcomes attributed to favourable Cultural Resource Sets was much more pronounced in cases of increased innovativeness, helps shed the light on a phenomenon in which the familiarity contained within cultural resources was bridging the affective and cognitive gaps caused by the decreased familiarity of the innovation. Cognitively, whether a higher level of understanding was truly achieved due to the inclusion, or whether the understanding was perceived (wrongly) as being higher, the fact remains that the perceived cognitive deficit was compensated for. The affective deficit caused by increased uncertainty was similarly reduced, helping illuminate the processes of flow and transfer of meaning and affect from the Cultural Set to the innovation with which it was being associated.

Also, the inclusion of a wide set of possible mediators from the literature, helps position this research and link it to existing work in the field. The mediators of Elaboration Likelihood (Ability and Motivation), Legitimacy (Socio-political and Cultural), Narrative (Drama and Personal Story), Expressiveness (Personal and Social), and Perceived Credibility, all help understand the mechanisms by which Culture can frame our responses to novel situations and offerings.

6. Contributions and Managerial Implications

The modeling for culture presented in this paper focuses on a 'markets' perspective and transcends a number of dimensionalist approaches that are static, usually nationalistically oriented, and unitary. Instead the 'Cultural Resource Sets' view is dynamic, pluralistic, and flexible. The research expands the marketing innovation literature, by examining cognitive, affective, and behavioral consumer responses to innovations with varying levels of complexity and uncertainty. It also integrates the findings to the existing literature by exploring and validating variables that mediate these responses.

Managerially, the work presented can serve as a utility for understanding actionable consumer collective (cultural) characteristics, that can be harnessed as a latent resource. It also presents a different approach to bridging complexity gaps caused by innovations under specific circumstances. Overall, the work can contribute to efforts for managing complexity in a global and increasingly pluralistic marketplace.

References

Baskerville, RF. (2003). Hofstede Never Studied Culture. Accounting, Organizations, and Society 28: 1-14.

Byrne, G. J., & Bradley, F. (2007). Culture's influence on leadership efficiency: How personal and national cultures affect leadership style. Journal of Business Research, 60(2), 168.

Darke, P.R., A. Chattopadhyay, & L. Ashworth. (2006), "The importance and functional significance of affective cues in consumer choice," Journal of Consumer Research, 34, 323-328.

Emirbrayer M, Goodwin J. 1994. Network Analysis, Culture, and the Problem of Agency. American Journal of Sociology 99(6): 1411-1454.

Gannon, M. J., Locke, E. A., Gupta, A., Audia, P., & Kristof-Brown, A. L. (2005). Cultural Metaphors as Frames of Reference for Nations: A Six-Country Study. International Studies Of Management & Organization, 35(4), 37-47.

Hayes A.F. (2013) Introduction to mediation, moderation, and conditional process analysis: a regression based approach. New York, United States: The Guilford Press.

Hofstede, G. (1983). National Cultures in Four Dimensions: A Research-based Theory of Cultural Differences among Nations. International Studies of Management & Organization, 8(1-2): 46-74.
House R, Javidan M, Hanges P, Dorfman, P. (2002). Understanding Cultures and implicit leadership theories across the globe: an introduction to project GLOBE. Journal of World Business, (37): 3-10.
Jackson, T. 2011. From Cultural values to cross-cultural interfaces: Hofstede goes to Africa. Journal of Orgnaizational Change Management 24(4): 532 – 558.
Kahneman, D., Slovic, P., & Tversky, A. (1982). Judgment under uncertainty: Heuristics and biases. Cambridge, England: Cambridge University Press.
McCracken, G. (1986). Culture and Consumption: A Theoretical Account of the Structure and Movement of the Cultural Meaning of Consumer Goods. Journal Of Consumer Research, 13, 71.
Patel, T., & Rayner, S. (2012). Towards a Transactional Approach to Culture: Illustrating the Application of Douglasian Cultural Framework in a Variety of Management Settings. European Management Review, 9(3), 121.
Petty, R. E., & Cacioppo, J. T. (1981). Issue Involvement As A Moderator Of The Effects On Attitude Of Advertising Content And Context. Advances In Consumer Research, 8(1).
Polegato, R., & Bjerke, R. (2009). Cross-Cultural Differences in Ad Likeability and Ad Element Likeability: The Case of Benetton. Journal Of Promotion Management, 15(3), 382-399.
Reimer, S., & Leslie, D. (2008). Design, National Imaginaries, and the Home Furnishings Commodity Chain. Growth And Change, 39(1), 144-171.
Schein, E. H. (1984). Coming to a New Awareness of Organizational Culture. Sloan Management Review, 25(2), 3.
Swidler, A. (1986). 'Culture in Action: Symbols in Strategies', American Sociological Review, (51) 2: 273–86.
Tang L, Koveos P. (2008). A Framework to update Hofstede's cultural value indices: economic dynamics and institutional stability. Journal of International Business Studies 19: 1045-1063.
Unkelbach, C. (2006). The Learned Interpretation of Cognitive Fluency. Psychological Science (Wiley-Blackwell), 17(4), 339-345.
Woodside, A. G., Sood, S., & Miller, K. E. (2008). When consumers and brands talk: Storytelling theory and research in psychology and marketing. Psychology & Marketing, 25, 97.

Appendix A: Ads

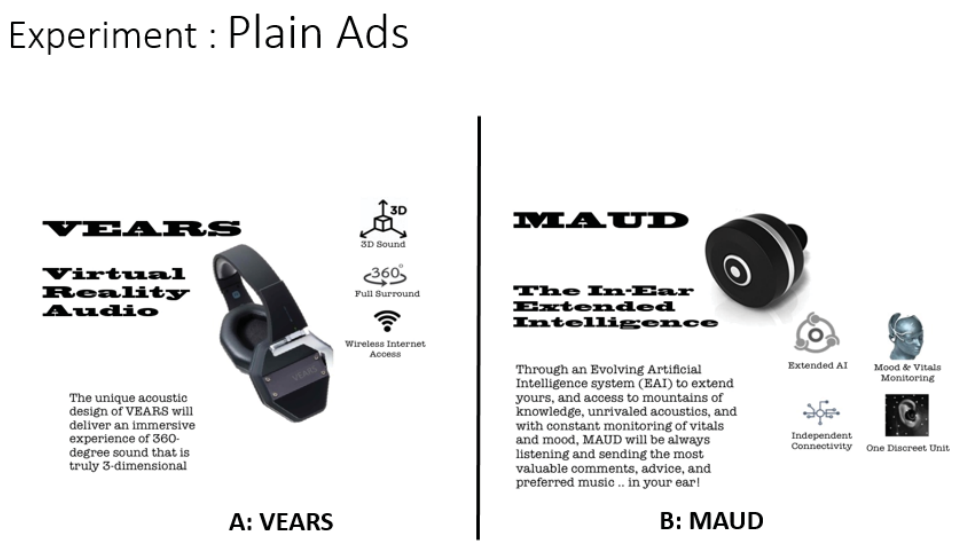

Figure 3 : Plain Ads for VEARS (incrementally innovative) and MAUD (radically innovative)

Figure 4: Cultural Resource Set Ads : US_National , Hero_Industry , IT_Professional

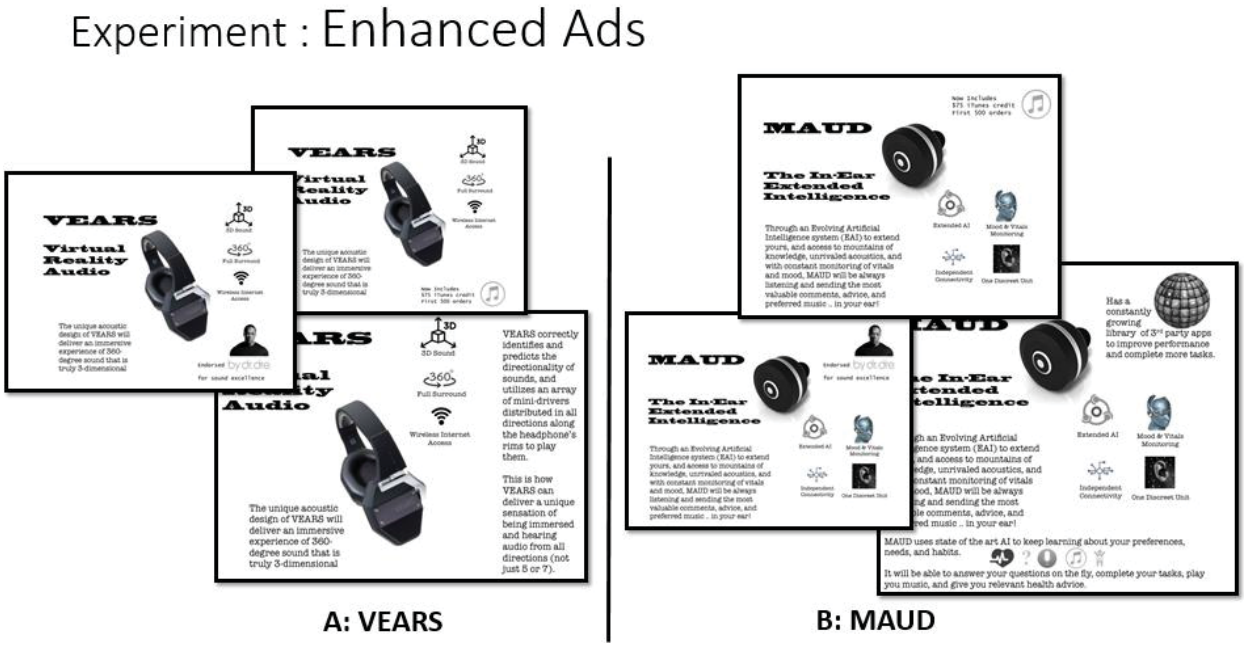

Figure 5: Enhanced Ads : Celebrity (Dr. Dre) ; Promotion (itunes Coupon), Extra Text Ads

Appendix B: Results

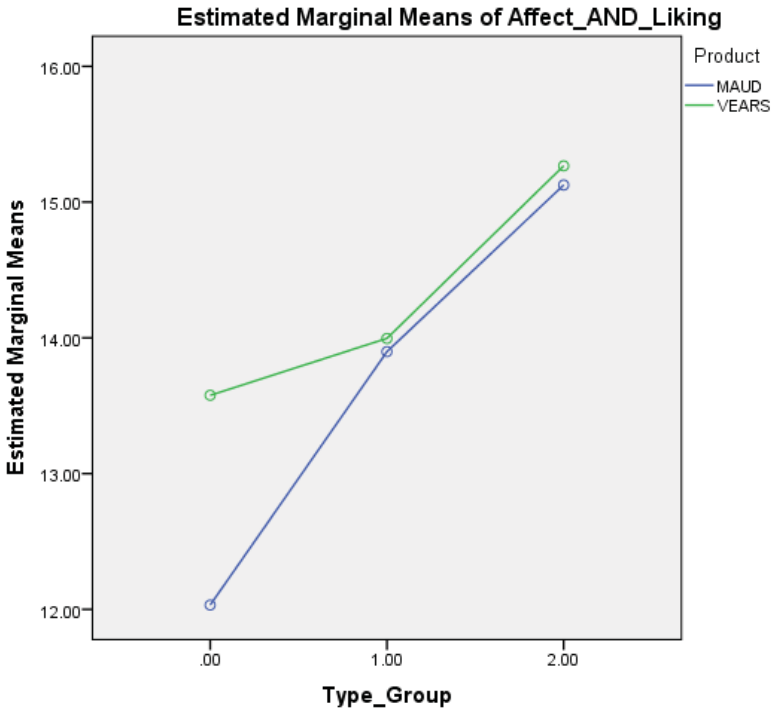

Figure 6: The Affective response for different types of ads (0 : Plain , 1 : Enhanced , 2 : Cultural-Favourable) for different innovations (MAUD : Radical , VEARS : Incremental)

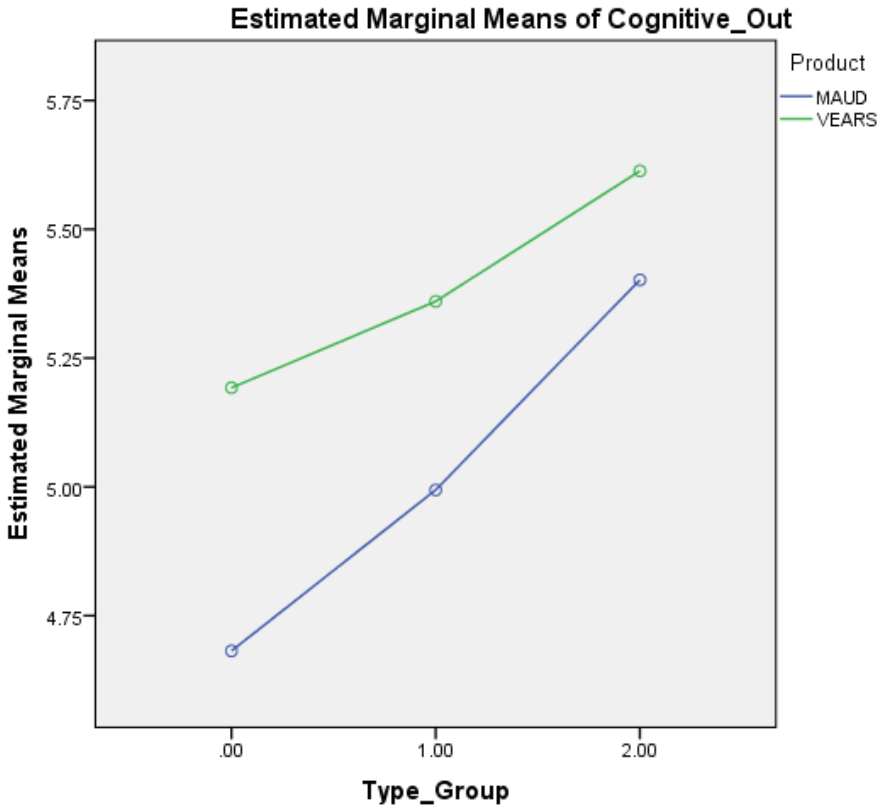

Figure 7: The Cognitive response for different types of ads (0 : Plain , 1 : Enhanced , 2 : Cultural-Favourable) for different innovations (MAUD : Radical , VEARS : Incremental)

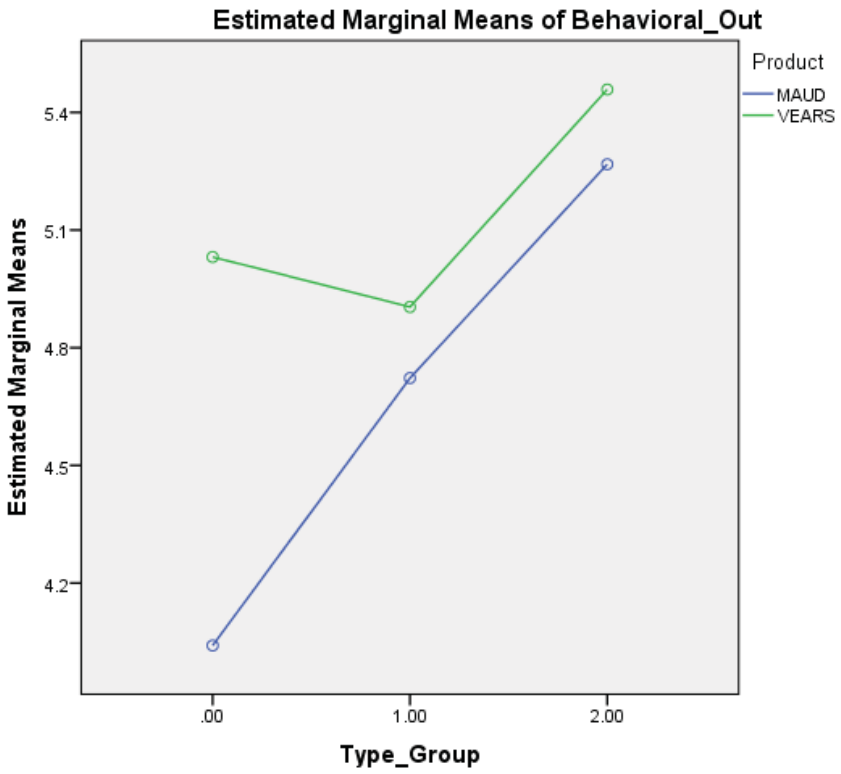

Figure 8: The Behavioural response for different types of ads (0 : Plain , 1 : Enhanced , 2 : Cultural-Favourable) for different innovations (MAUD : Radical , VEARS : Incremental)

Features of the Formation of a Complex of Marketing Communications of Social Innovative Projects

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Abstract: The active use of the innovative approach to the development of individual organizations and national economies has already proved its effectiveness. In a long list of technological, food related, organizational and other innovations that have already become customary, a special place today is occupied by social innovations. Innovations in the social sphere are designed to provoke social changes and promote the solution of socially important tasks by introducing new ideas, technologies, and strategies. The innovative approach to the organization of activities has traditionally been enhanced by the use of project management technologies. This leaves an imprint on the methods of using marketing tools to accompany social innovation. After all, marketing technologies can ensure the effectiveness of each stage of the life cycle of the project, from the initiation of social innovation to ensuring its acceptance by potential receivers of social benefits. The importance of the competent use of the complex of marketing communications in raising the effectiveness of social innovation projects is justified within the framework of this research. The study also defines additional requirements for the technology of forming a complex of marketing communications of social innovations imposed by the use of the project approach. These requirements relate to an additional target-oriented, timing and resource integration of social innovation project marketing communications. The paper also presents the results of the first stage of research aimed at identifying the features of the formation of a complex of marketing communications of social innovation projects initiated by two groups of entities: representatives of government bodies and representatives of commercial organizations.

Keywords: marketing communications, social innovative projects

1. Introduction

Social innovations today are not just one of the ways of solving such problems as poverty, ecology and aging. Social innovation is being seen as the source of systemic solutions and a proactive rather than reactive mechanism for managing to social problems.

The World Economic Forum (2017-2018) announced studying and replicating successful models and practices of social innovation to be one of the main tasks. At the same time, empathizing on the possibility of creating both a commercial and social value with the help of social innovations.

Social innovations - new ideas that meet social needs, create social relationships and form new collaborations. These innovations can be products, services or models addressing unmet needs more effectively (European Commission, 2018). It is possible categorize projects directed on creation of new social systems, education systems, public health services, systems of public communications as social innovations projects. These projects create new socially significant results using innovative approaches and / or technologies. The results of social innovation projects must cause social changes in society.

One of the main tools that provoke both the emergence and implementation of social innovation projects is marketing. The specificity of social innovation projects requires a more attentive attitude to marketing communications.

The purpose of this study is to identify features of the formation of a marketing communications complex of social innovation projects.

To achieve this goal, the following tasks are being accomplished within this stage of the study:

1. Identify the features of the formation of a marketing communications complex of social innovations projects, which are caused by using the project approach;
2. Identify features of the formation of a marketing communications complex for social innovation projects, depending on the type of initiating entity of the social innovation project;

3. Identify the features of the formation of a marketing communications complex of social innovations projects, depending on the willingness of the external environment to provoke the creation and accept the results of social innovation projects.

2. Theoretical foundations

Unfortunately, some fundamental works are not devoted to the problems of developing a marketing communications complex for social innovation projects. But today great results have been achieved in researching the theory of different types of innovations, their nature, t features of the innovation process, evaluating innovation potential by scientists such as Schumpeter (1934), Peterson (1972), Brown (1995), Trifilova (2003, 2005), Bessant and Tidd (2007, 2009), Glazyev (2003,2010,2011), Gokhberg (2007,2019,2013). Today such scientists as Phills, Deiglmeier and Miller (2008), Mulgan, Tucker, Rushanara and Sanders (2007), Bates (2012) are engaged in studying issues of social innovation.

A lot of fundamental and applied research is devoted to the marketing of innovations. And today is a special marketing innovation engaged Christensen and Bower (1996), Christensen (1997), Gupta and Lehmann (2004), Gupta and Mina (2008), Day (2011), Kotler (2012).Some works are devoted to the development of social marketing: Domegan, (2008), Kotler et al., (2002); Andreasen, (2002), Hastings (2003).

Various aspects of project management are at the center of attention of Archibald (1976, 2003), Razu (1994), Baguley (1999), Fischer (2000), Tovb and Tsips (2003), Voropaev (2006) and other famous scientists.

3. Methodology

The main methodological approach was the integration approach, which assumes simultaneous research both vertically (between individual elements of the management system) and horizontally (at different stages of the life cycle). This approach allows us to consider the possibility of managing marketing communications of the social innovations project within the framework of a diverse portfolio of projects of various types of organizations. The integration approach allows us to consider the issues of increasing the effectiveness of marketing communications of social innovation projects in the context of minimal marketing budgets. In addition, the used approach allows us to consider the simultaneity of the formation, with the help of marketing communications, of a positive attitude toward a concrete project of social innovations and form an environment conducive to their emergence and development.

We also used a project approach that determines the possibility of using various methods and tools of project management in the marketing support of social innovation projects.

For the collection of primary information, we used methods of included and unincorporated observation, questioning and expert survey. The paper presents the results of the first phase of the study, implemented from 06/2017 to 04/2018. Fifty-four projects were analyzed during the study. The sample structure is presented in Table 1.

Table 1: The structure of the sampling of social projects in Omsk

Social project typology	Type	Type		Term, months			Social change presence	Territory of impact	
		Project	Program	Up to 6	6-12	Over 12		City	AD*
Innovative	69%	82%	18%	42%	47%	11%	100%	76%	24%
Not innovative	31%	100%	0%	100%	0	0	79%	0	100%

* AD - Administrative District

Questionnaires were created at various stages of the project life cycle to determine the features of marketing support for social innovation projects. Seventy-eight respondents were questioned: managers of social projects and subjects responsible for marketing support of 54 analyzed projects.

An expert survey was used to assess the level of development of the environment conducive to the emergence and spread of social innovations. The group of experts included 7 people: project managers, implementing projects of social innovation for at least the last five years, representatives of authorities responsible for the social sphere development.

4. Research and results

4.1 Features of the formation of marketing communications complex of social innovations projects, depending on the state of the marketing environment

A survey of experts aimed at assessing the readiness of the regional environment to provoke the creation and accept the results of social innovation projects showed an average level of readiness of 3.86 out of 10 (for details see Table 2).

Table 2: The results of the assessment of experts on the readiness of the environment for social innovation (0-10)

№	Criterion for assessing the readiness of the environment	Assessment
1	Formation of different audiences interest to social innovations	2
2	The availability of social initiatives	4,1
3	The provocative nature of innovation by the regional environment	6,3
4	Information provision of real and potential consumers of social innovation	2,7
5	Integration of the processes of creating and implementing social innovations	4,2
Simple average for all criteria		3,86

Let us consider the impact of each criterion for assessing the readiness of the environment from the table by 2 to form a complex of marketing communications.

1. 1. Edelman research in 2015 showed that the barometer of public confidence in business is at its lowest level since 2008. In these conditions, the complex of marketing communications of any social innovations project should constantly create impulses that enhance the understanding of representatives of various business spheres to demonstrate their own, for example, corporate social responsibility through participation in the development and implementation of similar projects.

   However, involving representatives of the initially "non-social" business in social innovation projects requires the formation of marketing tools for identifying and assessing the impact on the image of companies of their participation in a particular project. Then companies will be able to assess the changing marketing environment, and more successfully build mechanisms for impact on it. The project marketing communications complex should include universal tools, tools and integrated communication technologies that simultaneously attract new "non-core" participants to the social innovation project and the willingness of the environment to accept the results of similar projects. Unequivocally, the low value of the indicator of the formation of interests in projects of social innovations is not only the result of an unbalanced complex of marketing communication support for projects. But experts have assessed this impact as determining.

2. Formed complexes of marketing communications of already implemented social innovations projects should influence the development of the market of social innovations. The already implemented projects, access to successful practices, transparency of the infrastructure mechanisms of this market directly indicate the formation of the market, the availability of social initiatives to any interested entities. Experts noted that they only found out about the possibility of taking a part in the creation of social innovation projects or about the possibility of joining existing projects through formal and informal marketing communications projects. Similarly, experts noted the significant impact on the perception of the availability of the implementation of social innovation marketing communication support for projects at the early stages of the life cycle of the project. This ensures the achievement of the "transparency of technology" effect of the project.

3. The marketing environment of the region should not only facilitate, but also provoke innovation.
   This is a large-scale task. It can not be solved even with the integrated tools of the marketing complex of individual social projects. This task can be solved more effectively within the framework of marketing support for projects united in programs. The initiators of such projects are the state-owned and municipal institutions or directly the authorities. Due to the specifics of the organization of

activities of these structures in Russia, the technology of forming a complex of marketing communications projects is less flexible and complex in budgeting and approval procedures.

4. According to experts, one of the serious problems of the development of social innovations is the unreadiness of consumers to choose (consume) products of social innovation. Intermediate results of a survey of potential consumers, launched in March 2018, allows us to conclude that information on social innovations is unavailable through traditional information channels for these entities. Accounting for the principles of stimulating marketing and the continuity of the impact of a complex of marketing commutations, as well as inter-project integration of communications should solve this problem.

5. Experts noted that the problem of the integration of processes of creating and implementing social innovation projects is not yet sufficiently well resolved. In Russia, there is an active growth of projects to create social innovations, but they do not always end up being introduced. Marketing communications, formed within the project creation project should provoke the interest of the parties interested in its implementation.

4.2 Features of marketing communications related to the project nature of social innovations management

In earlier studies (Chernobaeva, 2013), we identified features related to the project nature of innovation management, but not dependent on the type of innovation:

1. Marketing support of an innovative project should simultaneously provide a marketing impact on a multi-level target audience.
2. When organizing marketing support for innovative projects, internal marketing tools are of particular importance.
3. Marketing support of innovative projects should be carried out continuously at all stages.

Let us briefly consider the manifestation of these features within the process of forming a set of marketing communications for social innovation projects.

In the course of analyzing the readiness of the regional environment for social innovations, we have already noted the need to influence social innovation projects on a multi-level target audience. The projects analyzed during the research allow us to say that the marketing impact on the representatives of the authorities is of great importance. This is due to the fact that 100% of the analyzed projects of social innovations were implemented on the terms of full or partial funding from the grant support provided by federal, regional or local authorities. Representatives of target audiences, which promote the replication of the technologies of social innovations or products of their use, were also noted.

The most significant impact audiences were identified for the main groups of analyzed social innovation projects with the use of the questionnaire. The survey revealed the priorities in the technology of forming marketing communications used by the project managers used today. The results are shown in Table 3. When developing the technology for forming an IMC complex, it is necessary to clarify the actual significance of each group of entities.

Table 3: Distribution of marketing communications influence priorities for target audiences of social innovation projects * (1-10, where 1 is the maximum significance of the audience)

Subjects / Project Groups	Project product consumers	The project team	Representatives of public authorities	Investors	Sponsors	Contractors, subcontractors	Public interest groups	Independent experts	Non-governmental organizations	Mass media
Creative development	1	2	6	4	3	9	5	7	8	5
Civil-patriotic education	3	4	1	7	5	6	2	3	7	2
Education	1	2	1	5	3	6	1	2	4	1

Ecological education	2	3	1	5	2	6	3	4	4	2
Physical Culture and sport	1	2	1	2	3	5	2	3	4	2
Prevention of deviant behavior	3	2	1	3	2	7	4	6	5	5

*1-10, where 10 - the maximum significance of the audience. The definition of audiences as equivalent was allowed.

The abundance of internal marketing communications used to increase the effectiveness of the project assumes increased importance in projects of social innovations. After all, the main function of internal marketing is to improve the level of satisfaction of the company's employees in order to improve customer satisfaction. Social innovation projects require a high level of involvement in solving other people's problems. However, initially non-responsive subjects may be involved in the project team. The complexity of the subject area of the project, the focus on social changes at different levels, requires maximum social involvement not only of the team members, but of the entire organization. Solve this problem, create a constant sense of its participants a sense of satisfaction and pride in the results of their work, a feeling of optimism will help soft instruments of internal marketing communications.

Continuity of marketing support for projects at all stages of the life cycle of social innovation projects is complicated by the principle of a credible change in the number of stakeholders. Possessing low profitability, but high heterogeneous risks, determined at times by long periods of innovation development, most projects at any stage of the life cycle try to attract additional investors. Marketing communications aimed at this group of breakers should be changed depending on the increment of positive results of the implemented stages of the project. The transmitted information must clearly communicate the real commercial, marketing and social benefits of the investor.

Already considered requirements for marketing communications of social innovation projects, determined by the level of readiness of the environment, also determine the need for uniformity and continuity of impact on all subjects of the market of social innovations.

Listed features of marketing support for social innovations managed using the project methodology, in our opinion, are complicated by the need to include the complex of marketing communications of the project in the already existing marketing policy of the enterprise. This can be done only through careful integration of all marketing communications that accompany the emergence of a new social value as a result of the project activity, with the already formed or still forming image of the company. At the same time, the results of the survey showed that special importance should be given to Target (by purpose), Time (in time), and Resource (by resources) integration.

From the point of view of the project management process organization, it better to raise the about the initial development of the marketing complex of any type of project aimed not only at bringing the results of the project activity to the consumer, but also the complex that reinforces or corrects the existing image enterprise, rather than the issue of "inclusion".

4.3 Features of the marketing communications complex, depending on the type of initiating entity of the social innovation project

Social entrepreneurship projects are realized by subjects of different types and forms. In the course of our study, we have projected projects with partial or full coverage of expenses at the expense of various grants. As we have already noted, the peculiarity of social innovation projects is the involvement in the project implementation of a large number of subjects of various types and organizational and legal forms.

The hypothesis of this stage of the research was that the marketing communications management can be implemented both by the initiator and other participants. At the same time, the integrated marketing communications management system (IMCMS) will be modified, which will require the development of several types of management models.

This hypothesis has not been confirmed. Table 4 presents the structure of the analyzed projects according to the origin of the initiators to different groups.

Table 4: The structure of the analyzed projects according to the origin of the initiators to different groups

	State organizations and authorities	Commercial organizations,	Parity participation of state and commercial organizations	Individuals	Non-Profit Organizations
Initiator of the project	68%	13%	16%	0%	3%
Participation of representatives of other organizations in the project team	100%	83%	100%	0%	100%
Do not transfer responsibility for MCMS	100%	100%	100%	0%	100%

The initiator of the majority of the analyzed projects are state organizations and representatives of authorities of different levels that do not transfer marketing communications projects of social innovation projects to the entities that implement it. This phase of the study will be completed in December 2018.

The technologies used today in the Omsk region to form a complex of marketing communications by commercial organizations and state organizations are significantly different in terms of the low level of strategic integration for the purposes of the latter. For commercial organizations where social innovation projects are implemented in parallel with typical commercial projects, the issue of forming strategic programs or project portfolios is acute, with the corresponding synergistic effect of joint management, on the combination of social and commercial benefits, and the multiplicity of communication effect.

5. Conclusion

The paper presents the results of the first stage of the study of the features of the formation of a marketing communications complex for social innovation projects in a particular region. The obtained results allow us to draw a conclusion about the expediency of using project management tools to ensure the continuity of the communication impact of similar type's projects on representatives of a multi-level target audience. Studies have shown the dependence of the priority of the impact on different target audiences depending on the scope of the social innovation project.

The project approach also allows us to provide integration processes in management of marketing communications of projects. The conducted survey showed insufficient experience and, as a result, low indicators of integration of marketing communications by goals, time, and resources. Detailed study of technologies for integration of marketing communications in these areas will be devoted to the following stages of the study.

The non-confirmation of the hypothesis about the transfer by the initiators of the project of marketing communications management to representatives of other companies in the project team led to the exclusion from the research plan of the development phase of the adaptive mechanism for the transfer of control functions of the IMC.

The study also made it possible to determine that organizations do not fully use the tools of project management in the practice of marketing support for social innovations. Although in the context of "low" budgets and the need to accumulate and subsequently replicate successful practices, it is advisable to use the formation of "project archives" and individual "problem projects". Inclusion of these tools in the process of forming an integral complex of marketing communication support for social innovation projects will be one of the tasks in achieving the main objective of the study.

References

"Annual Report 2016-2017. World Economic Forum" (2017), [online], World Economic Forum, http://www3.weforum.org/docs/WEF_Annual_Report_2016_17.pdf pp 14/

Barkalov S., Voropaev V. & Sekletova G. (2005) Mathematical foundations of project management. Moscow: Higher School.

Bates, S. (2012) The social innovation imperative, New York: McGraw-Hill

Brown, S.L. & Eisenhardt, K.M. (1995) “Product Development: Past Research, Present Findings, and Future Directions”. Academy of Management Review, 20, 343-378.

Fathutdinov, R. (2008) Innovation Management. Sanktpiterburg. Findings, and Future Directions”. Academy of Management Review, Vol. 20, No. 2, pp. 343-378.

Gerasimov, V. and Cherednikova, L. (2007) Project management: objectives, methods and tools. Siberian Academy of Finance and Banking, Novosibirsk.

Growth. Social Innovation. (2018), [online], European Commission, http://ec.europa.eu/growth/industry/innovation/policy/social_en

Mazur, I. & Shapiro, V. (2009) Project management: international approach. Directory of professional, Moscow.

Mazur, I. (2010) Project management, Moscow.

Mulgan, G., Tucker, S., Rushanara, A. & Sanders, B. (2007) Social innovation: what it is, why it matters and how it can be accelerated. [online] Skoll Centre for Social Entrepreneurship, SAID Business School, Oxford. www.youngfoundation.org/files/images/03_07_What_it_is__SAID_.pdf.

Oslo Manual - Guidelines for Collecting and Interpreting Innovation Data (2010), 3rd Edition. Moscow.

Phills, J., Deiglmeier, K. & Miller, D. (2008) “Rediscovering Social Innovation”, [online], Stanford Social Innovation Review, Fall, https://ssir.org/images/articles/2008FA_feature_phills_deiglmeier_miller.pdf

Schultz, Don E., Tannenbaum, Stanley I., Lauterborn, Robert F. (1993), Integrated Marketing Communications: Putting It Together & Making It Work. NTC Books: Lincolnwood.

“Social Innovation A Guide to the Achieving Corporate and Societal Value” (2016), [online], World Economic Forum, Geneva Switzerland, http://www3.weforum.org/docs/WEF_Social_Innovation_Guide.pdf

Tidd, J. & Bessant, J. (2009) Managing Innovation: Integrating Technological, Market and Organizational Change. John Wiley & Sons Ltd. England.

Social Innovation: the Role and the Impact on Regional Development in Portugal

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Abstract: The field of social innovation has received scholarly and policy interest during the last two decades (Adams and Hess, 2010), this has been driven by increased attention to such trends as the social engagement of citizens, and different organizations, in innovative processes. This has been sharpened by criticism aimed at dominant classical business models and narrow economic outlooks on development that sometimes put aside the social development and the needs of societies where innovation is about solving social problems (Van der Have and Rubalcaba, 2016). However, despite the growing interest in research on social innovation, so far there is no universal definition of the phenomenon. This leads to the fact that social innovation studies lack a clear perspective on how to measure the successful implementation of social innovation. As a result, studies that are dedicated to the impact of social innovation in general and its impact in regional development specifically are still represented in a small scale. Answering the research question on how social innovation might influence the regional development, this paper aims to give an overview of the concept of social innovation. Based on this overview, the paper further explores the relationship between social innovation and regional development and the impact that social innovation might have on regional development. Following this, some ideas on how several existing approaches might be used in order to access the impact of social innovation in the regional development will be given. To illustrate the need for such metrics, the example of a social innovation implementation in Portuguese sub-region Baixo Alentejo will be presented.

Keywords: social innovation, regional development, impact of social innovation, regions

1. Introduction

In recent years interest in the applications and impacts of social innovation (SI) within the field of regional development has grown. The issues of social innovation and regional development have long been dealt with separately by the European Union in its policies, and by different groups of scholars and researchers. Only recently, awareness has grown that the regions are important areas for social innovation and that there is a need to merge the studies on social innovation together with regional development studies in order to better understand how social innovation emerges, develops and influences the reality in regions. Having perceived this research gap, this paper tries to investigate the theoretical approaches related to social innovation and focus on the impact that social innovation has regarding the development of innovative solutions to existing problems in a regional context.

This paper is interested in examining four key issues within the contemporary field of SI. These are: the ways in which SI is conceptualized; the links between SI and regional development; the ways in which its impact is measurable; and the effects of SI impact within a given region (here the paper looks at one example in the Baixo Alentejo sub-region of Portugal).

The paper breaks down into several key sections related to the abovementioned themes. Section 2 examines some of theoretical understandings that underpin notions of defines SI. This guides the paper's understanding vis-a-vis the object of study, and gives background on the main literature and trains of thought influencing research into this matter. In the next section the paper discusses the connection between SI and regional development (Section 3), examining both the theoretical and applied impacts. This implies that some changes may be attributable to the activities of SI organizations/actors, though, conversely, the same changes may be caused by distinct variables. As such, there is some discord in the literature about the manner in which one can reliably measure said impacts. In Section 4, this paper attempts to present two existing ideas on how to measure SI impact and how it might be further developed and applied for further research. Following previous sections, Section 5 provides an overview from the field of SI, its implementation and its impact based on the experience of the Association for the Development of the Municipality of Moura (A Associação para o Desenvolvimento do Concelho de Moura, ADCMoura) whose purpose is to support and promote the sustainable development of the municipality of Moura in the Baixo Alentejo sub- region. The paper concludes with a summary and suggestions for further investigation.

2. Social Innovation: definition and concept

According to the report prepared by the European Commission in 2013, social innovation represents the development and implementation of new ideas (products, services and models) that opt to meet social needs and create new social relationships or collaborations that also aim to provide new responses to existing pressing social demands, which affect the process of social interactions (European Commission, 2013).At the same time, a very similar definition was proposed by the CrESSI project where social innovation was defined as "the development and delivery of new ideas and solutions (products, services, models, markets, processes) at different socio-structural levels that intentionally seek to change power relations and improve human capabilities, as well as the processes via which these solutions are carried out" (Ziegler et al, 2017).

In the discourse about social innovation, Mumford and Moertl (2003) define social innovation as the "generation and implementation of new ideas about people and their interactions within a social system" (Mumford and Moertl, 2003). Further linking to the previous works of scholars, the author argues that social innovations are a specific form of representation for significant forms of creativity, that respectively lead to the formation of new institutions, new industries, new policies, and new forms of social interaction (Drazin, Glynn and Kazanjian, 1999). In this respect, social innovation changes reality not only by representing new solutions for existing problems but also by being a stimulus for institutional or organizational change.

Moreover, social innovation differs from other forms of creativity in that the development, and eventual implementation, of new ideas involves large numbers of people and alters their interactions. As a result, most forms of social innovation can be expected to require a substantial investment of resources, as well as elite support (Dougherty and Hardy, 1996).

Following previous ideas, Neumeier (Neumeier, 2012) in his article argues that, according to the common understanding of innovation, it is still mainly associated with the concepts of technical and economic innovation. This perspective leads to the argument that, whereas innovations associated with economics and technology are well researched and defined, "understandings of so-called social innovations are not as well elaborated" (Adams and Hess, 2008). In this matter there is a substantial difference between social innovations and, what scholars describe as, business innovations that are aimed at profit maximization and are distributed through or adopted by organizations that are primarily motivated by profit maximization (Mulgan et al, 2010). However, this comparison is very important in understanding the specific form that social innovation takes, or the way in which it is being developed and implemented. When it comes to social innovation, scientists often argue that the definition of such may become stymied by the nature of the phenomenon. Concentrating on technological innovations, scholars in the field of innovation argue that the complexity of societies and the different ways of introducing social innovation in those societies impose restrictions and challenges vis-a-vis social innovation.

Pol and Ville (2009), after discussing different ways of addressing social innovation, came to the conclusion that the term social innovation had several overlapping meanings, including concepts such as institutional change, social purposes and the public good (Pol and Ville, 2009). Based on these ideas, they suggest defining social innovation as "any new ideas with the potential to improve either the macro-quality of life (quality of life in relation to a group of individuals) or the quantity of life" (Pol and Ville, 2009). As a result, the authors suggest conceptualizing social innovations as driving forces for the improvement of the overall living conditions of people (Pol and Ville, 2009).

Moulaert et al. (2005), following on from other scholars, argue that social innovation is the structuring concept, and, according to these scholars, "for local development to be successful, various domains of intervention (economy, housing, education and training, local democracy, culture, etc.) had to be integrated" (Moulaert et al., 2005). For these authors social innovation is a comprehensive concept, pointing to a multidimensional process of social change. So it can be concluded that social innovations in the sense of Moulaert et al. are new forms of civic involvement that contribute to an empowerment of disadvantaged groups and lead to better citizen involvement which may, in turn, lead to a satisfaction of the unsatisfied needs of a given society, resulting in an improvement in the quality of life in a given environment.

On the basis of the above mentioned definitions, social innovation is understood in this paper to represent new ideas that attempt to meet social needs and improve the living conditions of people in a given

community at a given level (whether that be the local, regional or national) by providing new responses to existing pressing social demands, improving institutional structures, creating new opportunities for network building and interaction between actors, and involving people in decision-making.

Taking into consideration the above evidence, the literature suggests that SI is comprised of new ideas being deployed with an aim to provide solutions that meet social needs. SI tends to inspire changes in institutions, organizations and interpersonal interactions creating new realities that may produce greater civic involvement leading to empowerment for the socially disadvantaged. As a driving force for social purposes aimed at the public good, social innovation is distinct from innovation in the generalized private sector, which is driven by profit maximization rather than the social good. Furthermore, there is a possibility that technological and social innovations overlap and intersect.

Having defined what is understood by the term social innovation in this paper, focus now moves to the interplay between SI and regional development.

3. Social Innovation and the role it plays in regional development

Local and regional development, as well as the implementation of social innovation, has become an important activity for national, regional and local governments across the world since the 1960s and 1970s. Regional development is usually associated with the geography of welfare and its evolution, and it has played a central role in such disciplines as economic geography, regional economics, regional science and economic growth theory. Some authors point out that the concept is not static in nature, but refers to complex space-time dynamics of regions (Capello, Nijkamp, 2010). In the meantime, the context for local and regional development has experienced dramatic alterations caused by economic changes and the new challenges presented by globalization, which have made the performance of regions more challenging. According to Pike et al (2011), the economic system has become more internationalized, even 'globalized', knowledge intensive and competitive. This contemporary emergence has raised the specter of the "deepening of the unevenness in development for particular territories and sharpened geographical inequalities in prosperity and well-being of certain regions" (Pike et al, 2011). Thus, some regions have faced difficulties in both adjusting to their new environment and finding ways to improve their economic situation. In overcoming these difficulties and tackling the challenges, social innovation might be of a great help.

Social innovations are considered to be an important tool when it comes to regional development and also an important way to achieve competitiveness in remote or structurally weak regions (Dinis, 2006). According to Dinis (2006), regions face many challenges when it comes to their socio-economic situation, and in such circumstances the implementation of social innovations becomes crucial. Nevertheless, Dinis argues that innovative solutions can be found in these areas specifically because they face said challenges in the social and economic spheres of regional development. The argument presented by the author is that innovation and also marketing perspectives are useful tools for the implementation and adaptation of a sustainable strategy for these regions to progress both at societal and organizational levels.

As a result, debates about local and regional development have shifted from a focus on the quantity of development to a concern with its quality. Initially, this involved a focus on the impact of economic development on the natural environment and the constraints this placed on development, but has evolved into a more general concern with questions related to quality of life. To help in solving existing problems in such regions, social innovation and entrepreneurship are both seen as the driving factors for growth.

Moreover, scholars point out the importance of entrepreneurship in enhancing the innovative capacity and growth potential of regions. Simultaneously, the debate on entrepreneurship and innovation has prompted the emergence of new concepts such as innovative regions, innovative milieus, learning regions, or knowledge-based regions where innovation has become the critical survival factor in a competitive space-economy and, in turn, determines the direction and pace of regional development.

According to the literature, SI represents an opportunity to close some of the existing cleavages (economic, social, developmental etc.) between regions in the modern globalized world. It is thought to achieve this by stimulating competitiveness and being a driver for regional growth, as profits are fed back into the region and innovativeness is fostered among the people. As social entrepreneurship begins to take over some of the

functions previously the purview of state actors, there has been a shift in the debate from one of quantity to one of quality of innovation. In this sense SI represents a tool by which regions can gain competitiveness, regenerate their economies, produce new exploitable resources (such as knowledge), and improve their organizational capacities. That being said, SI may, in some cases, be a response to a negative developmental situation rather than a tool being deployed to actively push a growth agenda. In the next section this paper attempts to approach a metric by which the impact of such innovation could potentially be measured.

4. Assessment of the SI impact: existing and emerging measurements

The issue of measuring social innovation has been discussed by both practitioners and academics due to the very high demand for a unified, more common approach to how to measure SI and its impact (Mulgan, 2006; Pol and Ville, 2009). According to the TEPSIE report published in 2013, in a time of emerging as well as pressing existing social challenges, and the imperative to meet the current social needs of different groups in a more effective way, the issue of social innovation measurement has become a "significant priority for individual national states and Europe as a whole" (TEPSIE, 2013). In the existing literature on the topic of social innovation, there is a view that the measurement of its impact is made more problematic by the little studied and complex nature of the phenomenon. However, the report of the TEPSIE project (TEPSIE, 2013) notes that, despite attempts to create a unified system of indicators for measuring social innovation and its impact had been undertaken by many scientists, until present no single system had been developed. This is due to factors such as the set of extant definitions for social innovation, the specific context in which social innovations are implemented (for example, the different political contexts of different countries and, therefore, regions), as well as the complex nature of social innovation that is not conducive to measurement with existing tools.

According to Gibbon and Dey (2011), the objective of impact measurement in the third sector is to understand (in social, environmental and economic terms) what difference an organization's activities make to the world and to communicate that value to the organization itself and to its stakeholders (Gibbon and Dey, 2011). At the same time, social impact measurement can help social enterprises set realistic objectives, monitor and improve performance, prioritize decisions and access capital markets more competitively (Nichols, 2007).

Therefore, based on several ideas found in the field, a short summary of how it might be possible to measure the impact of social innovation can be given.

4.1 Social impact measurement: potential tools

The first tool that might be implemented in measuring the impact of social innovation in a given region is the European System of Social Indicators (GESIS), which is an instrument that might be used to analyze the individual and societal well-being of European citizens in terms of quality of life, social cohesion and sustainability and, therefore, changes in the social structures of European societies. The European System of Social Indicators suggests the two dimensional approach that covers both objective and subjective dimensions of the quality of life. Despite the fact that the indicators developed within the framework of the program for measuring the quality of life cannot be applied to measure the impact of SI without adaptation, some of them measuring, for example, the level of civic participation promoted with the help of SI, can still be adapted for the purpose of measuring SI impact. Covering different life domains such as health, environment, social security, social and political participation and integration of citizens, this system provides a useful basis for further development of indicators that potentially could be very helpful in measuring the SI impact in regional development. This is due to the fact that social innovation can generate changes in the integration policy of the region (for example, social enterprises that promote integration of Roma people in Baixo Alentejo sub-region) and can influence the economic development of the region and entrepreneurship activities (ADCMoura, EPAM Project), thereby influencing the situation in region as a whole.

The TEPSIE project mentioned previously offers another perspective on measuring the impact of SI. According to Schmitz et al (Bund et al, 2013), social innovation is much more service-based and even more importantly explicitly includes new "models, markets and processes", so that the output measures used for the impact of technological innovation are much harder to apply for SI impact measurement. Thus, there is a challenge of measuring specific aspects for SI and, therefore, it is necessary to both adopt existing metrics and complement them with new aspects. The proposed idea for SI measurement is based on the idea proposed by NESTA (2009) foundation which focuses on framework conditions for innovation that might provide resources for firms to innovate knowledge creation, entrepreneurship, selection of innovation and mobilizing resources. However, it was taken further by TEPSIE and adopted into a system that seems more suitable for measuring the impact of

social innovation in regional development focusing on the impact, not the social innovation itself. Bund et al proposed to frame social innovation measurement based on three interrelated levels that form part of the innovation cycle: entrepreneurial activities, field specific outputs and outcomes and framework conditions (Bund et al, 2013). In this regard, each of the level should be briefly explained. Entrepreneurial activities refer to a set of actions, characteristics, attitudes and behaviours that can be traced back to the innovator and represent active forces working towards innovation ('push factors') (Bund et al, 2013). The second level of measurement is the level of field specific outputs and outcomes that allows looking at the results of the innovation activities. Outputs, in this case, refer to measurable results that can be linked to an individual or an organization. At the same time, outcomes are much harder to measure and it is hard to connect them directly to separate organizational or individual activity (Bund et al, 2013). The last level of measurement is the level of framework conditions which represents so called "pull-factors" for SI and includes four sub-levels which are political, institutional, societal climate and resources framework. Each one of them enables the fostering of social innovation directly or indirectly, covers the existence of shared needs in a society and gives the legitimacy within society for these which are crucial for SI since it is assumed to be a new solution for social problems that are considered important and legitimate by the members of a given society. Moreover, the resources framework considers the existence and availability of resources which might be potentially relevant for the innovation process, such as financial resources, available networks of people dealing with SI. Giving an example which will be further discussed (see Section 5), the promotion of the EPAM project in Baixo Alentejo sub-region helped to create a network of producers both on the local and regional level (resources framework) which, in turn, promoted the involvement of more individuals and organizations (societal climate network) and, therefore, might potentially increase openness to the development and innovation from the local and national government (institutional framework).

In the following section, the example of how SI might be implemented in a regional and local level focusing on ADC Moura and the EPAM project will be given.

5. An example of SI implementation in Baixo Alentejo

To illustrate how social innovation is implemented and applied in practice, this article will consider the example of The Association for the Development of the Municipality of Moura (ADCMoura) in the Baixo Alentejo sub-region of Portugal and one of its current projects EPAM (Empreender na Fileira das PAM em Portugal). ADCMoura is a non-governmental, non-profit organization, whose purpose is to support and promote the sustainable development of the municipality of Moura and other parts of the Alentejo region, dealing with environmental education, entrepreneurship, business creation and promotion, providing equal opportunities, promoting gender equality, and fostering institutional and strategic cooperation among the actors involved. Despite the fact that the organization has implemented and been involved in many projects, in this article, the EPAM project will be given as a primary example of their activities.

The EPAM project, started by ADCMoura in 2011, with support from the National Rural Network Program (RRN), incorporates a set of tools to support the development of aromatic and medicinal plant production in Portugal. It acts at the levels of network building, research and provision of information, training, internal and external promotion and representation. One of the foundations of the EPAM process is the promotion of collaborative solutions, attempting to promote business development and cooperation between producers of the plants, researchers and companies, doing so in two ways: first, by organizing local meetings and workshops, and second, by providing access to the project´s online platform wherein the above mentioned actors can share and exchange their experience. In theory this would provide a platform where the growth of this industry is supported by the sharing of best practice, creating a sense of community around the enterprise and solidarity among those engaged in it.

One of the main objectives of the EPAM project is to promote social innovation for sustainable economic and rural development of the Baixo Alentejo region. According to Stöhr, there has been a paradigm shift in regional development strategies (Stöhr, 1984) that resulted in changes of understanding of regional development which was seen as not merely quantitative anymore but rather quantitative (e.g. the broad development of human capabilities based on their respective societal conditions) (Stöhr, 1984). Therefore, the innovation orientation was the main goal of such a development where innovations were not restricted to technological innovations but also included organizational and institutional innovations. This point might be proven by the activities of EPAM network. The work of ADCMoura has provided, through the EPAM project, a gateway to

important information vis-a-vis best practice through the organization's access to other bodies such as Center d'Etude et de Développement Durable Euroméditerranéen (CEDDEM) and European Herbs Growers Association (EUROPAM). Furthermore, the website of the organization under the auspices of their EPAM project, allows the agents involved to increase the collaborative potential and efficiency of the agents, and third parties, through helping them to coordinate their actions more effectively. Moreover, by organizing different workshops and events and therefore fostering the networking, the EPAM project contributes to the development of new skills and capabilities of both local population and regional actors. From the evidence above it can be said that EPAM represents a social innovation in line with the definitions encountered earlier in this paper: it employs an existing idea (that of internet connectivity) in order to address various social needs (by attempting to foster sustainable employment) by promoting participation of various stakeholders and creating networks (through its website). Therefore, EPAM project contributes to the regional development of Baixo Alentejo by creating new employment opportunities for local population, fostering and developing networks between actors involved as well as by providing new ways of knowledge and skills exchange among actors. However, social enterprises face a challenge when it comes to measuring the effectiveness of their actions. Despite the demand for a common approach on how to measure the impact of innovative solution by both policy makers and practitioners, this kind of approach still does not exist. Therefore, despite the above, there is little evidence at present of the impact of these initiatives.

6. Conclusion

In this article SI represents the deploying of novel ideas so as to improve the living conditions of people in structurally weak regions by addressing social issues, building up institutional and intrapersonal capacities and democratizing socio-economic decision-making. SI has the capacity to change the dynamics of regional society in a way that may potentially empower those at risk of social marginalization or depravation, and this is a key to addressing issues of interregional inequities. This is achieved by the social dynamic of SI, which emphasizes the reinvestment of profits into the local economy in the shape of sustainable employment, the fostering of a knowledge economy and the driving of regional economic growth.

Considering that this phenomenon represents a potential boon in the field of regional development, and the betterment of the situation of those suffering from social deprivation, there is still no robust metric by which to measure the outcomes of this phenomenon. The social impact measurement has been addressed by both academics and practitioners who point out the importance of such a tool in order to evaluate the activities and their results in different fields. Moreover, the effective impact measurement will provide an opportunity to social enterprises to prove the effectiveness of their achievements. Therefore, existing approaches in different fields, such as European System of Social Indicators (GESIS), might be adopted and implemented in order to measure the impact of SI in the area of local and regional development. As such this represents a valuable area of future investigation, which could have positive outcomes in various fields of SI in the future, including resource allocation, promoting investments and targeting specific issues with best methods.

References

Adams, D. and Hess, M. (2010). Social Innovation and Why it Has Policy Significance. The Economic and Labour Relations Review, Vol 21, No. 2, pp 139-155.

Bund, E., Hubrich, D., Schmitz, B., Mildenberger, G. and Krlev, G. (2013). Blueprint of Social Innovation Metrics: Contributions to an Understanding of the Opportunities and Challenges of Social Innovation Measurement. [ebook] Available at: http://archiv.ub.uni-heidelberg.de/volltextserver/18700/1/D2.4_final.pdf [Accessed 18 May 2018]

Capello, R. and Nijkamp, P. (Eds.). (2010). Handbook of regional growth and development theories. Edward Elgar Publishing.

Dinis, A. (2006). Marketing and innovation: Useful tools for competitiveness in rural and peripheral areas. European Planning Studies, Vol 14, No. 1, pp 9-22.

Dougherty, D. and Hardy, C. (1996). Sustained product innovation in large, mature organizations: Overcoming innovation-to-organization problems. Academy of management journal, Vol 39, No. 5, pp 1120-1153.

Drazin, R., Glynn, M. A. and Kazanjian, R. K. (1999). Multilevel theorizing about creativity in organizations: A sensemaking perspective. Academy of management review, Vol 24, No. 2, pp 286-307.

Gibbon, J. and Dey, C. (2011). Developments in Social Impact Measurement in the Third Sector: Scaling Up or Dumbing Down? Social and Environmental Accountability Journal, Vol 31, No. 1, pp 63-72.

Hubert, A. (2010). Empowering people, driving change: Social innovation in the European Union. Bureau of European Policy Advisors (BEPA). Available online: http://ec. europa. eu/bepa/pdf/publications_pdf/social_innovation.pdf.

Moulaert, F. (Ed.). (2013). The international handbook on social innovation: collective action, social learning and transdisciplinary research. Edward Elgar Publishing.

Moulaert, F., Martinelli, F., Swyngedouw, E. and Gonzalez, S. (2005). Towards alternative model (s) of local innovation. Urban studies, Vol 42, No. 11, pp 1969-1990.

Mulgan, G. (2006). The Process of Social Innovation. Innovations: Technology, Governance, Globalization, Vol 1, No. 2, pp 145-162.

Mulgan, G., Tucker, S., Ali, R. and Sanders, B. (2007). Social innovation: what it is, why it matters and how it can be accelerated. London: Young Foundation.

Mumford, M. and Moertl, P. (2003). Cases of Social Innovation: Lessons From Two Innovations in the 20th Century. Creativity Research Journal, Vol 15, Nos. 2 & 3, pp 261-266.

Murray, R., Caulier-Grice, J., and Mulgan, G. (2010). The open book of social innovation. London: National endowment for science, technology and the art.

Neumeier, S. (2011). Why do Social Innovations in Rural Development Matter and Should They be Considered More Seriously in Rural Development Research? - Proposal for a Stronger Focus on Social Innovations in Rural Development Research. Sociologia Ruralis, Vol 52, No. 1, pp 48-69.

Nicholls, A. (2007). What is the Future of Social Enterprise in Ethical Markets. Office of The Third Sector: London.

Noll, H. H. (2002). Towards a European system of social indicators: Theoretical framework and system architecture. Social indicators research, Vol 58, Nos. 1-3, pp 47-87.

Phills, J. A., Deiglmeier, K. and Miller, D. T. (2008). Rediscovering social innovation. Stanford Social Innovation Review, Vol 6, No. 4, pp 34-43.

Pike, A., Rodríguez-Pose, A. and Tomaney, J. (2011). Handbook of local and regional development. London [England]: Routledge.

Pol, E. and Ville, S. (2009). Social innovation: Buzz word or enduring term? The Journal of Socio-Economics, Vol 38, No. 6, pp 878-885.

Reeder, N., O'Sullivan, C., Tucker, S., Ramsden, P. and Mulgan, G. (2012). Strengthening social innovation in Europe: journey to effective assessment and metrics. Enterprise and Industry, European Commission.

Stöhr, W. B. (1984). Changing external conditions and a paradigm shift in regional development strategies?. Estudos de Economia, Vol 4, No. 4, pp 461-486.

van der Have, R. and Rubalcaba, L. (2016). Social innovation research: An emerging area of innovation studies?. Research Policy, Vol 45, No. 9, pp 1923-1935.

Ziegler, R., Molnár, G., Chiappero-Martinetti, E. and von Jacobi, N. (2017). Creating (Economic) Space for Social Innovation. Journal of Human Development and Capabilities, Vol 18, No. 2, pp 293-298.

Attitudes, Abilities and Aspirations in the Worldwide Entrepreneurship Ecosystem

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Abstract: Since 2011, The Global Entrepreneurship Index (GEI) has measured the health of the entrepreneurship ecosystem in several countries. The index combines multiple dimensions of the entrepreneurial environment and classifies the data into three main areas: attitudes, abilities and aspirations. The attitudes component measures the local population's attitudes toward entrepreneurship, and weights it using institutional variables. The abilities component measures a set of important characteristics regarding the entrepreneur's abilities and the business technological profile. The aspirations component measures innovation, technological transfer and diffusion. Our investigation, however, has identified a lack of studies that test the possible linkage between the GEI components. Given the importance of this research field, we aim to assess the relationship between attitudes, abilities and aspirations in the entrepreneurship ecosystem. Based on annual data for the GEI from 2011 to 2017, we propose a structural model to identify the effects of attitudes and abilities on entrepreneurial aspirations. Assuming that the structural relationship between attitudes, abilities and aspirations might differ across countries, the model is estimated using quantile regression in a panel data setting. Control variables were included, in addition to dummy variables that identify the particular effect of attitudes and abilities over different regions, such as Europe and Latin America. Our findings show a positive effect of attitudes and abilities on aspirations; however, the magnitude is significantly different across quantiles. Furthermore, the effect of the European region is positive and significant only for lower quantiles. This effect declines and becomes negative in the right tail, reflecting the reduction of entrepreneurial aspirations in countries with high GEI results. Specific policies are needed to reverse the declining trend of aspirations in European countries. These findings may be useful for formulating public policies involving entrepreneurship and also contribute to the debate about the effects of attitudes and abilities on different levels of entrepreneurial aspirations.

Keywords: Global Entrepreneurship Index, Attitudes, Abilities, Aspirations, Quantile Regression, Entrepreneurship ecosystem

1. Introduction

Schumpeter (1982) was the first to emphasize the importance of entrepreneurs in the innovation process. Entrepreneurs are responsible for the creative process, using their accumulated knowledge and skills. Innovative entrepreneurs create new products and processes that drive the economy (Schumpeter, 1982). It is recognised that entrepreneurship boosts productivity, innovation, job creation and economic growth (Hoffman 2007).

Since the start of the 21st century, entrepreneurship has been increasingly investigated in theoretical and empirical studies (Cătălin, Sorin-George and Răzvan, 2017), resulting in a considerable evolution and better understanding of the concept. The OECD (2008) defines entrepreneurship as a human action in search of generating value through the creation or expansion of economic activity, identifying and exploring new products, processes or markets. As the debate has matured, metrics and indicators for measuring entrepreneurship have been developed to capture its essence and allow comparison between localities, regions and countries.

Szerb, Komlósi and Páger (2016) argue that there are several concepts of entrepreneurship that attempt to measure the phenomenon. The authors state that entrepreneurship at the country level is a systemic phenomenon and should be addressed as such. Entrepreneurship is also multifaceted, and therefore impossible to measure in its totality. Moreover, the literature has proposed a number of methodologies such as the Global Entrepreneurship Index (GEI), which seeks to measure entrepreneurship ecosystems using composite indicators.

Created in 2011, the GEI comprises a combination of multiple dimensions of the business environment and classifies the data into three primary areas: attitudes, abilities and aspirations. Positive attitudes are understood as being necessary for competent individuals to choose entrepreneurship rather than alternative

occupations. Ability reflects the quality of new undertakings and Aspirations seek to reflect the potential of enterprises to achieve rapid growth and high productivity.

Our investigation identified a lack of studies that empirically assess the possible connections between the GEI components. As such, we aim to evaluate the relationship between attitudes, abilities and aspirations in the entrepreneurship ecosystem, based on GEI data between 2011 and 2017. We test the hypothesis that attitudes and abilities affect aspiration results in the GEI, using a quantile regression model in a panel data setting. Dummy variables were also included to capture the particular effect of different regions on aspirations. This study analyses the GEI with a different focus, and the results are potentially important for policy makers that seek to improve the entrepreneurship ecosystem.

2. Entrepreneurship ecosystem

Ács, Szerb and Autio (2013) report that, in addition to the factor endowment of a particular locality, the role of entrepreneurship must also be considered when analyzing economic performance. According to Ács and Szerb (2009), Ács and Szerb (2012), Ács et al (2009) and Ács, Szerb and Autio (2013), the entrepreneurship ecosystem consists on complex collaborative networks of dynamically interacting systems and sub-systems within a set of dependencies and inter-dependencies that is continuously changing.

Szerb, Komlósi and Páger (2016) recognise the systemic nature of entrepreneurship at the national level, and that entrepreneurship is drived by individuals. Ács, Szerb and Autio (2014) argue that, in the entrepreneurship ecosystem, individuals incorporate business attitudes, abilities and aspirations in a dynamic interaction process. Figure 1 illustrates the theoretical concept of the entrepreneurship ecosystem.

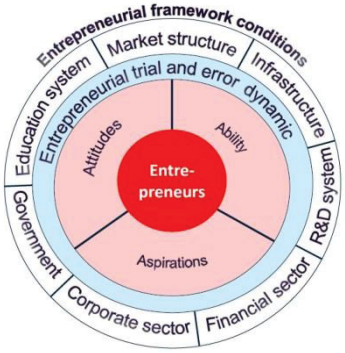

Figure 1: Theoretical Concept of Entrepreneurship Ecosystem

Source: GEI (2017)

Innovative entrepreneurs are the core of the system and they are characterised as having varied levels of business abilities and aspirations. They start a business in search of perceived opportunities, which are validated in a process of trial and error (GEI, 2017). Entrepreneurship is regulated by a series of structural conditions (market, infrastructure, R&D system, financial sector, corporate sector, government, educational system). The GEI report (2017) explains that a healthy entrepreneurship ecosystem will lead to an efficient allocation of resources and will increase the Total Factor Productivity through innovation.

Following Schumpeter (1982), the GEI (2017) understands that the entrepreneur has the responsibility of coordinating the allocation of scarce resources and the activities needed to achieve growth. This innovative entrepreneur will guarantee that the invention will have some usefulness and will contribute to raising productivity and economic growth. Aidis and Estrin (2013) recognise the role of institutions in the entrepreneurship ecosystem. Institutions determine the rules of the game, including intellectual property rights and market regulations. The importance of institutions lies on its influence o on economic incentives and resource allocation.

The entrepreneurship ecosystem is concerned with the quality of incentive mechanisms created by institutions, and its impact on economic growth. According to Aidis and Estrin (2013), institutions create incentives to allocate entrepreneurial talent to activities with higher private returns. The GEI (2017) observes that entrepreneurship ecosystems can allocate resources to a more productive use and generate innovative activities that drive this process. In addition, the literature on entrepreneurship recognises the importance of

financing opportunities and the need to garner resources, which is not trivial, especially when discussing resource allocation from existing activities into new ones. There is always associated risk in this process, and the lack of resources prevents a good ecosystem performance. Venture Capital may be a solution to this problem but is relatively scarce in underdeveloped countries.

2.1 Global Entrepreneurship Index

The Global Entrepreneurship Index was introduced in 2014 by the Global Entrepreneurship Network (GEN), following an earlier version between 2011 and 2013. It is an annual index that measures the entrepreneurship ecosystems of several countries. In 2017, the index was calculated for 137 countries. The GEI assumes that the entrepreneurship ecosystem at a socioeconomic level exhibits self-organisation, stability and sustainability.

Szerb (2017) observes that the GEI is based on a holistic view of different aspects of the entrepreneurship ecosystem. The Index methodology consists of constructing sub-indices at several levels. For each country, the data contains 28 variables related to 14 sub-areas, which generate three sub-indices (Attitudes, Abilities and Aspirations) that result in the Global Entrepreneurship Index (Table 1).

Table 1: Composition of the Global Entrepreneurship Index (GEI)

	Sub-index	Pillars	Variables
Global Entrepreneurship Index	**Attitudes Sub-index**	**Opportunity Perception**	*Opportunity Recognition*
			*Freedom (Economic Freedom*Property Rights)*
		Start-up Skills	*Skill Perception*
			*Education (Tertiary Education*Quality of Education)*
		Risk Acceptance	*Risk Perception*
			Country Risk
		Networking	*Know Entrepreneurs*
			*Agglomeration (Urbanisation*Infrastructure)*
		Cultural Support	*Career Status*
			Corruption
	Abilities Sub-index	**Opportunity Start-up**	*Opportunity Motivation*
			*Governance (taxation*Good Governance)*
		Technology Absorption	*Technology Level*
			Technology Absorption
		Human Capital	*Educational Level*
			*Labour Market (Staff Training*Labour Freedom)*
		Competition	*Competitors*
			*Competitiveness (Market Dominance*Regulation)*
	Aspiration Sub-index	**Product Innovation**	*New Product*
			Tech Transfer
		Process Innovation	*New Technology*
			Science (Gerd(Average Quality of Scientific Institutions + Availability of Scientists and Engineers))*
		High Growth	*Gazelle*
			*Finance and Strategy (Venture Capital*Business Sophistication)*
		Internationalisation	*Export*
			Economic Complexity
		Risk Capital	*Informal Investment*
			Depth of Capital Market

Source: GEI (2017)

According to the GEI (2017), the business attitudes sub-index captures entrepreneurial attitudes given some important institutional variables. It involves the entrepreneurial opportunities the population perceives, weighted by economic freedom and property rights; the start-up abilities the population perceives, weighted by the quality of education; risk acceptance, that is, the fear of failure in entrepreneurship, combined with a measure of a country's risk; entrepreneurial support networks (ease of access); how the population view entrepreneurs in terms of status and career choice and how the corruption level affects this view.

The entrepreneurial abilities sub-index measures important entrepreneur characteristics that determine to what extent new start-ups will have the potential to grow, such as: motivation based on opportunity rather than based on necessity (weighted by the combined effect of taxation and the quality of government services); the potential of start-up activity (combined with the ability to absorb new technology); the educational level of entrepreneurs (weighted by the percentage of start-ups founded by individuals with academic degree or

secondary education, by a measure of the entrepreneur's propensity to training their employees, and by labour freedom); the level of product exclusivity or start-up market exclusivity, combined with the market power as well as the effectiveness of competitive regulations (GEI, 2017).

Finally, the entrepreneurial aspirations sub-index captures the distinctive and qualitative aspects of the entrepreneurial activity: the tendency of companies to create new products, weighted by a country's ability to transfer technology; the use of new technologies for start-ups, combined with Gross Domestic Expenditure on Research and Development (GERD) and the potential of a country to perform applied research; percentage of high-growth companies that intend to hire at least ten employees and plan to grow by more than 50% in five years; the availability of venture capital and the sophistication of business strategies; the degree of internationalisation, measured by the company's export potential and weighted by the country's economic complexity; the informal investment at earlier stages and a measure of the depth of capital markets.

2.2 Empirical Literature

In order to identify the empirical literature on the GEI we used two important platforms: Web of Science and SCOPUS, and a Brazilian search engine (PERIÓDICOS/CAPES). Only one keyword was used (Global Entrepreneurship Index) in searching for titles, abstracts, keywords and texts. In total, 101 related articles were identified in the Web of Science database and 122 in SCOPUS. After excluding duplicities and investigating the remaining texts, 11 relevant papers were selected: 9 of them are in SCOPUS and 2 are in Web of Science.

The empirical studies have heterogeneous results, but they have one point in common: the use of the Global Entrepreneurship Index (GEI) in their scientific research. Ács and Szerb (2009) were the precursors of the Global Entrepreneurship Index (GEINDEX). The authors hypothesised that the relationship between entrepreneurship and economic development is slightly S-shaped, not U or L-shaped, and provided evidence that entrepreneurship across countries is positively related to economic development.

Bulut, Mutlu and Nazli (2013) examined six methodologies that measured entrepreneurship and innovation, as follows: IUS (Innovation Union Scoreboard), GEM (Global Entrepreneurship Monitor), GII (Global Innovation Index), ICI (Innovation Capacity Index), GEINDEX (Global Entrepreneurship Index) and WCY (World Competitiveness Yearbook). The study also mapped and compared sample size, the quality of the indices, method of measurement and frequency, among other specifications. Ghazinoory, Bitaab and Lohrasbi (2014) used the GEI data to investigate the influence of different social capital dimensions on the National Innovation System (NIS) in 34 countries. Using exploratory factor analysis and structural equation modelling, these authors detected a strong positive effect of institutional confidence and networking on entrepreneurship.

Nataraajan and Angur (2014) analysed the impact of the knowledge economy, using the Knowledge Entrepreneurship Index (KEI), and the business activity, using the Global Entrepreneurship Index (GEI), on the quality of life (QoL) in a country. The data were analysed using correlation and regression analysis, and it was found that the KEI and GEI have a significant effect on quality of life. Inácio Júnior et al. (2016) studied the Brazilian entrepreneurship ecosystem using the GEI and the National System of Entrepreneurship (NSE) theory. The study indicates that the institutional interaction in Brazil have a low-to-middle quality, being the social context the primary bottleneck in the national entrepreneurship ecosystem. The authors also demonstrated that the Brazilian entrepreneurship ecosystem shows low internationalisation of its companies and reduced innovation in products and processes, among other problems.

Szerb, Komlósi and Páger (2016) explain how the GEI methodology is projected to trace the profile of National Entrepreneurship Systems. The authors used the Penalty for Bottleneck (PFB) methodology to compare the business performance of the European Union (EU) and the USA, and the evidence shows that the former lags behind the latter. Szerb, Komlósi and Páger (2016) report that a uniform policy does not work in the EU member states, which requires the application of different combinations of policies to improve the GEI scores.

Atiase et al (2017) investigated the role of four critical resources (credit, electrical energy, contract enforcement and political governance) on explaining the entrepreneurship quality and the business support in Africa (response variables). The authors used the the GEI data for 35 African countries, some important covariates obtained from the World Bank (credit access, electricity access and contract enforcement in Africa) as well as the Ibrahim Index of African Governance and other control variables (GDP, Foreign Direct

Investment, population and education). The authors used OLS regressions and discovered that electricity access and governance policy were statistically significant and positively correlated with the GEI. Credit access was not significant to explain the response variables.

Jovanovic et al (2017) studied and compared the metrics of composite indices used in Technology Management (TM): The Global Competitiveness Index (GCI), The Global Innovation Index (GII) and the GEI. The authors also analysed the correlations between the GCI and GII pillars and found that the indices perform Technology Management (TM) treatment. However, they observed a lack of composite indicators used exclusively for TM performance measured globally by official institutions. Cătălin, Sorin-George and Răzvan (2017) investigated the evolution of the GEI in the top ten countries between 2015 and 2017. The authors found an absolute dominance of the USA and the growing presence of European countries. Szerb (2017) examined the possibilities for developing Hungarian entrepreneurship with the help of the GEI. The author identified the following weaknesses in the Hungarian entrepreneurship ecosystem: opportunity recognition, product innovation, financing and competition.

The empirical literature revealed a number of important insights, such as the scarcity of studies on the results of the GEI. However, not a single study investigated the relationship between attitudes, abilities and aspirations in the entrepreneurship ecosystem.

3. Methodology

This is a quantitative study based on documentary research. Information on the sample design and empirical strategy is provided in the following sections.

3.1 Sample Design

Our sample was constructed based on the availability of the GEI sub-indices (attitudes, abilities and aspirations). The sub-indices are available in the Global Entrepreneurship Network (GEN) annual reports, between 2011 and 2017. However, the current year GEI is always based on country data of the previous year. Thus, for estimation purpose, we decided to lag the GEI sub-indices by one year (2010 to 2016). Table 2 shows that the first year of the GEI covered only 71 countries, increasing significantly to 137 in 2016.

Table 2: Number of countries mapped by the GEI that presented the results of sub-indices

Countries covered by the GEI	2010[1]	2011[1]	2012[1]	2013	2014	2015	2016
Total	71	79	118	120	130	132	137

Source: The authors. 1- Note: The GEI data for 2011 to 2013 correspond to the previous version (Global Entrepreneurship and Development Index), which varied between 0 and 1. To reconcile the earlier version with the current one, the data for 2011 to 2013 were multiplied by 100.

Given the changes and discontinuity in the GEI structure, we decided to conduct the investigation using all available data (both time series and cross-sectional data). This resulted in an unbalanced panel. In addition to the GEI sub-indices, we control for some variables related to intellectual property, as follows: i) Gross Domestic Product Per Capita based on Purchasing Power Parity - GDP PPP international dollars based on the 2011 ICP round; ii) Number of scientific and technical journal articles Per Capita iii) Number of patent applications (non-residents and residents) Per Capita; iv) Number of trademark applications (non-residents and residents) Per Capita. These variables were obtained from the World Bank.

3.2 Empirical Model

Assuming high heterogeneity in the structural relationship across countries and the presence of unobserved individual characteristics, we estimate a quantile regression model with fixed effects in a panel data setting, as suggested by Dahl and Kristensen (2013). In addition to controlling for time-invariant unobserved heterogeneity, panel data quantile regression can assess the effect of a particular covariate across different quantiles of the response variable, which makes the inference more informative and robust.

Koenker and Bassett (1978) were pioneers on quantile regression. Koenker (2004) further refined the method, allowing its application for longitudinal data. According to the literature, there are still a number of limitations, such as including a large number of fixed effects and their influence on the conditional response of different quantiles. Powell (2014) also developed an estimator that addresses this problem and is unconditional of the fixed effects.

Bache, Dahl and Kristensen (2013) address the problem of assuming fixed effects in short panels (which generally occur if we attempt to forcibly balance a panel). The authors propose a solution using the correlated-random-effects (CRE) estimator, which controls for the possible (time invariant) dependence between the fixed effects and a set (or possibly all) of covariates. Since the fixed effects are not directly estimated, the distribution of the response variable, although conditional on the covariables, is unconditional of the fixed effects.

We estimate a CRE model following that of Bache, Dahl and Kristensen (2013):

$$y_{mt} = x_{mt}^{T}\beta + s_{m}^{T}\pi + \varepsilon_{mt}, \quad (1)$$

where m is the index for countries and t is the index for years. The time-invariant unobserved effects are controlled by the covariate vector s_m, constructible from repeated measurements of the time-varying covariates in x_{mt} (time-invariant covariates, such as geographic region, are not used to construct s_m). In general, s_m is constructed using the t-means (averages over time) of the time-varying covariates in x_{mt}. This allows for unobserved characteristics to correlate with x_{mt}. In addition, the unobserved effects can affect both the scale and location of the response distribution. The s_m vector enters linearly in the criterion function and the unobserved effects are allowed to vary with each quantile.

The model was estimated using log variables (coefficients are elasticities) and dummies to capture the particular effect of different regions on aspirations. The regions follow the United Nations criteria: EUR = Europe; NAC = North America; LCN = Latin America and the Caribbean; CSA = Central and Southern Asia; SEAO = Southeast Asia, East Asia, and Oceania; NAWA = Northern Africa and Western Asia; SSF = Sub-Saharan Africa. Table 2 shows that the number of countries in the GEI vary annually. Nevertheless, the estimator proposed by Bache, Dahl and Kristensen (2013) allows the use of unbalanced panels (s_m is constructed using the years available for each country).

4. Results

Table 3 shows the estimated results for all variables. In general, the effects of attitudes and abilities are positive and significant across quantiles (attitudes are not significant for lower quantiles and abilities are not significant for the 90% quantile). This result demonstrates the importance of attitudes and abilities in determining the aspirations of countries. Furthermore, the magnitude of the abilities effect tends to decline as we move from the left to the right tail, and it disappears on the 90% quantile. Thus, it is reasonable to assume the hypothesis that countries with different levels of entrepreneurial aspirations respond differently to their abilities. However, this cannot be clearly inferred with respect to attitudes, since there is an unexpected break in quantile 50.

The (observed) control variables captured some important effects on aspirations. It is important to highlight the significant and positive effect of GDP per capita between the 20% and 90% quantiles. GDP per capita appears to have a high elasticity in the right tail of the aspirations distribution. If we assume that GDP per capita is a proxy for economic development and that the aspirations sub-index is a proxy for entrepreneurship, the results confirm the hypothesis of Ács and Szerb (2009) regarding the relationship between entrepreneurship and economic development.

Although the positive result for patent applications filed by residents is expected (since resident applications may materialise into innovative products and processes that will be exploited by domestic individuals), we have a significant and negative effect for domestic applications on the 90% quantile. One possible hypothesis to be tested is that in countries with higher aspirations, competition for patents is so intense that it may reduce aspirations by discouraging incumbent inventors. As such, the competitive environment for patents is good, but perhaps not in excess. A similar reasoning may be used for the number of scientific and technical journal articles, which also exhibits an interesting negative effect in the right tail. Increasing scientific competition (proxied by scientific production) may reduce aspirations in countries that already have higher aspirations results (and thus, that have been experiencing a more intense scientific competition).

Patent applications filed by non-residents may also be reducing domestic aspirations because they are potential innovations that will be monopolised by foreign agents. This expectation may be causing a significant

negative effect for the lower quantiles. However, this effect tends to decrease as aspirations rise. Countries with higher aspirations may have a higher probability to protect themselves more efficiently against the impact of non-resident patents, and they may even absorb these prospective patents in favour of domestic entrepreneurship, which would alter the negative effect into a positive or insignificant one. Nevertheless, this argument implies that patent applications filed by residents and non-residents have a sort of opposite effect on aspirations when we move to the right tail. Furthermore, countries with low aspirations may be correlated with "inefficient" domestic patent offices that haver a large Pending Patent Backlog in comparison to the patent offices of countries with higher aspirations (USA, Canada, Europe, etc).

Table 3: Results for quantile regressions using the CRE estimator

ASP	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
LogAtTI	0.0196	0.1248	0.3556***	0.5073***	0.0930	0.3450***	0.4300***	0.3949***	0.2740***
	(0.129)	(0.114)	(0.121)	(0.132)	(0.113)	(0.099)	(0.075)	(0.086)	(0.086)
LogABI	1.4252***	1.2876***	1.0140***	0.7873***	0.6201***	0.6221***	0.5741***	0.3648***	0.0791
	(0.200)	(0.158)	(0.096)	(0.105)	(0.075)	(0.059)	(0.097)	(0.113)	(0.059)
LogGDP	0.3915	1.3637***	0.8485***	0.6424***	1.0102***	1.6680***	1.4886***	2.1171***	2.2172***
	(0.411)	(0.283)	(0.175)	(0.194)	(0.238)	(0.377)	(0.307)	(0.201)	(0.475)
Articles	0.8945***	0.9071***	0.4904***	0.2183***	0.1583*	-0.0859	-0.1945***	-0.3792***	-0.4805***
	(0.303)	(0.197)	(0.138)	(0.082)	(0.092)	(0.083)	(0.050)	(0.058)	(0.122)
logPatRes	0.0622	0.2697***	0.0427	0.0587***	0.0500***	0.0298*	0.0606***	-0.0308	-0.1098***
	(0.066)	(0.076)	(0.028)	(0.021)	(0.018)	(0.017)	(0.020)	(0.027)	(0.019)
logPatnRes	-0.1128***	-0.1200***	-0.0370**	-0.0066	-0.0507	0.0112	0.0407**	0.0441*	0.0009
	(0.032)	(0.041)	(0.018)	(0.023)	(0.032)	(0.026)	(0.019)	(0.022)	(0.037)
logTradRes	-0.0535	-0.0770***	-0.1492***	-0.0532***	-0.0265	0.0694**	0.0475***	0.0322**	-0.0027
	(0.041)	(0.017)	(0.034)	(0.012)	(0.027)	(0.032)	(0.011)	(0.014)	(0.003)
logTradnRes	0.3236	0.6222***	0.0868	-0.2481	-0.6429***	-0.7803***	-0.4722***	-0.2742**	-0.0847
	(0.318)	(0.147)	(0.110)	(0.160)	(0.181)	(0.104)	(0.156)	(0.109)	(0.059)
EUR	0.4934***	0.0380	0.0274	0.0606	0.0522	-0.0705	-0.0836***	-0.1349***	-0.0974***
	(0.103)	(0.111)	(0.093)	(0.084)	(0.031)	(0.044)	(0.023)	(0.016)	(0.028)
LCN	0.3687*	-0.4863***	-0.5893***	-0.4015***	-0.3431***	-0.4229***	-0.2519***	-0.2831***	-0.3432***
	(0.211)	(0.160)	(0.098)	(0.063)	(0.051)	(0.060)	(0.085)	(0.031)	(0.042)
NAC	0.4438***	-0.1034	-0.1577*	-0.0324	-0.1158**	0.0135	0.0710	-0.0378	0.2269
	(0.136)	(0.108)	(0.093)	(0.066)	(0.055)	(0.057)	(0.057)	(0.046)	(0.168)
NAWA	0.8514***	0.1839	0.1457	0.3643***	0.3039***	-0.0268	-0.0184	-0.0898***	-0.1669***
	(0.129)	(0.126)	(0.123)	(0.059)	(0.087)	(0.084)	(0.023)	(0.028)	(0.030)
SEAO	0.5166***	(0.2042)*	-0.0713	0.0532	-0.0619	-0.1832***	-0.1302***	-0.1430***	-0.2737***
	(0.124)	(0.121)	(0.080)	(0.063)	(0.074)	(0.042)	(0.028)	(0.026)	(0.074)
SSF	0.3948***	0.1128	0.2500***	0.2569***	0.2497***	0.2051***	-0.0045	-0.0459*	-0.1511***
	(0.125)	(0.124)	(0.096)	(0.079)	(0.049)	(0.049)	(0.126)	(0.027)	(0.036)

Source: the authors

With respect to the regional dummies (relative to CSA - Central and Southern Asia), we find a significant and positive effect of the European continent on aspirations only at lower quantiles. The effect eventually declines and becomes negative between the 70% and 90% quantiles, reflecting the decrease in entrepreneurship aspirations in countries that already have better results for this sub-index. This requires the adoption of new and specific policies to reverse the declining trend in the entrepreneurship aspiration results in Europe, as reported by Szerb, Komlósi and Páger (2016). The Latin American and Caribbean region also produced an overall reduction in aspirations.

5. Concluding remarks

Our study aimed to assess the linkage between abilities, attitudes and aspirations on the entrepreneurship ecosystem, as measured by the Global Entrepreneurship Index. It was found that the sub-indices of attitudes and abilities have a positive but heterogeneous effect across the quantiles of the response (aspirations) distribution. We found, for example, that the entrepreneurship abilities contribute more to aspirations at lower quantiles, in comparison to the smaller effect found at higher quantiles.

In general, the effect of the control variables is asymmetrical across the conditional distribution of the response variable. We understand that more specific investigations are needed in order to analyse some controversial results. It would be particular interesting to investigate the negative relationship between aspirations and the variables that proxy intellectual property rights. Additional methodological approaches, such as using a dynamic model and controlling for other institucional variables, may provide a significant contribution to future studies.

This study contributes to the discussion by presenting evidence that entrepreneurial activities and the quality of new enterprises indirectly impact on economic growth captured by aspirations. The results require the attention of public and private authorities and Economic development agencies since aspirations can be maximised by improving attitudes and abilities in the entrepreneurship ecosystem.

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References

Acs, Z.J., and Szerb, L. (2009) The Global Entrepreneurship Index (GEINDEX). Foundations and Trends in Entrepreneurship, 5, pp 341-435.

Acs, Z. J. and Szerb, L. (2012) Global Entrepreneurship Index. Cheltenham, UK: Edward Elgar, pp 400.

Acs, Z.J., Braunerhjelm, P., Audretsch, D.B., and Carlsson, B. (2009) "The knowledge spillover theory of entrepreneurship", Small Business Economics, 32(1), pp 15–30.

Acs, Z.J., Szerb, L., and Autio, E. (2013) Global Entrepreneurship Index. Cheltenham, UK: Edward Elgar.

Acs, Z.J., Szerb, L., and Autio, E. (2014) National Systems of Entrepreneurship: Measurement and Policy, Research Policy.

Aidis, R. and Estrin, S. (2013) Institutions, Incentives and Entrepreneurship, Chapter 3 in Z. Acs, L. Szerb and E. Autio, The Global Entrepreneurship and Development Index 2013, Edward Elgar, pp 18-26.

Atiase, V.Y., Mahmood, S., Wang, Y. And Botchie, D. (2017) "Desenvolver o espírito empresarial em África: desafios investigando recurso crítico",Journal of Small Business e Desenvolvimento Empresarial.

Bache, SHM., Dahl, CM. And Kristensen, JT. (2013) "Headlights on tobacco road to low birthweight outcomes: Evidence from a battery of quantile regression estimators and a heterogeneous panel", Empirical Economics, Vol 44, Issue 3, pp 1593–1633.

Bulut, C. Mutlu, E.E. and Nazli, M. (2013) Innovation and Entrepreneurship Assessment Initiatives: A Critical View. Proceedings of the European Conference on Entrepreneurship and Innovation. 8th European Conference on Innovation and Entrepreneurship (ECIE). Hogeschool Univ Brussel, Brussels, BELGIUM, pp 126-135.

Cătălin, G., Sorin-George, T. and Răzvan, P. (2017) Entrepreneurship in the World: The Analysis of the Global Entrepreneurship Index in the Period 2015-2017, Ovidius University Annals: Economic Sciences Series, Issue 2, pp 14-18.

GEI. (2017) The Global Entrepreneurship Index 2017. Global Entrepreneurship and Development Institute (GEDI) and Global Entrepreneurship Network (GEN), Washington, D.C., USA.

Ghazinoory, S., Bitaab, A. and Lohrasbi, A. (2014) "Social capital and national innovation system: a cross-country analysis", Cross Cultural Management, Vol. 21 Issue: 4, pp 453-475.

Hoffman, N.A.A. (2007) A Framework for Addressing and Measuring Entrepreneurship. Entrepreneurship Indicators Steering Group, Paris.

Hart, D.M. ed. The Emergence of Entrepreneurship Policy: Governance, Start-Ups, and Growth in the U.S. Knowledge Economy. Cambridge, England: Cambridge University Press, 312.

Inácio Júnior, E., Autio, E., Morini, C., Gimenez, F.A.P. and Dionisio, E.A. (2016) "Analysis of the Brazilian Entrepreneurial Ecosystem", Desenvolvimento em Questão, Vol 14(37), pp 5-36

Jovanovic, M., Rakicevic, J., Jaksic, M.L., Petkovic, J., and Marinkovic, S. (2017). Composite Indices in Technology Management: A Critical Approach. In V. Jeremic, Z. Radojicic, & M. Dobrota (Eds.), Emerging Trends in the Development and Application of Composite Indicators (pp. 38-71). Hershey, PA: IGI Global.

Koenker, R. and Bassett, JRG. (1978) "Regression quantiles", Econometrica, vol 46, n. 1, pp 33-50.

Koenker, R. (2004) "Quantile regression for longitudinal data", Journal of Multivariate Analysis, vol 91, n. 1.

Lundström A. and Stevenson, L. (2005) Entrepreneurship Policy – Theory and Practices, ISEN International Studies in Entrepreneurship, Springer.

OECD. (2008) Defining Entrepreneurial Activity: Definitions Supporting Frameworks for Data Collection. OCDE Statistics Working Paper.

Powell, D. (2014) "Did the economic stimulus payments of 2008 reduce labor supply? Evidence from Quantile Panel Data Estimation", RAND Labor & Population, Working Paper.

Nataraajan, R. and Angur, M.G. (2014) "Innovative ability and entrepreneurial activity: two factors to enhance “quality of life”", Journal of Business & Industrial Marketing, Vol 29 Issue: 6, pp 469-475.

Schumpeter, J.A. (1982) Teoria do Desenvolvimento Econômico: Uma Investigação Sobre Lucros, Capital, Crédito, Juro e o Ciclo Econômico. São Paulo: Abril Cultural.

Szerb, L., Komlósi, É. and Páger, B. (2016) “Measuring entrepreneurship and optimizing entrepreneurship policy efforts in the European union”, Ifo institute for Economic Research, CESifo DICE Report, 14 (3), pp 8-23.

Szerb, L. (2017) “A vállalkozói ökoszisztéma Magyarországon a 2010-es években – helyzetértékelés és szakpolitikai javaslatok”, Vezetéstudomány/Budapest Management Review, 48 (6-7), pp 2-14.

The Musician as Entrepreneur – Multidisciplinary Innovation with Performing Violinists – Achieving a Sustainable Competitive Advantage via the Biomechanical Enhancement of the Left Hand

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Abstract: Musicians are entrepreneurs, despite a lack of specific literature treating them thus. Musicians take the risk of launching themselves as performers, often with very little to fall back on if it does not work out. Musicians are not accustomed to creating a business plan for their careers and, more generally, lack an understanding of business models and financial investments, as often the return for hours of individual practice is simply not cost-effective. Many musicians also have careers in teaching, juggling a mix of music-related activities to make ends meet. Music is a life of passion and not one where riches are expected to flow. Additionally, at a time when the pressure to perform well is increasing daily, due also to added competition, and with performing musicians starting their music studies and careers earlier and earlier, at ever more tender ages, the probability of suffering a severe injury during one's career is exceedingly high. This research intends to discuss a process of prolonging careers and minimizing injury, while also maximizing performance, by way of leveraging technology. Research is in fact lacking linking classical music to technology, and this study shows that a biomechanical approach can produce significant changes in the hand position over the violin. All violinists and violists face the difficulties of playing on a non-symmetrical instrument, which makes it quite easy to create wrong postures and techniques. Retroreflective markers were placed on the joints of the left hand, and their movement during violin play captured by a MoCap system (Qualisys AB, Sweden) operating at a sampling frequency of 200 Hz. A violinist was asked to play a score (A1) using his usual playing technique and next to perform the same score using the enhanced technique (A2). The resulting data was analysed in the Visual 3D software (C-Motion, USA) in order to extract relevant parameters and metrics. Very positive and encouraging results were captured. The enhanced technique seems to allow the violinist to play the same score with less tension in the hand, with greater amplitude of the fingers, and a more natural position with angulations closer to the natural ones, allowing to play faster and with smaller pattern deviation, and so with more precision.

Keywords: performance, injuries, violin, excellence, technique, music, scientific innovation

1. Introduction

Should musicians become experts at marketing their own work and product (Teixeira et al., 2018)? How many musicians actually become products with exponential valuations (Au-Yong-Oliveira et al., 2018)? What training on internationalization should musicians receive (Oliveira et al., 2012, 2013)? Should musicians solely focus on improving their product and their performances – practicing hours on end? This article is about the latter, rather than about teaching musicians basic business and marketing expertise.

This is not the first time that top performers in their chosen area have turned towards anatomical aspects of their professions and techniques in order to improve their performance and to explain positions of excellence.

For example, in golf, the late Ben Hogan, one of the all-time golfing greats, was a pioneer in linking certain anatomical movements to excellent golf swings. Movements such as pronation and supination, of the forearms, were words introduced into golfing language by Ben Hogan as Ben Hogan did a full analysis of the body, linked to golf. Hogan published the ground-breaking book entitled: *Ben Hogan's five lessons: The modern fundamentals of golf* (Hogan, 1957). In this book, there is one whole chapter dedicated to how a golfer should grip the golf club. In proportion to the whole length of the book (which only had five chapters, the last being a

summary and review), this was very significant. Much as with this study, the concern is with the basics and the fundamentals. This study is also concerned with the placing of the left hand on the violin, much as Hogan (1957) dedicated much of his work to how to grip the golf club.

Only those who put tremendous effort into practice may reach a point whereby they are able to question certain modes of functioning which have been taken for granted for centuries.

Pianists, for example, are known to have injuries linked to excessive practice. Certain musical compositions have even been written for one hand only, so that pianists do not have to stop playing entirely. With the violin it is not possible to play with only one hand. Thus the importance of this research – to aid in increasing levels of performance, while diminishing the number of injuries incurred.

A single violinist participated in this study (the lead author) since the new technique under development was of his authorship, and therefore he was, at the time, the only expert available. The lead author of this study, an expert violinist, first played a score (A1) using his usual playing technique and then performed the same score using the enhanced technique (A2). The resulting data was analysed in the Visual 3D software (C-Motion, USA) in order to extract relevant parameters and metrics such as the flexions/extensions and abduction/adduction angles of the fifth finger (little finger), as well as the frequency of movement during the fast phase. The enhanced technique allows the violinist to play the same score with less extension and flexion of the fourth finger and at the same time promoting its adduction. This allows the finger to be kept at a more natural position, and by decreasing the abduction it releases some tension in the surrounding muscles.

This study is a small part of the doctoral research being undertaken by the lead author. It includes some of the major points raised by the research as well as some of the images used to portray and explain the anatomical issues involved. In the lead author's own words, during over twenty years of an intense and passionate career linked to the violin, a number of curiosities and queries have arisen, which have subsequently motivated analysis. As a student, then a performer, and later on as a teacher, several frailties linked to generalized problems of violinists and violists have been discovered. Time has been spent with students / violinists of all ages and in what may be considered an intense way. As a performer, and so from a more personal perspective, and having worked in several orchestras, done symphonic and opera programmes, performed recitals and solo performances with orchestras all over the world, the realisation is that there are several limitations on diverse levels, which have provided the motivation to seek more in-depth solutions, from a more scientific and provable perspective. Below, a set of problems and circumstances which originated this research project will be discussed.

One may well adopt the perspective that musicians are entrepreneurs, who depend on their talents, initiative and efforts to make a living in their chosen profession, as their own bosses – which will often benefit greatly from a passion for music, in its many forms. Being able to practice longer and while also avoiding injury is considered to be a major breakthrough in music and for the musician-entrepreneur. To analyse performance in a laboratory, as described herein, is also a form of innovation, so essential to the entrepreneurship process.

2. Literature review

2.1 Innovation

"Innovation enhances employment and society through its improvement of competitiveness" (Oliveira et al., 2008, p.353). Musicians as entrepreneurs also depend on innovation to achieve desired success rates. Innovation for performing artists is linked to how they convey their message and to novel ways of interpreting musical scores (their degree of passion, how they dress, how they move their bodies to capture the attention of audiences, among others).

Educational innovation is innovation (Au-Yong-Oliveira et al., 2015) pertaining to educational contexts (Moreira et al., 2017) and may be seen as innovative activities undertaken to improve the learning experience, including across national borders (Spyrtou et al., 2018). This research paper pertains to this category whereby the objective is to improve advanced performance learning of the violin following an innovative form of analysis using technology.

The current research may also be named research pertaining to high performance work systems (HPWS), as discussed by Zhu et al. (2018), where an entrepreneurial orientation has a positive effect on the outcomes achieved, indeed as should occur in a teacher–student relationship.

We consider that the teacher and the quality of the learning experience may greatly contribute to the attainment of competitive advantage, by students. When students are competing at the international level as well as in other performances, as musicians, and aimed at the general public with an interest in high-performing artists and, in this case, classical music, their mentors, past and present will have had a tremendous effect on how well they are able to perform.

A sustainable competitive advantage will exist when a student may practice and study his or her instrument for a longer period of time without incurring an injury due to excessive practice and while maintaining exceptionally high levels of performance while doing so. This article shows how this may be possible.

2.2 Muscle Diseases in Musicians

Regardless of the instruments used, the left wrist is till the body zone most affected by musculoskeletal problems (Frank & Muhlen, 2007). Between the various groups of musicians studied, most studies point to string players as those with a higher prevalence of musculoskeletal problems. In addition, when comparing the two arms of violinists and violists, they also demonstrate that those groups have twice the prevalence of muscle disorders in the upper left limb compared to the upper right limb. This can be justified by the fact that the right-hand flexors do not have great mobility, only having the task of holding and controlling the movements of the bow.

Moraes & Papini (2012) argue that the great majority of musculoskeletal problems in violinists and violists stem from technical inaccuracies or muscular tensions that violinists develop in the performance of their instrument in a specific passage or in a more generalized approach. Both advocate that the amount of force, coordination, speed and fine motor control required in the daily performance of the instrument done for hours, added to a poorly conscious or even incorrect technique, can effectively lead to quite serious musculoskeletal problems that can result, in the last instance, in the termination of all such professional activity.

Work-related musculoskeletal disorders (WMSD) are common in the upper limbs and in the spine vertebrae associated to the various professions in which physical movements are very repetitive, such as the study and performance of string instruments (Sousa, 2010). One is able to enumerate a list of inflammatory and degenerative diseases, associated to repetitive movements, muscular overload and incorrect body posture that result in professional risk factors (Zaza, 1998).

2.3 Violin Methods

The entire literature regarding the violin, which includes methods, and other documents such as theses and literature on the performance of the instrument and its technique, is quite diverse and is based essentially on three different approaches. The first deals with purely technical aspects through a simple theoretical explanation of the various competences and how to develop them: placement of the violin, placing of the hand on the bow, operation of some types of bow strokes, vibrato and its development, improvement of the tuning and coordination, and issues such as left-hand functioning, vibrato, double stops, finger placement, thumb and others (Fischer, 1997).

The second type of approach deals with more meta-theoretical and generalist issues concerning the life of a violinist, his career as a recitalist, orchestra musician or soloist, psychological questions about performance and attitude on stage, such as studying and others.

As for the third type, it can be said that from this vast and diversified conceptual body of the violinist domain and property, there is a much more practical and musical literature, composed essentially of technical exercises and small musical excerpts. Most of the time, these examples and various exercises are accompanied by short technical explanations, points strictly essential to anticipate and take care of, and aim at the gradual development of a certain skill or technical difficulty.

These are the technical aspects most recurrent in the approaches of these instrumental manuals, distributed mainly, in the different tasks and competences of the left hand:

- Tuning
- Change of position
- Position and action of the fingers on the string (pressure and speed)
- Arpeggio scales
- Fingerings
- Chords
- Double stops
- Finger patterns
- Ornaments, articulation, pizzicatos
- Harmonics
- Vibrato
- Independence and finger speed

The technical evolution and awareness of the various violin methods written throughout history has been increasing exponentially. This has led to increasingly virtuous and demanding compositions and technical issues. In turn, and in order to accompany and aid this compositional evolution (that translates into more complex violin techniques), the ability to describe its operation has also increased. Also, on the detailed functioning of the left hand, there are some authors who have approached the theme of "finger patterns" such as Gerle (1983), Primrose (1960) and Bang (1919) who explain in a schematic and rational way different combinations between the interval distances between fingers which facilitates the operational mechanic of the left hand.

None of these methods deal with the prism of the biomechanical and anatomical functionality of the left upper limb, adapting it to the mechanical properties of the violin and to the different technical challenges involved.

On the other hand, and from a scientific point of view, recently a lot of research has been done on instrumental performance and in the field of biomechanics. However, the existing studies focus primarily on electromyography and on the right upper limb. Studies on the left upper limb, which in violin performance is highly demanding along the dimensions of strength, precision, and biomechanical efficiency, are rather sparse.

2.4 Anatomy and specific properties of the left upper limb

The intrinsic muscles of the hand are mostly responsible for digital adduction and abduction. With these movements, which allow individuals to tighten the fingers holding a sheet of paper between them or to separate the fingers fully, the intrinsic muscles interlock the lumbricals and the abductor muscle of the little finger.

The muscles responsible for the flexion and extension of the digital phalanges have their origin in the arm and not the hand (Magee, 2002).

One of the most relevant anatomical-functional features of the hand to be considered for this study is digital movement. The intersection point of the metacarpals and phalanges, which results from the digital rotation at the moment of the flexion of the fingers, is shown by the condyloid joints (Gardner, Gray, & Rahilly, 1978). At the moment of the flexion of the fingers these touch in the center of the palmar zone.

2.5 Entrepreneurship

Entrepreneurship and economic growth and development are related, according to the literature (Velilla et al., 2018). An additional connection may be made between entrepreneurs and being one's own boss. "As Schumpeter (1934) said, innovation signifies entrepreneurship; and Drucker (1985) defended that innovation and entrepreneurship go hand-in-hand, all successful entrepreneurs are committed to systematically practicing innovation" (Oliveira et al., 2008, p.354). Herein, we see an example of a musician innovating.

Innovation, or pioneering in some aspect relevant to society, and putting it into practice, is an essential part of entrepreneurship. Musicians are entrepreneurs who depend upon themselves and on their ability to perform

to be able to make a living. To be able to perform for as long a period as possible, without suffering injuries due to excessive practice, is an objective that this study seeks to promote.

Much as Mark Zuckerberg, the entrepreneurial co-founder of Facebook, who sought to bring a new mode of interacting and communicating to society, so do musicians also speak a global language understandable by all, whatever one's cultural background. Music speaks a universal language and needs no interpreter, as do images and videos posted on social networks such as Facebook and YouTube. Musicians attempt to give their own interpretations to often centuries-old creations, innovating once more; likewise, entrepreneurs in the technological world try to reinvent something which has been done for centuries by men and women around the world.

Musicians, though being self-employed, and thus entrepreneurial, do not pursue or otherwise receive training on how to run a business. All business activity is focused on improving the product – namely, their performance. Perhaps in the future we shall see musicians attending business and management courses, with the objective to be able to boost their careers further. Besides planning, one might foresee that such training may also involve how to choose a recording label, how to negotiate recording contracts, and how to develop relationships with music agents and other stakeholders in the music industry. Consumer segmentation and targeting may also be of use, as musicians seek out those most interested in their genre. A digital marketing competence may be deemed essential – as musicians seek to be heard by a larger audience over time and leveraging social networks in the process. To date, however, all training is, as mentioned above, mainly product-oriented, and this study follows a similar line of thought.

3. Methodology

The purpose of this research is to identify techniques that offer potential improvements in technique that may prolong careers and minimize injury. The method used was that of an experiment – and the 3D motion capture Qualysis was chosen (chosen over a number of others, a choice which took around one year), given its ability to measure in great detail the most sensitive variation of the position regarding angulation and height of the hand in relation to the scale of the violin, and to be able to analyze in a subtle form all the biomechanical functioning of the left hand. In addition, it allows to relate data and results of different parameters and in the three axes X Y Z that correspond to the three axes of the movement of the various joints that would be analyzed, as can be seen in the following image (image 1). The subject of the experiment was the lead author – due to availability and to convenience.

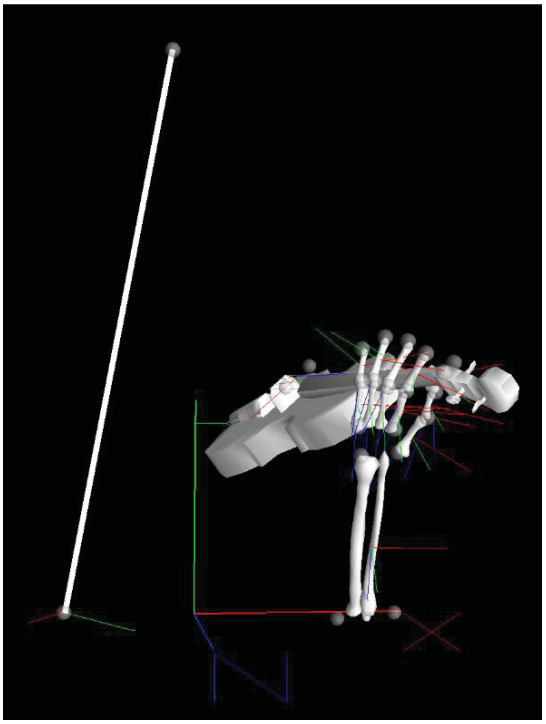

Image 1: Markers and vector system on the X, Y and Z axis (three dimensions)

A set of very practical and intuitive exercises were determined in order to eliminate the repetition variable as a way to increase the type of preparation in the execution of the exercise. The main objectives were to:

1. Analyze the mechanical behavior of the hand, with different heights, on the same string, in relation to the point of contact with the violin arm, in the same position and with the fingers on a single string.
2. Understand the behavior of the fingers, hand and the wrist, with different angulations, in the same position.
3. Analyze and compare the position of the hand in the different possible interval openings between the index and little finger, taking into account the height and the angle of the hand in relation to the violin arm. Intervals can range between perfect 4th intervals, perfect 5th intervals, 6th minor intervals.

3.1 The Types of Exercises

These were:

3.1.1 A1E and A2E exercises

Image 2: Musical exercise used for the A1E and AE2 execution

The first exercise was performed with the hand in a considerably high position, thus with a smaller distance from the metacarpophalangeal joint in relation to the violin arm, called A1E. The second exercise was performed with the same musical stretch but with the hand in a lower position, therefore with the most distal joint of the scale, called A2E.

3.1.2 A1G and A2G exercises

The two following exercises were performed on the G string since we wanted to compare a more centered / natural position and a considerably low hand position with a considerable distance from the metacarpophalangeal joint to the fingerboard edge, which would not be very feasible on the E string.

Image 3: Musical exercise used for the A1G and A2G execution

The exercise performed with the hand in a low position in relation to the violin arm was named A1G and the exercise with the hand in a slightly higher position and a more natural height for the G string was named A2G.

3.1.3 B1 and B2 exercises

These exercises were performed with longer intervals and the angulation variation in the biomechanical functioning of the hand was analyzed. Thus, the following exercise was performed with a small angulation in B1 and with a greater angulation between the metacarpophalangeal joint and the fingerboard in B2.

Image 4: Musical exercise used for the B1 and B2 execution

3.1.4 C1 and C2 exercises

The exercises were performed on the G string, but with a bigger interval, from the 6th to the lower. The first was performed with a small angle of alignment of the metacarpophalangeal articulation in relation to the fingerboard edge in C1 and with a steeper angulation at C2.

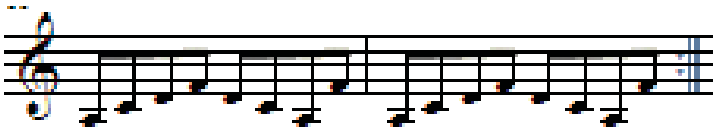

Image 5: Musical exercise used for the C1 and C2 execution

With the help from Engineer Pedro Fonseca, responsible for the development of the scientific research process in Labiomep (one of the most advanced biomechanics laboratories in the Iberian Peninsula in the analysis of movement), we consider the following procedures in the data collection process:

- Each exercise should be repeated three times to give consistency to the results.
- Each one of the exercises would be started with a metronome-controlled speed at 60 beats per minute, so in one second 4 notes would be played, and for about 5 seconds.
- Immediately in these initial 5 seconds, the same exercise was concatenated, but executed as quickly as possible, for roughly during the same time.

3.2 Execution norms

For each of the exercises, small musical excerpts, or sequences of notes, were written with the desired interval for each of the exercises. In order to analyze specific parameters in the arm and left-hand mechanism, some variables were altered in a controlled manner, but each one was repeated three times in order to obtain more credible values, creating graphs with averages drawn in a precise line, and also in order to get data such as regarding repeatability or standard deviation in a shaded area.

Within each attempt, this was divided into two different sections. The first was controlled metronomically with time at 60 beats per minute and for 5 seconds. The second part was immediately concatenated and for about the same time and was performed at the highest possible speed.

3.3 Sample

The initial sample used (made up by twelve participants) was as diverse as possible in terms of age (with participants born between 1983 and 2002), gender (with five female and seven male participants), technical training, different body compositions and different hand morphologies. However, the results were not very encouraging, since not all were able to perform the proposed exercises with the correct proposed changes of the variables, leading to a considerable standard deviation, without great consistency and regularity in the graphs. We realized that since each of the exercises had to be repeated three times, so that there could be better control of the results with the parameters we had asked to change and fix (a specific hand height or very particular angle of the metacarpophalangeal joint), at the end of the second and third attempt, these values were already different. This made it impossible to analyze the results with a broader level of participants.

Therefore, we considered that this scientific project should focus on only one individual. After a brief analysis, the individual who demonstrated more regularity in the results and greater control of the indicated variables was the lead author of this scientific project. Thus, it was decided with Professor Rui Garganta and Pedro Fonseca, that it would be best to analyze the detailed biomechanical functioning of an individual to better understand the relation of the altered variables in the left hand's biomechanical functioning and concerning performance. Thus, this experiment has shortcomings as one admits that there is much variation between individuals when playing musical instruments such as the violin. People have different physical makeups and adapt to different techniques in a unique way. Albeit, we still share the perspective that the experiment is useful in determining potential improvements in violin technique.

4. Discussion

This chapter intends to continue the discussion of the results but now on an inter-relational plane between the various exercises. It is intended to meet the initial problem and the questions elaborated at the beginning of this scientific project, pondering the results obtained from the observations.

The images (6-9) below demonstrate the strenuous positions that the left upper limb is put in in order to play at the highest level.

Image 6: Left upper limb position 1

Image 6 shows the point of contact changed, on purpose, in exercises A1 and A2 (in images 2 to 3), above, between the line of the fingerboard and the proximal phalange of the index finger. This has to be done to play a certain string and in a certain way, to the level of excellence; the distance has to be exactly right, done purposefully.

Image 7: Left upper limb position 2

Image 7 shows a different point of contact (compared to image 6), between the fingerboard and proximal phalange. As it is the biomechanically most efficient position in the E string, the metacarpophalangeal joint articulation is more distant from the line of the fingerboard than in the upper image (image 6), in G string. This position may originate awkward and wrong positions of the left hand, fingers and wrist and is not easily attainable. Albeit, the correct position is very important, and if incorrect a number of lesions may result. With the methodology followed in this study the software showed that image 7 has the correct position to avoid lesions. Image 7 is the natural correct position. Incorrect positions lead to slower, less efficient playing, more prone to error, and less regular finger articulation (as shown by the standard deviation detected and captured by the specialized software); as well as a greater tension in the hand, as detected in this study.

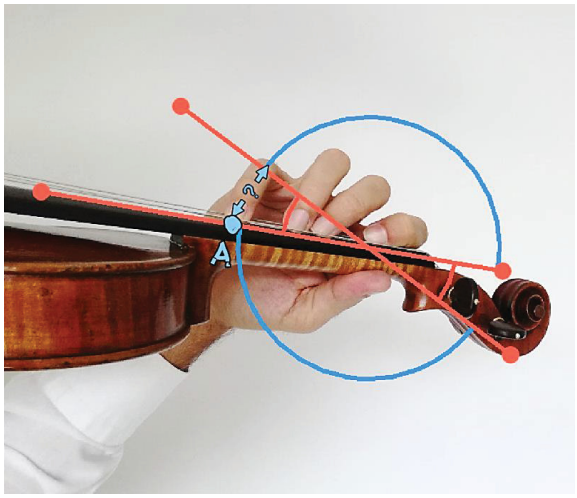

Image 8: Left upper limb position 3

Images 8 and 9 show the parameter studied in exercises B and C (images 4 and 5 above). As demonstrated, a different angulation between the metacarpophalangeal joint and the fingerboard, determines the position of the attack of the finger on the string, considering a natural and non-tense position of the hand. Of course, if one wants to attack point A (image 8) with a flat angulation of the metacarpophalangeal joint, one must tense the little finger to abduct as much as possible, to reach point A (image 9). As is shown in image 9, without finger tension and a flat angulation of the metacarpophalangeal joint and the fingerboard (the red lines, captured by the MoCap system – Qualisys AB, Sweden), the natural point of attack of the finger is point B, the wrong note, or the note not desired by the exercise.

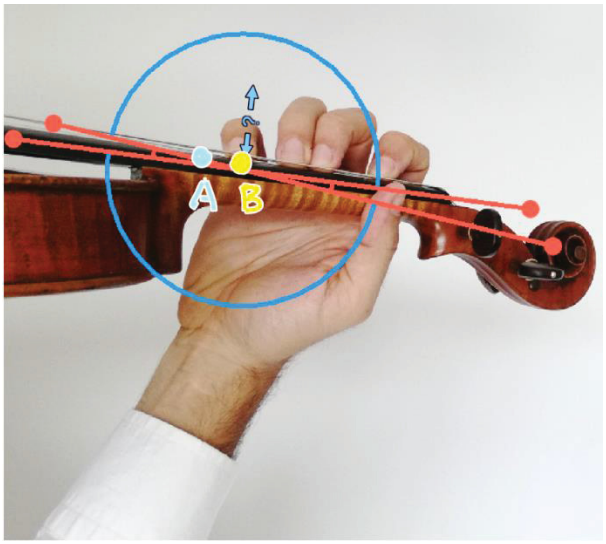

Image 9: Left upper limb position 4

5. Conclusion

Give that there are orchestras (including the famous Gulbenkian orchestra, in Portugal) with up to half of their musicians on sick leave, at any given moment in time, which represents a tremendous expense for the orchestras in question, this study could not come at a better time. In the intervals of some orchestra rehearsals (rehearsals which may go on for up to 7-8 hours at a time, for several days, before a major performance at a major venue), such as the Vienna Symphony Orchestra, there are certain group postural exercises aimed at the musicians (e.g. Pilates workouts, stretching exercises, posture exercises, and / or weight training). What our study is emphasizing is that the technique adopted – correct or incorrect – will have a very significant effect on the quality of the music produced as well as on the longevity of the musician-entrepreneur.

All violinists and violists face the difficulties of playing on a non-symmetrical instrument, which makes it quite easy to create wrong techniques. Scientific research on the left hand is very sparse. The approach described herein is unconventional and scientifically and anatomically based.

A scientific methodology was developed, composed of some simple and repeatable note patterns, and this performance was analyzed in 3D by a MoCap system (Qualisys AB, Sweden) that operates at a sampling frequency of 200 Hz, capturing the positioning of retroreflective markers on the joints of the hand, wrist, left forearm, violin and bow.

The influence of the height and angulation of the hand in relation to the violin arm at different amplitude intervals was analyzed, at both regular and fast execution speeds.

The resulting data were analyzed using Visual 3D software (C-Motion, USA) to extract relevant parameters and metrics such as flexion / extension and abduction / adduction angles on the wrist, index finger and little finger, and the relative position of the hand to the violin arm, as well as the frequency of movement during the fast execution.

The enhanced technique seems to allow the violinist to play the same score with less tension in the hand, with greater amplitude of the fingers, and a more natural position with angulations closer to the natural ones, allowing to play faster and with smaller pattern deviation, and so with more precision.

This study thus deals with the biomechanics of the left limb; 3D motion analysis; MoCap Qualisys AB; angulation and level of the metacarpophalangeal joint; an application to a virtuoso program; and an anatomical functional model.

Much as with entrepreneurs, musicians cannot interrupt their playing and practice (equivalent to interrupting the sales and source of revenue of any regular enterprise) at any point in their careers, especially not for long periods. This article and study is part of a doctoral research project and seeks to give a view on what the research project involves. The end result aims to be the longevity and general good health of musicians – in this case, violin and viola players.

6. Suggestions for future research

The lead author has had significant contact with a number of elite performers during his career. Many top athletes, in Portugal, from sports as different as the martial arts, golf and soccer (football) complain that, after many years of practice, arduous training and competition, they have acquired lesions and injuries that affect their quality of life. Some are on medication, and are postponing having operations to have artificial bones put in (knees and hips, mainly). Others have already had operations – one Portuguese martial artist expert has two "new" artificial hips. World-renowned golfers Jack Nicklaus and Tom Watson have had new hips put in. The former had both hips replaced, the latter only one. Therefore, when a former President of the Portuguese Republic, when asked about what the secret to his longevity was, answered "Sport! I never did any!" this may not be surprising. What this article has discussed is a new technique to help avoid lesions when playing the violin at an advanced level. It would be interesting to interview sportspersons and musicians to ascertain just how much they were forewarned by their teachers about such health hazards and if they would have acted differently if they had had the chance. Furthermore, what do they think of a research program to help avoid lesions for violin players? Finally, more musicians need to be involved in the experiment described herein, in order to confirm the results obtained.

References

Au-Yong-Oliveira, M., Costa, J.P., Gonçalves, R., Branco, F. (2018) The rise of the unicorn: shedding light on the creation of technological enterprises with exponential valuations. Proceedings of the World Cist 2018, 27-29 March, Naples, Italy. In: Rocha, A., Adeli, H., Reis, L.P., Costanzo, S. (Editors), Trends and Advances in Information Systems and Technologies, Vol 1, pp 967-977. Advances in Intelligent Systems and Computing, Vol 745. Springer.

Au-Yong-Oliveira, M., Moutinho, R., Ferreira, J.J.P., Ramos, A.L. (2015) Present and future languages – How innovation has changed us. Journal of Technology Management and Innovation, Vol 10, Nº2, pp 166-182. DOI: 10.4067/S0718-27242015000200012

Bang, M. (1919). Maia Bang Violin Method, Part 1 by Leopold Auer. New York: Carl Fischer.

Fischer, S. (1997). Basics: 300 exercises and practice routines for the violin. New York: Edition peters.

Frank, A., & Muhlen, C. A. (2007). Frank, A. & Mühlen, C. A. (2007). Queixas músculo-esqueléticas em músicos: prevalência e fatores de risco. Revista Brasileira de Reumatologia, 47(3): 188-196.

Gardner, E., Gray, D., & Rahilly, R. O. (1978). Anatomia, Estudo regional do corpo humano. guanabara: koogang.

Gerle, R. (1983). The Art of practising the violin. London: Stainer & Bell.

Magee, D. J. (2002). Avaliação Musculoesquelética. São paulo: manole.

Moraes, G. F., & Papini, A. A. (2012). Desordens musculoesqueléticas em violinistas e violistas profissionais: revisão sistemática. Itabira, MG, Brasil: Universidade Federal de Itajubá Campus.

Moreira, F., Gonçalves, R., Martins, J., Branco, F., Au-Yong-Oliveira, M. (2017) Learning analytics as a core component for higher education disruption: Governance stakeholder. TEEM 2017, October 18-20. Cádiz, Spain.

Oliveira M., Ferreira J.J.P., Barandas H. (2008) Innovation And Entrepreneurship: What Professors From Leading Universities Say? BASYS 2008 – 8th IFIP International Conference on Information Technology for Balanced Automation Systems – Hotel Ipanema, Porto - 23-25 June. In: Azevedo A. (eds) Innovation in Manufacturing Networks. IFIP – The International Federation for Information Processing, vol. 266, chapter 38. Springer, Boston, MA, pp. 353–362. DOI: https://doi.org/10.1007/978-0-387-09492-2_38

Oliveira, M.A., Ferreira, J.J.P., Xavier, A., de Sousa, J.C.C.P., Meireles, G., Sousa, M., Tomperi, S., Torkkeli, M., Salmi, P., Tolsma, A., Ye, Q., Tzmrielak, D., van Geenhuizen, M. (2012) Spin-Up – Creating an entrepreneurship coaching and training program for university spin-offs. Proceedings of the ECIE 2012 – Santarém, 20-21 September, vol. 2, pp.530-538, Viva, C., e Lucas, F. (Eds.).

Oliveira, M.A., Ferreira, J.J.P., Ye, Q., van Geenhuizen, M. (2013) Spin-Up: A Comprehensive Program Aimed to Accelerate University Spin-Off Growth. Proceedings of the ECIE 2013, Brussels, Belgium, 19-20 September, vol. 1, pp.34-44.

Primrose, W. (1960). Technique is memory: A method for violin and viola players based on finger patterns. London: Oxford University press.

Sousa, L. F. (2010). Lesões por esforço repetitivo em instrumentistas de cordas friccionadas. Aveiro: Universidade de Aveiro.

Spyrtou, A., Lavonen, J., Zoupidis, A., Loukomies, A., Pnevmatikos, D., Juuti, K., Kariotoglou, P. (2018) 'Transferring a Teaching Learning Sequence Between Two Different Educational Contexts: the Case of Greece and Finland'. International Journal of Science and Mathematics Education, vol. 16(3), 1 February, pp.443-463. DOI: 10.1007/s10763-016-9786-y

Teixeira, S., Branco, F., Martins, J., Au-Yong-Oliveira, M., Moreira, F., Gonçalves, R., Pérez-Cota, M., Jorge, F. (2018) Main factors in the adoption of digital marketing in startups - An Online Focus Group Analysis. The proceedings of the 13th Iberian Conference on Information Systems and technologies (CISTI 2018), Cáceres, Spain, June, pp.1-5.

Velilla, J., Molina, J.A., Ortega, R. (2018). Why older workers become entrepreneurs? International evidence using fuzzy set methods. The Journal of the Economics of Ageing, vol.12, pp.88-95. https://doi.org/10.1016/j.jeoa.2018.03.004

Zaza, C. (1998). Playing-related musculoskeletal disorders in musicians: systematic review of incidence and prevalence. Canadian Medical Association Journal, 1019-1025.

Zhu, C., Liu, A., Chen, G. (2018) 'High performance work systems and corporate performance: the influence of entrepreneurial orientation and organizational learning'. Frontiers of Business Research in China, vol. 12(4), https://doi.org/10.1186/s11782-018-0025-y

Masters Research Papers

Service Innovation Implications: The Importance of Business Alignment by Employees

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Abstract: The market's evolution and ever-increasing competitiveness forces organizations to find new ways to reinvent themselves. According to the principles of the Service Dominant (SD) Logic, it is argued that Service Innovation depends on the participation of all the direct actors in any given organization, focusing on its employees as key elements for delivering the brand promise made to the consumer, regardless of any eventual direct contact between them. The success of organizations relies on their growth capability and, for this reason, the measurement of investments is fundamental to the business strategy. Thus, the tangibility of the Internal Brand Management (IBM) is essential in management decisions, only possible through the construction of Key Performance Indicators (KPI). Given the intangibility inherent to the processes of brand building, brand promise delivery and service co-creation, which are directly dependent on the definition of the business strategy, the present article proposes a method to create KPIs with the aim of understanding the alignment of employees in relation to the business strategy. Based on a literature review, which corroborates the relevance of the theme, a case study is presented on a multinational Business-to-Business (B2B) organization. Using a mixed methodology, the research is divided into two moments: 1) A qualitative analysis which a) Identifies the strategic categories of the organization being studied, b) Evaluates the focus given to those main categories through the most important internal brand dissemination documents and c) Organizes the Employee Satisfaction Questionnaire based on those same categories; 2) A quantitative analysis to evaluate the results of the alignment of the Employee Satisfaction Questionnaires' answers with those strategic categories previously referred to for the period 2011 to 2017. Therefore, it is suggested that all organizations have tangible information that allows the identification of KPIs to serve IBM. However, traditionally, there is no objective systematization of these indicators, which could lead to the measurement of the employees' alignment under this perspective.

Keywords: Service Innovation; Internal Brand Management (IBM); Key Performance Indicators (KPI)

1. Introduction

Building a business nowadays has exceeded the simple assumption of production of goods, a vision once vital in a society whose only purpose was to satisfy its basic needs. This evolution has become crucial to the growth of organizations by enforcing the adaptation of the industry's supply, from a traditional concept of production of goods to a solution of "extended product" where intangible resources, co-creation of value and relations prevail (Neely 2009; Vargo & Lusch 2004). The product is, therefore, by itself, a "service distribution vehicle" and an object to deliver "satisfaction of higher order needs" (Vargo & Lusch 2004). Vandermerwe and Rada (1988), quoted in Neely (2009), introduce the concept of «servitization» of production "in order to consolidate the paradigm shift from simple product-centric business (PCB) to "PCB's Service" («adding value and adding services») (Raddats & Easingwood 2010). Organizations have become «living beings» whose mutation is mandatory for their survival. As stated by King & Grace (2010) there *"can be no denying that in today's competitive and fragmented market, competitive advantage realized through tangible, functional benefits, is no longer sustainable."*

Organizations applying this management concept to create competitive advantage (Raddats & Easingwood 2010) aim to index their products to a set of benefits that set them apart from those of the competition. This corroborates the idea that value creation in services depends on the way the organization's resources are effectively distributed between the promotion, execution and outcome of the service process (Grönroos 1998). The creation of value and the delivery of promise by the organization thus take place transversally, involving all the actors of the organization and, as a consequence, all these points of contact influence the opinion and therefore the level of satisfaction of the consumer. To Grönroos (1989), marketing is dispersed in the organization, moving out of its borders and emerging somewhat throughout the organization, particularly in circumstances where the consumer can be influenced, both directly or indirectly.

Organizations can no longer focus exclusively on the issue of the production of goods and have evolved into more complex social structures, highly dependent both on their external environment and on internal critical mass. The organization as a whole has the responsibility to provide all the conditions needed to the production process, including development, design, manufacturing, distribution, sales and support activities (Grönroos & Ravald 2011). Given the multiplicity of nodes in the network of relationships under which business happens, it is critical for organizations to streamline their strategy so that their target audience may instantly identify everything they constitute to them, whether tangible or immaterial. "*Marketing can be viewed as the building, maintenance, and liquidation of networks and interactive relationships between the supplier and the customer, often with long-term implications*" (Gummesson 1991).

The Service is thus an experience by which the consumer is part of the production process, allowing him to withdraw the benefits sought (Vargo & Lusch 2004; Grönroos 1998). Any industry always has this line of direct contact with consumers, whether it is a B2C (Business-to-Consumer) or B2B (Business-to-Business) organisation, and its purpose is to close the sale effectively. The study of Gummesson & Mele (2010) introduces the relevance of creating a global theory about marketing in order to explain the process of co-creation of value, not only in the B2C context but also in B2B circumstances. The authors suggest that the premise of the topic should focus on the concepts of «A2A interaction» (Actor-to-Actor interaction) and on the «integration of resources». This line of contact presumes the construction of a relationship in which the empathy created between the parties assumes a role of enormous importance for the identification of the consumer with the organization. The Service, as a business logic, implies the facilitation of some interactive processes that support the creation of consumer value in their daily practices (Grönroos 1998). The role of the organization is, in turn, to create conditions so that consumers can generate the expected value (Grönroos & Ravald 2011), collaborating and learning with them and adapting to their needs (Vargo & Lusch 2004).

In any organization, the number of Part-Time Marketers (PTM's) far exceeds Full-Time Marketers (FTM's) (Gummesson & Grönroos 2012). The PTM is responsible for facilitating resources that enable the fulfilment of the promise of value creation conceived by the FTM (Grönroos 2008). Just as mentioned by Grönroos (1989), the different employees in the organization whose functions intervene in the Service orientation are considered as «internal consumers»: "*such internal customers have to be served as well as the ultimate, external customers are supposed to be*." In this sense, the aim of the present study is to evaluate the inference that Internal Brand Capital and, thus, Internal Brand Management (IBM) actions have on a group of employees and what is their involvement with the strategy, which is the point of origin of all the actions of an organization. The present research intends to promote a debate on the premise that "*all employees carry the brand promise regardless of their role and direct contact with the consumer*" (Grönroos 1989) as the fulfilment of the promises and commitments established between the parties shall be maintained if the relationship is to last over time. It is therefore intended to demonstrate the importance of the organization's investment in IBM under the assumption that its strategy and the success of its business model depends on the active participation of the employees.

2. Service Innovation and Internal Brand Management (IBM)

When thinking about Service the first reference comprises the direct interaction with the consumer and everything it constitutes, such as intangibility, heterogeneity, perishability and simultaneity. This is why we need to identify the required capabilities so that the means to implement the service will increase as firms shift their focus from PCB's to PCB's Service, as Kindström et al. (2013) refer. The authors also advocate that PCB's business model may provide opportunities, but this probability will not be enough to take the necessary advantage that service innovation has to offer. This reiterates the idea that the production of service is obtained in the co-creation process and it is made tangible by the goods associated with it.

In 2000, (Berry 2000) "*in packaged goods, the product is the primary brand. However, with services, the company is the primary brand*". This statement shows that a brand was a mere mechanism of product identification and a reference of a given producer. Nowadays, it is the vehicle for the transmission of ideas and the personification of the values of an organization as well as the tangibility of its business model strategy. Thus, the brand became the inevitable asset of the organization's sustainability, as it reflects its functional and emotional benefits (King & Grace 2010). Organizations, therefore, should focus on the brand's main lines that will allow them to achieve their organizational objectives. According to Keller & Lehmann (2003), and as already mentioned before, there are numerous contact points within the organization that affect brand equity,

and, therefore, the brand. The authors underline that every one of these individuals should be "*cognizant of relevant branding effects*", as they "*make different brand-related decisions and need different types of information*".

Consequently, the focus of organizations should rely on the importance of their brand, whereby the consumer builds relations that stimulate the sale and substantiate their repetition, thus enhancing the generation of value and the creation of financial assets for organizations. The brand could be considered as a «dead object» without conscience, and even the literature points out that it is not possible to provide it with an identity.

However, from the moment it functions as a set of values to be evoked, both internally and externally, the brand comes to life and its consciousness takes shape in its reflexive nature when considering the internal target groups of a brand, administrators and employees (Burmann et al. 2009). The literature refers to the importance of building a brand promise that allows the identification of the organization's brand positioning.

The relevance of the employees' participation in the delivery of the brand promise is vital if it is to be analysed by the consumers when delivering the organization's promise (Berry, 2000). According to the author, the employees' actions transform the concept of "*Brand Vision into Brand Reality*". To improve customer bonding, organizations should, therefore, invest in interaction capabilities as a means of increasing his/her attachment to the brand (Kindström et al. 2013).

Through the brand, organizations bring to the market not only the effective and operational business positioning, but also the meaning they intend to build in the minds of their target audience and the social ideas with which they commit. Chernatony (1999) refers to the Brand View and Culture as central elements that influence and are influenced by Positioning, Personality and Relations between stakeholders. This issue raises once again the importance of employees in the delivery of the service, because their actions will be translated into future perceptions by consumers about the brand in question. As is underlined by Piehler, Grace, & Burmann (2018), there is a paucity of scientific work within the thematic of IBM, even with the increasing interest in organizations.

The strategic choices of a business should point to some core characteristics of the organization's brand, because they will be the vehicle that allows all stakeholders, especially customers and employees, to create links of identification. Positive outcomes are more likely to emerge when employees recognize that the organization supports their work based on strong values and well-being programs (Lages & Piercy 2012).

Providing employees with a direction that influences their attitudes and behaviours ensures that tasks are performed with higher engagement with the expected performance and the organizational requirements (King & Grace 2010).

Chernatony & Cottam (2009) highlight three central departments in the construction of the brand, Marketing, Consumer Service and Human Resources, each one contributing differently to the brand's success. When we work in harmony and in synchronization with the business model it is more likely that employees are engaged with the brand and, whenever in contact with the customer, recognize the accomplishment of the promise they are looking for. Working together, the IBM programs will be more effective if they allow employees to determine how they shall construct their interpretation of the organizational brand, which will be translated into expected brand-related behaviours. Thus, IBM's goal is to influence the behaviours and attitudes of employees. As King & Grace (2010) state, "*to do this effectively, however, requires an understanding of how employees react and respond to such internal initiatives*" and "*this distinction is important because it is only through the evaluation of internal brand management outcomes i.e. employee attitudes and behaviour, that continued investment and enhanced internal brand management practices are to be realised.*"

3. Conceptual model - Internal Brand Management (IBM) Key Performance Indicators

The proximity to businesses anticipates the urgency of this issue and the relevance of the creation of effective value for organizations. Brand value measuring became paramount to the real understanding of the business model of an organization as it is, today, one of the more valuable assets despite its intangible form. "*Profitable brand management requires successfully designing and implementing a brand equity measurement system.*

Crucial to developing such a system is an understanding of how brand value gets created" (Keller & Lehmann 2003).

For this study, Piehler et al. (2018) underline the contribution of future research advocating the importance of IBM to the organization, as an intention to add value to scientific knowledge about the issue. First, aiming at validating the "*relevance of IBM for brand management and company success*", the case study intends to demonstrate that successful internal brand programs will ensure a stronger business alignment with the organization's stakeholders inside the firm and therefore a more likely increase / better financial performance. Secondly, the chosen organization is, as will be demonstrated further, an international B2B industrial manufacturing organization with a strong focus on the service area. Thirdly, it highlights that organizations build practical and pragmatic measuring instruments that allow the evaluation of the IBM investment. Finally, it is a purpose to provide a holistic view within the organization, as it is stressed that all IBM investment is part of a cycle beginning with business orientation and ending in its measurement.

4. Methodology

The main objective of the study is to provide companies with a new process of systematization and measurement of the strategic alignment of employees with the company. In this sense, a methodology is proposed for the construction of Key Performance Indicators (KIPs), aiming at allowing the measurement of the intangible component of the service from the perspective of the employees, according to the conceptual model previously exposed.

Similarly to the scientific work of the creation of constructs in the literature, the intention here was to apply the same process of model drawing to a pragmatic and real case study. Using a mixed research process, the proposed methodology was put into practice throughout the accomplishment of a case study composed of the following sequential steps (Fig. 1):

1. Qualitative research through observation and direct contact with the organization to identify the business strategy's main goals and change them into codes named, for this matter, as strategic categories (Leech & Onwuegbuzie 2007);
2. Indexation of employee satisfaction questionnaires into strategic categories, as established in the previous paragraph (King & Grace 2010);
3. Simple qualitative analysis of the most relevant documents of the organization's strategy communication to its employees, through word counting, with the purpose of quantifying the most relevant messages in the organization's discourse, without the interference of any interpretation by the research team (Leech & Onwuegbuzie 2007);
4. Descriptive quantitative analysis of the results of the employee satisfaction questionnaires, intending to measure the employees' alignment with the business strategy categories (Lages & Piercy 2012).

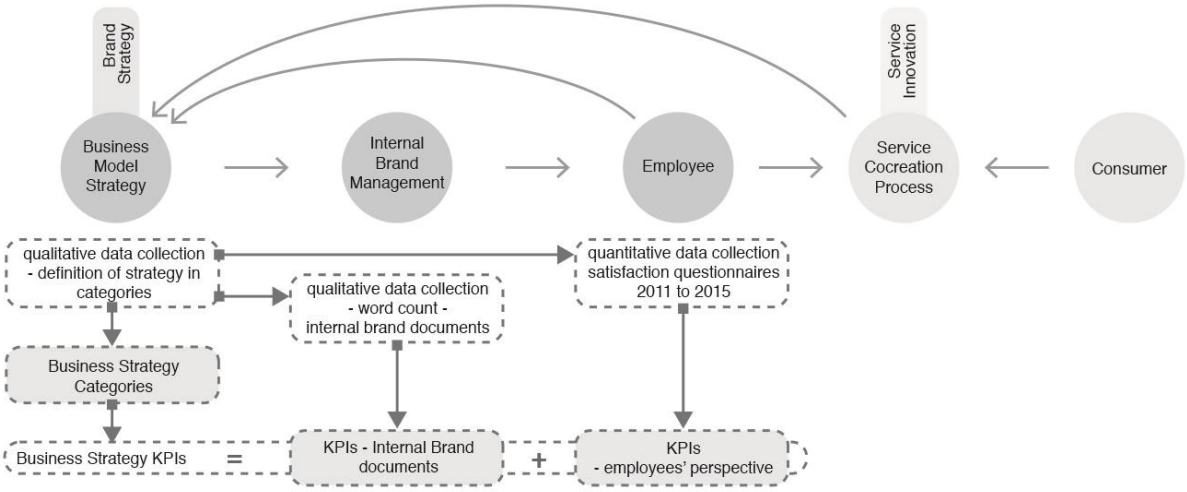

Figure 1: Purpose model

Given the claim of the present study to bring to the light of knowledge some pragmatic information, it was judged to be more realistic to approach the research using these tools rather than to construct other data collection instruments whose origin would only be supported by a bibliographic review. The ambition to contribute in a profitable and operable way to the daily life of the organization reiterates the choice for that data collection process and underlines the practicality of methodological decisions.

The organization under analysis operates in the construction sector with industrial production in the national territory since 1990. It is integrated into an international group of the same sector and positions itself as the world leader in its activity. Although being an industrial organization, it is based on the delivery of service and is focused on offering quality solutions with a close proximity to its customers as well as a close monitoring of their needs.

Consistent with the relevance of the study, it was necessary to find an organization that had a balanced investment in terms of time and operational and financial resources related to human resources programs, service customer and marketing program, which includes brand development. Therefore, we would be able to directly compare the results of each one individually and the alignment between them.

The primary reason for the choice of the organization under consideration is that it maintains this balance, but also equitably supports the strategic importance of the mentioned programs, aligns its tactical implementation on the ground with the organization's overall strategy and promotes the congruence between the actions and discourses of the mentioned programs.

4.1 Sample, Data Collection and Data analysis

The current research is based on a case study, where access to information is based on a close and long relationship between the researchers and the organization. This has enabled an extensive collection of information with the necessary reliability guarantee, obtained through the proximity with the elements that strengthen the validity of the researchers' empirical findings. The knowledge about the organization and the proximity with it made it possible to construct the strategic categories mentioned above.

On the other hand, the internal brand and strategy communication documents allowed the accomplishment of the discourse analysis through the counting of the more frequent words realized by using WebQDA software. We analysed the 500 most mentioned words with more than 3 characters. 18,02% of the words, amounting to 12.319 words out of a total of 68.374 contained in the documents, were considered relevant for the discussion. For the analysis, all words whose repetition represents 0.05% with respect to the total, which implies its use 34 times, were considered. From these, all words, such as verbs or adjectives, which would not allow a congruent interpretation given the breadth of meanings they could hold according to context, were removed. Below we can see the relevance of each strategic category in the formal discourse of the organization and thus understand which message should reveal a higher alignment by the employees.

Regarding the quantitative analysis, the sample included all employees holding a permanent contract with the organization from 2011 to 2015 (Table 1), who answered a complete questionnaire of 78 questions. The collection of data was of the responsibility of the organization and it was realised biannually in the last quarter of each year. It is important to note that the researcher did not interfere either with the questionnaire or with the data collection process. The questionnaires were organized through a Likert scale of 5 levels, as can be seen in figure 2.

Table 1: Sample Date

TABLE 1 - Sample Data	2011	2013	2015
Number of employees with contract	204	177	175
Number of responses considered valid	157	111	112
Response rate considered valid	76,96%	62,71%	64,00%

5. Findings

The result obtained is highly satisfactory from the management perspective, since the level of the employees' alignment is always positive in all categories if we consider that more than 80% of responses are positive. For this reason, the results below the typology of answers «agree» and «totally agree» are not considered for the discussion. To better understand the analysis of the results, a direct comparison is presented in Fig. 2 between the word count by category and the result of a quantitative analysis of the employee satisfaction questionnaires for the years 2011 to 2015.

The first relevant reference for the discussion concerns the investment in the brand held by the organization, given that of the total number of words considered the direct name of the organization's brand is referred to 895 times (1.31%) and the nominal associations arising directly from the brand adds another 672 references (0.98%), which makes a total weighting of 2.29% references (1,567). This leads us to the conclusion that there is a strong brand-level investment, although this cannot be corroborated by the quantitative study. In light of the experience gained, it follows that this conclusion may result in a positive response, but this can only be ascertained if research continues, as mentioned below with regard to future considerations.

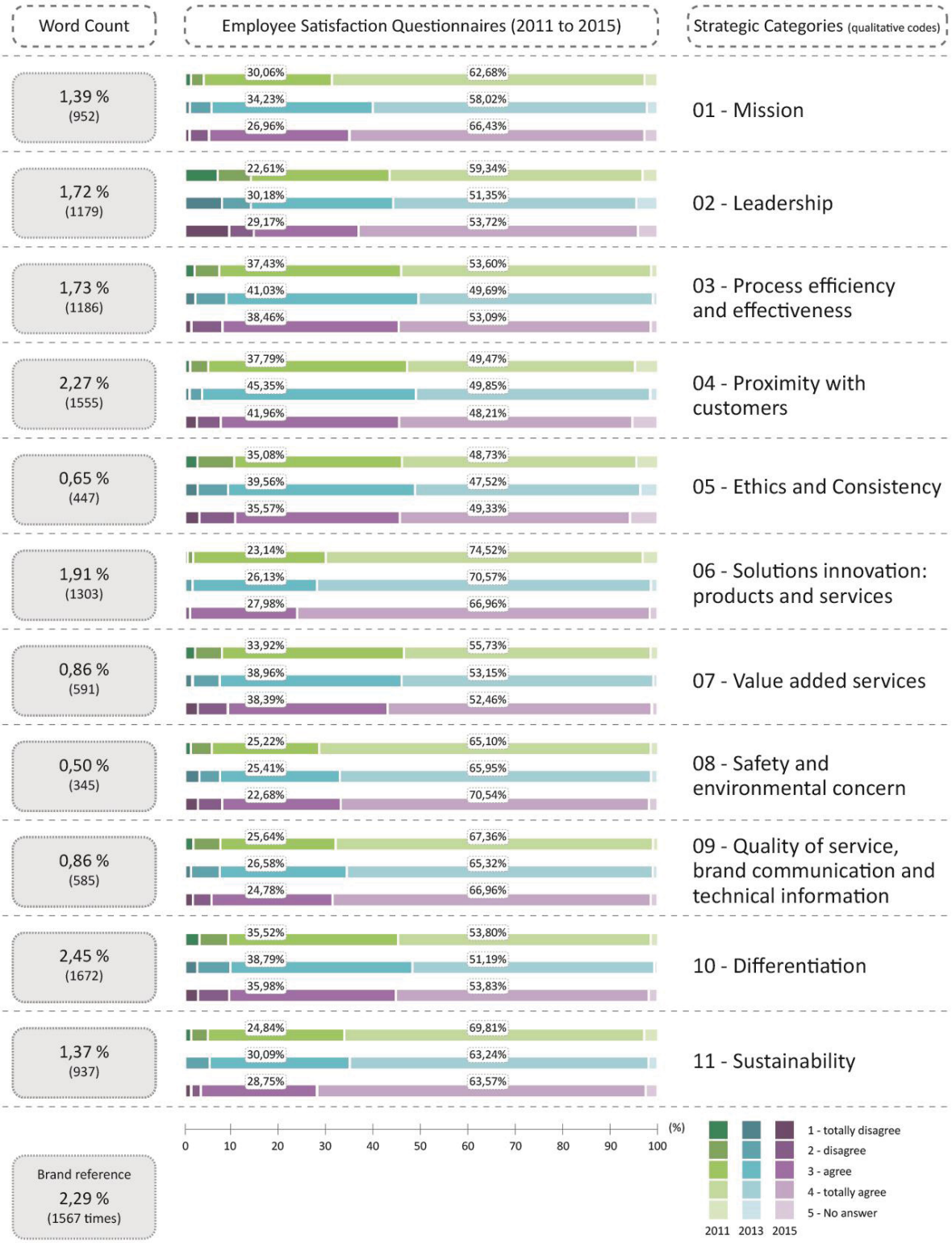

Figure 2: Findings – graphic summary

Regarding the relationship between the communication dialogue and the alignment of the employees related to the strategic categories, here are the conclusions of Figure 2:

1. There is congruence between the communication dialogue and the strategic categories «Mission», «Solutions innovation: products and services» and «Sustainability».
2. There is a discrepancy between the speech and the result in the category «Safety and environmental concern». However, this can be explained, since the internal communication documents related to this strategic category were not considered. It is known that the investment in this strategic category is high, both in time, training, communication and adaptation of industrial space. The purpose was to obtain a maximum reduction of risks and an improvement of the working conditions. The statistical analysis dates back to the year 2000, when the Frequency Index for accidents with and without casualties was higher than 50. Of the specific actions in this area, especially after 2003, a value of 0 was reached in 2016 for the same Index.
3. There is also a discrepancy in the category «Leadership», «Process efficiency and effectiveness» and «Proximity with customers» alignment and the communication dialogue. In relation to these categories, it will be interesting to probe and enquire why this happens.
4. The discrepancy between the communication dialogue and the category «Differentiation» can be explained by the fact that the documents used mostly come from the Human Resources department, since the objective is to evaluate the discourse of internal communication and the construction of categories is concretized at the level of an overall strategy. A more in-depth analysis is suggested of the documents in order to understand if this context is maintained.

Concerning the interpretation of quantitative data, it is possible to observe in all the strategic categories a decrease of «total agreement» (4) in 2011 to only «agreement» (3) in 2013 and a positive equivalent variation in 2015. This situation can be explained as was observed and accompanied by the researchers, by the strong decrease of the team size, considering the global economic crisis. During this period, particularly during 2012 and in early 2013, the organization was forced to cut its budget sharply, which has implied a contractual termination with a significant number of employees.

However, it can be observed that the category «Proximity with customers» has not changed over time, just as the «Ethics and Consistency» category has maintained a balanced result, even considering the above-mentioned economic crisis. The «Leadership» category, despite the recovery in 2015, did not keep up with the result obtained in 2011, as well as the categories «Solutions innovation: products and services» and «sustainability».

It is also possible to perceive that there is a strong orientation towards innovation, with «Solutions innovation: products and services» being the category with the superior result. The result of the «Mission» category is equally interesting, considering that it is not expected that many organizations will be able to achieve a total agreement result higher than 58%.

6. Managerial Implications and Conclusions

The article lists a wide range of literature areas whose relationships are relevant to management, particularly considering the relevance that IBM is acquiring within organizations, as well as in empirical research. The research allows us to conclude that the adopted methodology consents a monitoring of the investment made in each strategic area of the organization, which is corroborated by the overall congruence of the results exposed. Within organizations, there is a considerable amount of management-relevant data for all the different departments. Considering that IBM is merely a means of brand communication and organization strategy, we only need to find methodologies that may result in useful management data. The research presented offers managers a mechanism to understand which areas require an investment so that employees may align their behaviour with the purposes and guidelines of the organization. Thus, the present case study suggests a way of making the relationship between the business model and the employees' involvement more tangible.

7. Further research and limitations

One of the limitations of this case study involved the fact that it was not possible to influence the elaboration of the employee satisfaction questionnaire. Another limitation was the fact that the 2017 questionnaire was changed and new questions were introduced and others eliminated. Besides, it was applied with a different scale. For this reason, this survey was not included in the study. However, it would be interesting to incorporate the data in the future.

It is suggested that further research should include a comparison with the customers' satisfaction questionnaire, to understand if the employees' alignment is at the same level as the customers' comprehension of the organization. It would also be very interesting to further invest in a deeper qualitative study to understand if the concepts defined in the strategic categories are really embedded in the documents that support the internal documentation and if it is included in the direct discourse of both head and chief managers of the various departments within the organization. Such data could be compared to a direct and straightforward simple questionnaire administered to all employees about the core values of the brand, considering both tangible and intangible perspectives.

Empirical data obtained can also provide new insights if new categories are constructed in future, based on an academic point of view, by indexing the questions of the same satisfaction questionnaire to the constructs of the Employee based Brand Equity (EBBE), as recommended by King & Grace (2010): "*such a comparison may provide important insight into how internal brand management practices may, in fact, vary according to the level of employee involvement with respect to production elements that influence the brand.*"

References

Berry, L.L., 2000. Cultivating Service Brand Equity. Journal of the Academy of Marketing Science, 28(1), pp.128–137. Available at: http://link.springer.com/10.1177/0092070300281012.

Burmann, C., Hegner, S. & Riley, N., 2009. Towards an identity-based branding. Marketing Theory, 9(1), pp.113–118. Available at: http://mtq.sagepub.com/cgi/doi/10.1177/1470593108100065.

Chernatony, L. de & Cottam, S., 2009. Interacting contributions of different departments to brand success. Journal of Business Research, 62(3), pp.297–304. Available at: http://dx.doi.org/10.1016/j.jbusres.2007.12.005.

Grönroos, C., 1989. Defining Marketing: A Market-Oriented Approach. European Journal of Marketing, 23 (1)(1989), pp.54–58.

Grönroos, C., 1998. Marketing services: the case of a missing product. Journal of business & industrial marketing, 13(4/5), pp.322–338. Available at: http://www.emeraldinsight.com/doi/pdf/10.1108/08858629810226645.

Grönroos, C., 2008. Service logic revisited: who creates value? And who co-creates? European Business Review, 20(4), pp.298–314. Available at: http://www.emeraldinsight.com/doi/abs/10.1108/09555340810886585.

Grönroos, C. & Ravald, A., 2011. Service as business logic: implications for value creation and marketing. Journal of Service Management, 22(1), pp.5–22.

Gummesson, E., 1991. Marketing-orientation Revisited : The Crucial Role of the Part-time Marketer. European Journal of Marketing, 25(2), pp.60–75.

Gummesson, E. & Grönroos, C., 2012. The emergence of the new service marketing: Nordic School perspectives. Journal of Service Management, 23(4), pp.479–497.

Gummesson, E. & Mele, C., 2010. Marketing as Value Co-creation Through Network Interaction and Resource Integration. Journal of Business Market Management, 4(4), pp.181–198.

Keller, K.L. & Lehmann, D.R., 2003. How Do Brands Create Value? Marketing Management, 12(3), pp.26–31. Available at: http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=10600463&site=ehost-live.

Kindström, D., Kowalkowski, C. & Sandberg, E., 2013. Enabling service innovation: A dynamic capabilities approach. Journal of Business Research, 66(8), pp.1063–1073. Available at: https://www.sciencedirect.com/science/article/pii/S0148296312000872 [Accessed February 13, 2018].

King, C. & Grace, D., 2010. Building and measuring employee-based brand equity. European Journal of Marketing, 44(7/8), pp.938–971.

Lages, C.R. & Piercy, N.F., 2012. Key Drivers of Frontline Employee Generation of Ideas for Customer Service Improvement. Journal of Service Research, 15(2), pp.215–230. Available at: http://journals.sagepub.com/doi/pdf/10.1177/1094670511436005 [Accessed February 13, 2018].

Leech, N.L. & Onwuegbuzie, A.J., 2007. An Array of Qualitative Data Analysis Tools: A Call for Data Analysis Triangulation. American Psychological Association, 22(4), pp.557–584. Available at: http://class.classmatandread.net/qual/-qualanalysis%282%29.pdf [Accessed May 5, 2018].

Neely, A., 2009. Exploring the financial consequences of the servitization of manufacturing. Operations Management Research, 1(2), pp.103–118.

Piehler, R., Grace, D. & Burmann, C., 2018. Internal brand management: introduction to the special issue and directions for future research. Journal of Brand Management. Available at: https://link.springer.com/content/pdf/10.1057%2Fs41262-018-0096-2.pdf [Accessed February 13, 2018].

Raddats, C. & Easingwood, C., 2010. Services growth options for B2B product-centric businesses. Industrial Marketing Management, 39(8), pp.1334–1345. Available at: http://dx.doi.org/10.1016/j.indmarman.2010.03.002.

Vargo, S.L. & Lusch, R.F., 2004. Evolving to a New Dominant Logic for Marketing. Journal of Marketing, 68(1), pp.1–17.

Incorporating Innovative ICT in Child-Oriented Marketing – A Retail Sector Case Study

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Abstract: The retail sector, although being primarily traditional is deconstructing and modernizing itself in order to keep up with the technological and digital enhancements. The Portuguese panorama is remarkably structured upon child-oriented marketing initiatives with the involvement of technological platforms, gamification and enrolment components. The scrutiny of existing applications of innovative ICTs focused on children's marketing will serve as the basis for a new business campaign aimed at children and supported by digital marketing and innovative technological features that might trigger a future campaign's success. In addition, we conducted a small survey to parents and subsequent potential campaign customers to understand the indulgence of a children's marketing action and a triumphant social media advertisement. The in-store retail system has a huge competitor in the online configuration, in some product categories in conjunction with the privilege of buying anywhere and anytime. In what concerns child-oriented marketing, there is an understanding that actions need to focus on aspects such as interactivity, multimedia and personalized content, where the survey displayed a 99% approval in the creation and necessity of child-oriented marketing campaigns to retailers, and a 54% acclamation of a promotional social media action. This reveals that the online channel is a valid channel, and the in-store retailers, even still being preponderant, need to rethink the inclusion of an Omni-channel solution to solve the in-store versus online shopping retail system. Additionally, is recommended the creation of child-oriented actions to convert customer loyalty from a younger age and influence family consumption.

Keywords: ICT, Children Marketing, Social Media, In-store Retail, Online Retail.

1. Introduction

As individuals and organizations emerge themselves in the most recent arguments behind the Information Society buzzword, the incorporation of information and communication technologies (ICTs) in their daily lives is also becoming not a desire, but a requirement (Gonçalves, Martins, & Rocha, 2016).

As a younger public becomes more relevant, mainly due to their technology savviness, organizations are altering the way they communicate with these new prospects and how they market their products or services (Xiang, Magnini, & Fesenmaier, 2015). Confos and Davis (2016) argue that to be successful, marketing initiatives aimed at children and/or youngsters must include (innovative) technologies and platforms, such as Facebook and YouTube, gamification and enrolment components, though this is dependent on their age.

The retail sector is one of the most interested in reaching children and younger segments of prospects and, although being a typically traditional sector, the retail sector will have to modernize itself in order to keep up with the more digital requirements of its new customers (Stewart, Oliver, Cravens, & Oishi, 2017).

In what particularly concerns the retailing industry, the incorporation of ICT is changing the purchase experience process, where brick and mortar stores are progressively losing to their biggest competitor – the online stores (Galipoglu, Kotzab, Teller, Hüseyinoglu & Pöppelbuß, 2018).

The urgent transformation felt by technological growth, and its momentary status, reveals an extreme concern to pinpoint those with a longstanding stature, in serving marketing and business purposes. These ambitions are inspired through the smooth use of technological devices experienced by Generation Y and Generation Z, and with the prominence of social media platforms. Therefore, it is necessary to take into consideration customers' reactions in order to enhance customer service (Verhoef, Kannan & Inman, 2015).

Mobile technologies are empowering customers with more information about the products, providing them with the choice of finding information at their convenience and easily choosing between an online or physical store (Grewal, Motyka & Levy, 2018; Martins, Gonçalves, Branco, Barbosa, Melo & Bessa, 2017.

This paper pretends the inclusion of an extensive reference foundation as an agenda to further guide research in the retail area, with the renewal of both society and organizations, alongside a straightforward analysis of recent child-aimed campaigns made by big retail organizations, hence allowing one to acknowledge that, despite being targeted at a younger public, these dynamics are enforced and stimulated by adults, either by interacting with others to exchange campaign-related artefacts or by installing and using the campaign-related software applications. As argued by Ritch and Brownlie (2016) and Del Bucchia and Peñaloza (2016), this active parent participant is typically a consequence of social and familiar pressures that impel parents to avoid any type of negative or contrary action towards their children.

The first section includes an impact of the technological incorporation in consumer and organizational behaviour, succeeded by an understanding that retailers are a huge part of the global economy, while also trying to understand what the consequences will be concerning online implementations and the possible fusion of the offline and online in an Omni-channel future. The third section's aspiration is to study the premeditation of children and young consumers as future clients and as a marketing and communication target, prospecting new machinery tools to collapse the traditional marketing barrier built over time. Finally, spotlighting a new practice being driven by Portuguese retail giants to get customer fidelity with child-aimed campaigns – collectible campaigns – using smartphone and desktop applications and webpages in order to enact a posterior influence in family purchase decisions.

2. The incorporation of technology in consumer and organizational behaviour

According to Xiang, Magnini and Fesenmaier (2015) and Jorge, Teixeira, Correia, Gonçalves, Martins and Bessa (2018), understanding how ICTs impact consumer behaviour is crucial for organizations when developing marketing strategies. Most technologies are always in a transitory status, so there is a relevant importance in identifying those with the potential to serve long-term purposes.

In association with information technologies, a global environment has erupted in recent years, and as a matter of fact, the development of the Internet (which can be defined as a platform that facilitates technological innovations, new business practices, and a change in the competitive landscape of industry sectors) has transformed the nature of communication and marketing (Gonçalves, Martins & Rocha, 2016).

The adoption of a technological environment requires a solid perception of the long-term trends in the consumer market, rather than simply following a short-term soon-to-be obsolete technology. Capitalizing on the business environment changes is a requisite to sustained success denoting that these achievements enable opportunities for organizations to provide high-quality customer service leading to unceasing competitive advantages (Xiang, Magnini, & Fesenmaier, 2015).

As reported by Gonçalves, Martins and Rocha (2016) another concept has emerged – that of Social Networks – firmly transforming how one conducts business and affirming itself as a meaningful communication and marketing channel for goods and services, forcing institutions to seek new competitive advantages in the market.

The younger generations' involvement, triggered by the handling of information and communication devices across the Internet and by the seeking of information from multiple sources – television, video and social media – makes them an online advertising responsive target. Social media and online communications are making such an impact due to photo and video tools and also due to social networking. This meaningful tendency presents a great opportunity for marketing and management specialists to identify viable routes to

value creation over the inclusion and combination of new revenue sources into their current business models (Xiang, Magnini, & Fesenmaier, 2015).

As for organizations, there is a necessity to merge their ongoing business models with technological innovations caused by Millennial market prospects, endorsed with technological competences. Business leaders must find not only a way to provide the best customer service, but also the motivation – for employees – to achieve maximum performance while fluctuating between online and offline retailing (Stewart, Oliver, Cravens & Oishi, 2017).

To understand the proliferation and behaviour change in the use of ICTs, a research conducted by ACEPI and IDC (2017) reports that 39% of the Portuguese businesses have an online presence, where 84% have their own website and 67% own social media pages, indicating a rising necessity of being permanently connected with prospecting online customers.

The interest in ICT is motivated by the urgency in achieving better integration of new technologies with business purposes, creating a dependency due to the direct impact in compartmental behaviours. However, Martínez, Vaszquez, Estrada, Santillan and Zavala (2016) admit that business models tend to not consider the technologies in organizational requirements, making it difficult to discern how technologies are useful to their aspirations, even though productivity pressures are urging business-to-business (B2B) customers to consolidate their purchasing procedures and therefore encouraging them to entrust digital technologies, where a wide variety of tools – websites, social media, mobile applications – can assist the purchasing processes and expediting decision-making.

Thus, the peculiar development of the Internet and of e-commerce made a huge impact on the way consumers live and settle their decision making, contrasting in online and offline behaviours (Deka, 2017).

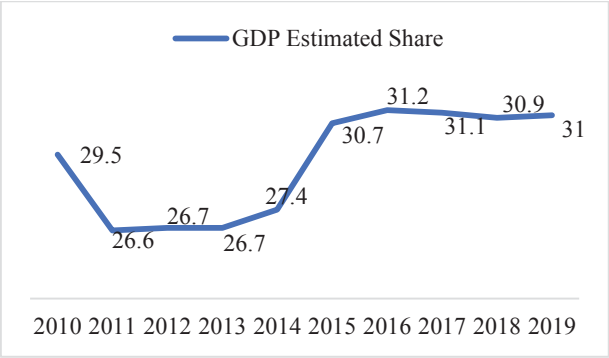
3. The modernization of the retail sector and the in-store versus online conflict

The retail industry, as exposed by von Briel (2018), is configured as one influential element of the global economy, with predictions of attaining 31% of the global domestic product by the year 2019 (figure 1) with about 28 trillion US dollars in revenues.

When analyzing the retail sales evolution between 2010 and 2019, the traditional system is shown as the prevailing one. However, when regarding online sales, we see an uninterrupted flourish representing 0.6 trillion dollars in 2010 and an expectation of 3.6 trillion dollars in 2019 (figure 2) (Falke Information, 2016).

Traditional retailers currently face a very significant upsurge of new online competitors to whom they are progressively losing customers due to the customer conversion behaviour provided by digital technologies. In effect, when customers want to search for information about a new product, they conveniently use the gadgets they have – smartphones, laptops or tablets – remaining comfortably on their sofa without having to go to a brick and mortar store in the proximity (Grewal, Motyka & Levy, 2018).

Figure 1: Gross Domestic Product Estimated Share (Source: Falke Information, 2016)

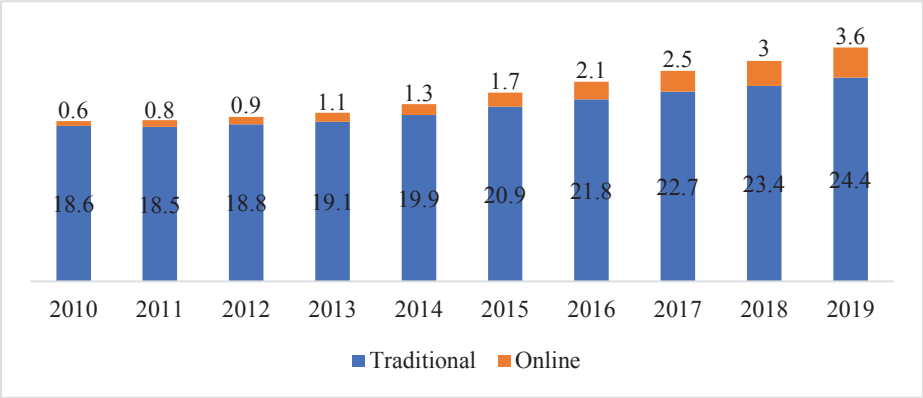


In recent years, traditional marketing channels – sponsoring, print advertising or television commercials – have been supplemented by new digital options – social media, search engines or price comparison sites – leading

to a change in the way business and marketing is done within the retail sector, while also generating new forms of competition (Grewal, Motyka & Levy, 2018).

As reported by Johansson and Kask (2016), retailers are facing a labyrinthine question of the inclusion or non-inclusion of e-commerce as a part of the retail amalgamation, in which the understanding in judging the appropriate retail configuration of whether to have a virtual or a physical store is of an extreme strategic relevance for the competitive advantage of a firm. Apart from the decision of the retail format, another vital aspect is the organization of the market standing to engage and maintain customers, either by offering lower prices than competitors or by differentiating themselves and earning a premium compensation (Hoehle, Aloysius, Chan & Venkatesh, 2017).

Figure 2: Retail Sales Evolution (US$ trillions) (Source: Falke Information, 2016)



The exponential increase of online shopping, like many other information technology activities, is bouncing in-store shopping rates and making potential niches emerge for virtual and physical shopping-related travel (Lee, Sener, Mokhtarian & Handy, 2017). Johansson and Kask (2016) argue that the implementation of an e-commerce solution is a root condition to achieve agile growth in the retail sector, and the consolidation of different communication channels – incorporating online and offline measures – may lead to sympathetic odds of triumph.

Online or in-store shopping decisions, as emphasized by Lee, Sener, Mokhtarian and Handy (2017) and later by Galipoglu, Kotzab, Teller, Hüseyinoglu and Pöppelbuß (2018) depend on different factors based, for example, on the momentum of the customer – the preference for shopping online instead of driving to get to a physical store – but also on the kind of product being purchased – the inclination to buy books online rather than food – where physical stores are still privileged crosswise multiple product categories. This authority is assumed due to the inability of inspecting online products in person, and although online shopping is on the rise, there are some identifiable disadvantages such as shipping costs and shipping wait times. Generally speaking, the periodically purchased products differ between: a) Online: purchase of non-daily products such as books, electronics or clothing; b) Offline: acquisitions of maintenance items such as gasoline or perishable goods (Statista, 2017).

The previously referred modernization occurs in the decision of retailers to merge themselves with technological and digital tools to meet customers' requirements. Online shopping can influence customer shopping travel through three systems: a) Substitution: the reduction of the overall travel replacing a piece of in-store by online shopping; b) Complementarity: the online shoppers stimulation to an additional shopping-related travel to a physical store in order to inspect or acquire a product; c) Modification: the manifestation that some condition in the shopping travel has changed – time of day or visited store – without affecting the decision to make the travel itself. These mechanisms do not act unilaterally, so as online shopping influences physical retailers, in-store shopping may impact virtual retailers – the customer can purchase the main item in-store and purchase the accessories online or vice versa (Lee, Sener, Mokhtarian & Handy, 2017).

Given the conjectured interdependencies between online and offline, Lee, Sener, Mokhatarian and Handy (2017) tried to understand which were the variables included in the shopping frequency decision. Customers bear dissimilar behaviours when debating about shopping decisions, since consumers with functional concerns – price, selection and convenience – tend to shop online, and although online shopping may substitute the act

of acquiring a product, it is – in the meantime – incapable to provide the social or psychological benefits that in-store shopping offers (Deka, 2017).

A broad solution is debated by Wang and Goldfarb (2016) pointing to the online channel not as an alternative or a substitute of the offline retailing, but rather as second thought complementary processes, exerting that the in-store experience must find a balance between the two channels.

Inman and Nikolova (2017) described the most disruptive retail technologies across recent decades, identifying those with the most impact in the industry (table 1).

Table 1: The most disruptive retail technologies across recent decades

Past Retail Technologies	**Present Retail Technologies**
Barcode Scanning (1974)	Mobile Apps
Videocart (1988)	Self-Checkout (1992)
Kiosks (1985)	Gravity Feed Shelving Systems (2002)
In-Store Coupon Dispensers (1992)	Smart Shelves (2003)
Walmart Smart Store (1998)	QueVision (2010)
	Personalized Promotions
	Scan and Go (2013)
	In-Store CRM (2013)

In addition, the appearance of a generation which exhaustively uses ICT contributes to the expeditious development of e-commerce (Knežević, Šipek & Jaković, 2017).

The consideration of children as a communication and marketing target is made in two different ways, equivalently with the channels used to get the adults' attention, with the modernization of the retail spectrum – in-store experience – in taking advantage of children's creativity and straightforwardly turning to technology with the implementation of character-themed tech shops and fun-featured animated candy displays; or with the use of online media tools – online experience – with the retelling of social media incorporation in marketing campaigns for children, conceiving bi-directional channels between the brand and the young consumer (Confos & Davis, 2016)

4. Children as a relevant target and child-oriented marketing techniques

Digital media is becoming an integrated part of children's lives (though we do recognize different behaviours and differentiated access to technology, according to a child's age, national culture, and social and economic status, as dictated also by their parents) and digital marketing that uses new and innovative strategies to target children – where the engaging and immersive nature of online content shapes the perfect environment within which commercial messages can be camouflaged – blurring traditional lines between content and commercial messages (Livingstone, Mascheroni & Staksrud, 2017).

Everyday social media acceptance contributed to the change of customers' buying methods, providing buyers with a great pallet of options. To store managers, it is a representation of a challenge where they need to maintain their focus. With the addition of promotions and related marketing and brand activity, the complexity is multiplied (Anderson, Steen & Stavropoulos, 2016) (Ramanathan, Subramanian & Parrott, 2017).

To speed up the online provenience options, war marketers exploit the fact that innumerable social network users post vast amounts of personal information on their profile pages – age, hobbies, brands or music – using technological tools to collect this "public" information and target them in their campaigns (Reijmersdal, Rozendaal, Smink, van Noort & Buijzen, 2017) (Livingstone, Mascheroni & Staksrud, 2017).

According to Confos and Davis (2016), children's social media usage is relevant to advertisers, taking advantage of their technology affinity to invite them, for example, to connect a specific application to their accounts or to expose them to advergames (advertising through games) – serving advertisers as another communication tool – and engaging with customers through multiple digital platforms. Advergames are exceptionally difficult for children to understand – the persuasive intention – due to the fact that the first assignment is to play the game and the second one involves the distillation of the advertising message, where the second task becomes hidden behind the first one (Vanwesenbeeck, Walrave & Ponnet, 2016). As reported

by Vandevijvere, Sagar, Kelly and Swinburn (2017), websites targeting children focus on the presence of brand logos, characters, music and sound effects and animation during the advergames.

The disjuncture between online media and traditional media is made by characteristics such as: a) ubiquitous connectivity; b) personalization; c) peer-to-peer networking; d) engagement; e) immersion; f) content creation.

These components enable new digital opportunities for those who market to young consumers, addressing aspects like interactivity, multimedia content and personalized content to this target's requirements (Confos & Davis, 2016). Websites are targeting children when they include fun, fantasy and adventure themes or games (Vandevijvere, Sagar, Kelly & Swinburn, 2017).

The younger ones created a "traditional marketing" barrier where in fact digital advertising – with the use of the above cited characteristics – proved to be strong to counter this inconstancy, impelling an immense number of organizations to use social media marketing to promote and engage Generation Z customers (Duffett, 2017).

4.1 Section IV – Social insertion in child-aimed campaigns

In 2018, the child-aimed retail campaigns are a powerful route to target not only children, but also adults. In Portugal, the retail giants are the most interested in segmenting these young consumers, working on customer loyalty since the beginning, confident of the technological incorporation with the introduction of tablet and mobile applications as well as a desktop participation to children and their parents. Some of the technological campaigns conducted in the last years are:

- "Super Animais 1", "Super Animais 2" and "Super Animais 3" by Pingo Doce: Both campaigns require the collection of cards – given after the acquisition of in-store products – where children can digitalize the cards using a mobile application, letting them play afterwards.
- "Super Gangue dos Frescos" by Lidl: Like the one above, it inspires the customer to acquire products, where in change there are eight collectible dolls and also a dedicated campaign webpage with eight interactive games allusive to these dolls.
- "Stikeez" by Lidl: Likewise, the same purchasing typology; it affiliates an android and iOS application.
- "Super Dicas" by Continente: Continente used their webpage "Kasa" tab including some DIY hints, so children may, for example, make their own personalized balloons or ice cream;
- "Turma das Sementinhas" by Jumbo: In a partnership with the Portuguese scientific toys producer Science4you, a children campaign was created, where children have access to a totally free downloadable application for iOS or android.

Another common point between these campaigns – other than the technologic embodiment – explained by Ritch and Brownlie (2016) and Del Bucchia and Peñaloza (2016) is the kid-friendly education, focusing on the fact that children need to learn something from them, either in the education or social fields, where parents are another agent particularly interested in these kinds of projects, and the ideal campaign to explain the propensity is the Super Animals from Pingo Doce.

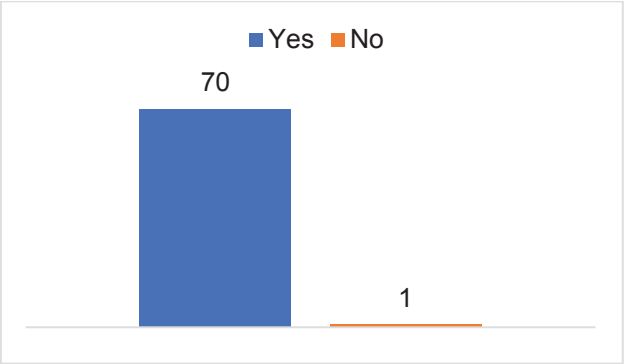
The first edition was doubtless the one that made the biggest impact on Portuguese society. With the use of social media platforms such as Facebook, people created totally dedicated groups to trading and selling the cards, while also selling advertising on pages like OLX (an online C2C/B2C e-commerce platform). The relevance of these social groups is that people looking for and selling the cards where not children at all – adults, parents or grandparents – interacting to complete the collection.

Besides these groups, thanks to this campaign the prosperity of social interactions between people with the same objective prevails. Trying to finish the collection of all the cards becomes easier and at the same time they get a feeling of satisfaction together with their children; not to mention the people trying to resell their duplicates, and thus earning some money. From a customer's point of view, this is an approbation of technological development from children, an acceptable practice in today's society.

In order to inquiry prospects of a potential child-aimed campaign, we conducted a survey (n= 71) to parents and the results, according to the above cited campaigns convinced us of the importance of these projects to prospect children and their families.

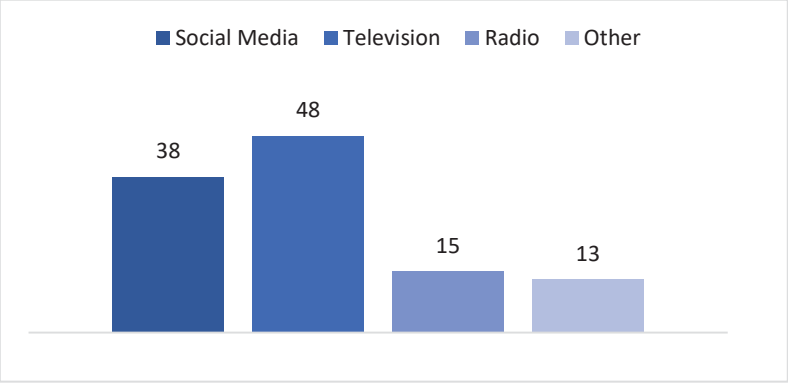
The first question highlights, as expected, the importance of these actions, where 70 people answered "yes" and only one answered "no", however pointing that that answer would easily become a "yes" depending on the construction of the campaign (figure 3).

Figure 3: Recognizing the importance of a child-aimed campaign



The second and most relevant question tried to understand the social media relevance in advertising, and in a multiple answer question we asked where in preference should the campaign promotional content be created and displayed. Even if 48 people answered "television" as a preferred way of communication, social media was chosen by 38 of them, thus calling attention to it through its overwhelming character among the rest of the choices (figure 4).

Figure 4: Advertising preference in a child-aimed campaign

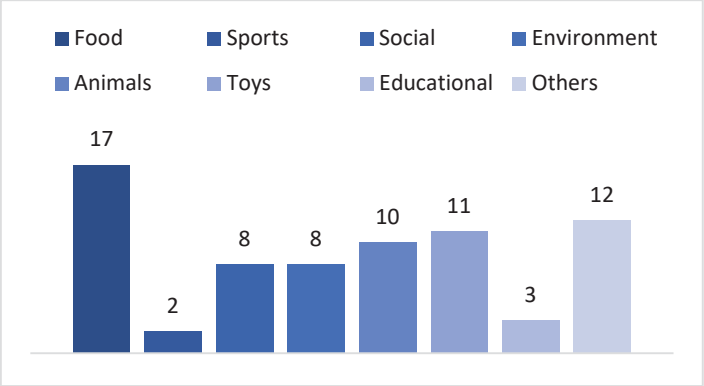


The third question intends to understand the themes that children mainly up to ten, or in some cases up to twelve years old prefer, according to their parents.

As displayed below (figure 5), food, and mainly healthy eating is an argument that parents think their children would enjoy the most in an action, followed by a physical toys campaign and an animal campaign (such as Pingo Doce, Super Animais action).

The above question is, of course, the parents' perspective of how a marketing campaign could be successful, however, this is not an exact science; in some cases, a child around the age of ten can be amazed by this kind of campaign and a twelve-year-old might prefer music-related content and social media interactions, so a target segmentation is a major question that can predict a marketing action success or failure.

Figure 5: Children preferences in child-aimed campaigns



These inquiries, although represent only three questions, show that an action oriented towards children is a valid option as social media is a communication channel praised by parents and children in advertising those contents. As argued by Ritch and Brownlie (2016), children have an influence on family consumption and this is an increasing trend, which in turn is making retailers and marketers focus on attitudinizing with these child-oriented projects, situating the child's needs on top of parental decision making.

5. Conclusions and outlook

This paper explores the question of technological incorporation in retailing, more exactly in child-oriented marketing campaigns, and reunites a contextual vision analysis of an increasing number of articles, demonstrating an outstanding interest in technological development. It also includes a generic picture of the technological sample in the retail field, mentioning some of the old technologies, which were once innovative, and some others considered innovative in some countries, but outdated in the technologically advanced countries. Humankind is caught in a dizzying, fast-paced technological growth, and long-term solutions are required to keep up this constant upgrade, not only in retailing but in all activity sectors.

Particularly in retailing, all trends work in an all-speed acquisition method, since people have less shopping availability, and online is continuing to grow; yet, a majority of people still prefer in-store shopping, so opportunities are still there for retailers to take advantage of. The best option remains the kind of business in operation and the product being sold (Galipoglu, Kotzab, Teller, Hüseyinoglu & Pöppelbuß, 2018).

Choosing between online and offline is not a simple task, although online stores grant opportunities that offline stores cannot provide to customers. An Omni-channel is probably the forthcoming tendency where customers will be able to interact with retailers across a huge diversity of platforms and devices, with the implementation of an online and offline experience at the same time (Hoehle, Aloysius, Chan & Venkatesh, 2017).

A younger public reveals as a relevant economic target to organizations due to its technological appetences, forcing organizations to change communication and marketing strategies in the implementation of campaigns and projects – particularly in the Portuguese landscape – aimed at children, and approved by parents and grandparents (Xiang, Magnini, & Fesenmaier, 2015). Such actions, as argued by Confos and Davis (2016), need to be interactive and have multimedia and personalized driven content in order to get a successful status, while also using social media platforms and innovative advertisement processes like advergames.

Finally, a child-oriented campaign action will prevail if its objective is the encouragement of social synergy, where education performs a major role in giving children access to new information – technological and non-technological – at the same time as they delight themselves with some – persuasive – retailing content.

References

ACEPI & IDC (2017): Estudo anual da economia e da sociedade digital em Portugal: Principais conclusões da edição de 2017.

Anderson, E., Steen, E., & Stavropoulos, V. (2016): Internet use and problematic internet use: a systematic review of longitudinal research trends in adolescence and emergent adulthood. International Journal of Adolescence and Youth. doi:10.1080/02673843.2016.1227716

Confos, N., & Davis, T. (2016). Young consumer-brand relationship building potential using digital marketing. European Journal of Marketing, 50(11), 1993-2017. doi:10.1108/EJM-07-2015-0430

Deka, P. (2017): A conceptual model for determining factors influencing online purchasing behavior. Journal of Management in Practice, 2(1), 1-15.

Del Bucchia, C., & Peñaloza, L. (2016). "No, I won't eat that!" Parental self-transformation in clashes of role enactment and children's will. Journal of Business Research, 69(1), 145-154.

Duffett, R. (2017): Influence of social media marketing communications on young consumers attitudes. Young Consumers, 18(1), 19-39. doi:10.1108/YC-07-2016-00622

Falke Information (2016): Overview & evolution of the global retail industry.

Galipoglu, E., Kotzab, H., Teller, C., Hüseyinoglu, I., & Pöppelbuß, J. (2018): Omni-channel retailing research – state of the art and intellectual foundation. International Journal of Physical Distribution & Logistics Management. doi:10.1108/IJPDLM-10-2016-0292

Gonçalves, R., Martins, J., & Rocha, Á. (2016). Internet e redes sociais como instrumentos potenciadores de negócio. RISTI - Revista Ibérica de Sistemas e Tecnologias de Informação, 18. doi: 10.17013/risti.18.ix-xi

Grewal, D., & Guha, A. (2017): Retailing and pricing cues: Special session proposal-2016 AMS annual conference. In: Stieler, M. (2017): creating marketing magic and innovative future marketing trends. Developments in Marketing Science: Proceedings of the Academy of Marketing Science. doi: 10.1007/978-3-319-45596-9_50

Grewal, D., Motyka, S., & Levy, M. (2018): The evolution and future of retailing and retailing education. SAGE. doi: 10.1177/0273475318755838

Hoehle, H., Aloysius, J., Chan, F., & Venkatesh, V. (2017): Customer's tolerance for validation in omnichannel retail stores: enabling logistics and supply chain analytics. The International Journal of Logistics Management. doi: 10.1108/IJLM-08-2017-0219

Inman, J., & Nikolova, H. (2017): Shopper-facing retail technology: A retailer adoption decision framework incorporating shopper attitudes and privacy concerns. Journal of Retailing. doi: 10.1016/j.jretai.2016.12.006

Johansson, T., & Kask, J. (2016) Configurations of business strategy and marketing channels for e-commerce and traditional retail formats: A qualitative comparison analysis (QCA) in sporting goods retailing. Journal of Retailing and Consumer. doi: 10.1016/j.jretconser.2016.07.009

Jorge, F., Teixeira, M.S., Correia, R., Gonçalves, R., Martins, J., Bessa, M. (2018): A Conceptual Research Model Proposal of Digital Marketing Adoption and Impact on Low Density Tourism Regions. In: Rocha Á., Adeli H., Reis L.P., Costanzo S. (eds) Trends and Advances in Information Systems and Technologies. WorldCIST'18 2018. Advances in Intelligent Systems and Computing, vol 745. Springer, Cham. doi: 10.1007/978-3-319-77703-0_52

Knežević, B., Šipek, Z., & Jaković, B. (2017): Internet as a purchasing information source in children's products retailing in Croatia. 40th International Convention on Information and Communication Technology, Electronics and Microelectronics. doi: 10.23919/MIPRO.2017.7973654

Lee, R., Sener, I., Mokhtarian, P., & Handy, S. (2017): Relationships between the online and in-store shopping frequency of Davis, California residents. Transportation Research Part A: Policy and Practice, 100, 40-52. doi:10.1016/j.tra.2017.03.001

Livingstone, S., Mascheroni, G., & Staksrud, E. (2017): European research on children's internet use: Assessing the past and anticipating the future. SAGE. doi:10.1177/1461444816685930

Martins, J., Gonçalves, R., Branco, F., Barbosa, L., Melo, M., Bessa, M. (2017): A multisensory virtual experience model for thematic tourism: A Port wine tourism application proposal. Journal of Destination Marketing & Management, 6(2), 103-109. doi: 10.1016/j.jdmm.2017.02.002

Ramanathan, U., Subramanian, N., & Parrott, G. (2017): Role of social media in retail network operations and marketing to enhance customer satisfaction. International Journal of Operations & Production Management, 37(1), 105-123. doi: 10.1108/IJOPM-03-2015-0153

Reijmersdal, E., Rozendaal, E., Smink, N., van Noort, G., & Buijzen, M. (2017): Processes and effects of targeted online advertising among children. International Journal of Advertising, 36(3), 396-414. doi: 10.1080/02650487.2016.1196904

Ritch, E., & Brownlie, D. (2016). Doing it for the kids: the role of sustainability in family consumption. International Journal of Retail & Distribution Management, 44(11), 1100-1117.

Statista (2017): Offline vs. online retail: Development – comparisons – consumer view.

Stewart, J., Oliver, E., Cravens, K., & Oishi, S. (2017). Managing millennials: Embracing generational differences. Business Horizons, 60(1), 45-54.

Vanwesenbeeck, I., Walrave, M., & Ponnet, K. (2016) Children and advergames: the role of product involvement, prior brand attitude in purchase intentions and changing attitudes. International Journal of Advertising. doi: 10.1080/02650487.2016.1176637

Verhoef, P., Kannan, P., & Inman, J. (2015): From multi-channel retailing to omni-channel retailing: Introduction to the special issue on multi-channel retailing. Journal of Retailing, 91, 174-181.

Von Briel, F. (2018): The future of omnichannel retail: A four-stage Delphi study. Technological Forecasting & Social Change. doi: 10.1016/j.techfore.2018.02.004

Wang, K., & Goldfarb, A. (2016): Can offline stores drive online sales? Journal of Marketing Research. doi: 10.1509/jmr.14.0518

Xiang, Z., Magnini, V., & Fesenmaier, D. (2015). Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. Journal of Retailing and Consumer Services, 22, 244-249.

An Innovation Support System for SMEs

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Abstract: Although it is often viewed as a somewhat unpredictable process, the importance of defining clear strategies for innovation is recognized. For this reason, many organizations develop processes that support innovation. In Portugal, the Portuguese Standard 4457: 2007 (NP 4457), which defines the requirements for a Research, Development and Innovation Management System (RDIMS), was introduced in 2007. These requirements act as guidelines for organizations that recognize the importance of innovation. This study aims to create a set of proposals, based on the NP 4457, that support the management of innovation in a small enterprise in the food industry. A case study was carried out in a business environment with a duration of 6 months. In this case study, with an exploratory nature and a qualitative approach, data collection involved documentary analysis, participatory observation and unstructured interviews. After analysing the reality of the company, an Innovation Support System was presented, divided into three components: Strategic Definition, Innovation Process and Evaluation of the Innovation System. The Strategic Definition component has the function of defining the responsibilities and delimiting the scope of innovation for the organization. The Innovation Process includes a set of processes, all the way from the internal and external analysis of the organization, through idea management, evaluation, selection and project management to the final result of the innovation process. Finally, the Evaluation of the system has the function of analysing its performance and proposing improvements. The system proposed here is an attempt to operationalize the recommendations of the Portuguese Standard having in mind the specificities of SMEs. Although it was created for a specific firm, it is based on generic references (such as the Stage-Gate Model or the Chain-linked Interactive Model) and it does not involve specific activities or characteristics of the organization or industry for which it was intended, which makes it possible to adapt it to other SMEs that are interested in improving innovation management performance and/or in the NP 4457 implementation and certification.

Keywords: innovation projects; innovation management; R&D management; innovation management systems; certification

1. Introduction

The ability to innovate allows companies to differentiate themselves from their competitors by improving their processes or by being able to produce goods or services more valued than their competitors (Leite, Albuquerque and Leal, 2007). Innovation is often associated with technological advances, but this is a limited vision, as innovation is present in another areas than technology within organizations.

Innovation is inherently uncertain, somehow disordered, made up of some of the most complex systems and subject to change of various types. Moreover, it is also difficult to measure and requires close coordination of adequate technical knowledge and excellent market-critical ability to satisfy all constraints simultaneously (Kline and Rosenberg, 1986). Despite being popularly described as a process without rules or plans, studies have shown that successful innovators have clearly defined strategies and management processes for innovation (Schilling, 2005).

In 2007, based on the Chain-linked Interactive Model, the Portuguese Quality Institute created the Portuguese Standard 4457:2007 (NP4457). The Standard presents the necessary requirements for a Research, Development and Innovation Management System (RDIMS), and aims at the certification of organizations, ensuring the recognition of the necessary technical skills for the management of innovation.

Due to their size and their characteristics, small and medium-sized enterprises (SMEs) feel that the innovation process is often hampered. The correct application of the standard in SMEs allows a systematic planning of the innovation process, thus helping to more easily recognize the opportunities and threats to which the organization is exposed, taking more advantage of the innovation process. In addition, the standard implies a continuous evaluation of the innovation process, which may act as a reflection for the organization on its own innovation processes.

The objective of this study, which adopted a qualitative and exploratory approach, was to define procedures and practices for innovation management that are best suited for a small enterprise in the food sector, making

its innovation process more agile and that can serve as a basis for a future implementation of the NP4457. The study proposes an integrated system of innovation management, comprised of several phases, which were designed having in mind the characteristics of a resource constrained SME, and that will hopefully improve and facilitate the proper management of innovation in this category of organizations.

2. Literature Review

2.1 Innovation Definition

Innovation is nowadays a very common word in the world of organizations, but its definition remains somewhat elusive. Innovation is often associated with cutting-edge technology, but that may be a reductive view. Often, it is less a question of technology and more a way of thinking and discovering creative solutions within organizations (Amabile, 1988; Hidalgo and Albors, 2008), by adapting their knowledge and skills in their offerings or in the way their products or services are delivered (Tidd, Bessant and Pavitt, 2005). Innovation occurs in an abstract way within organizations at a technological, marketing or organizational level, generating different results from case to case, and may involve various types of innovation (product, process, marketing or organizational). In fact, the successful innovations result from a good combination of the various organizational competencies (Caraça, Ferreira and Mendonça, 2006).

Innovation can then be seen as a tool for entrepreneurs, that is, the way through which they can exploit change as an opportunity for a different business or service (Drucker, 1985). The adoption of innovation allows organizations to adapt to the environment in which they are inserted or anticipate changes in order to increase or maintain their effectiveness and competitiveness (Damanpour and Gopalakrishnan, 2001). Innovation is what agile companies do, that is, they constantly reinvent themselves in terms of their solutions to the riddle represented by the threats and opportunities in their environment. This may mean adopting new technologies, or own generation (Bessant, 2003).

This study adopts the definition given in 2005 by the Organization for Economic Co-operation and Development (OECD), which defined innovation as "the implementation of a new or significantly improved product (good or service), process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations." (OECD, 2005, p.46).

2.2 Innovation Management

Innovation can be seen as a process involving the invention of something and the exploitation of its results (Roberts, 2007). The task of managing this process is then to create specific routines for the company. Routines represent the approaches that a given organization makes to meet the challenge of innovation. Innovation routines are increasingly recognized for their contribution to competitive advantage, and can't simply be copied from one context to another, they need to be learned and practiced over a sustained period of time (Bessant, 2003).

Following are some of the areas that should be managed to facilitate innovation. It is necessary to consider that the management of these areas should be done in a joint way, creating routines, and not individually.

- Innovation strategy - managing the innovation strategy requires understanding the what, why, and when of the innovation activity. This means developing, reviewing and updating an innovation policy and strategy consistent with the organization's mission and setting innovation goals in the short and long term (Adams, Bessant and Phelps, 2006; Hamel, 2006; Cooper, 2011).
- Portfolio Management - involves the definition of a diversified portfolio that encompasses different types of innovations. Choosing the right innovation projects isn't always easy, it is necessary to recognize the lack of information that exists in the initial phases and adapt selection criteria that are more broad than the financial indicators, including criteria like business opportunity or technical feasibility according to the projects (Adams, Bessant and Phelps, 2006; Cooper, 2011, 2013; Mitchell, Phaal and Athanassopoulou, 2014).
- Project management - a project can be defined as a unique enterprise, represented by a sequence of activities, limited in time, to achieve the objectives determined within a given budget. Due to the high level of uncertainty, the application of project management methodologies allows organizations to obtain the best results during its execution (Igartua, Garrigós and Hervas-Oliver, 2010; Miguel, 2013).

- Innovation process - innovation development is managed and improved through a clear process, using a structured step-by-step logic to guide and manage innovation (Igartua, Garrigós and Hervas-Oliver, 2010; Cooper, 2011).
- Leadership and organizational culture - Organizations can provide enough freedom to allow the exploration of creative possibilities, but they also need control over the innovation process to manage it effectively and efficiently. Innovative organizations must adopt contrasting structures and attitudes as they move from initiation to the stages of implementation of innovation (Adams, Bessant and Phelps, 2006; Cooper, 2011).
- Resources – Resource management for innovation means providing adequate resources for people to explore ideas, and ensuring that people have the resources and space to develop opportunities of innovation (Igartua, Garrigós and Hervas-Oliver, 2010; Cooper, 2011).
- Human Resources - attract, recruit, motivate, reward and develop individuals are the backbone of effective resource management for innovation (COTEC, 2010).
- Knowledge management and intellectual property - knowledge management is concerned with identifying, translating, sharing and exploiting knowledge within an organization. Intellectual property is intended to protect the intangible goods created by the intellectual activity of the human being, and are owned by the companies or persons who create or own them (Teece, Pisano and Shuen, 1997; Tidd, Bessant and Pavitt, 2005).
- Technology - organizations must be aware of technological developments since they can't always create their own solutions. Clearly, technology solutions may already exist elsewhere, and an innovative organization can simply adopt or adapt them through simple modifications to a new purpose (Roberts, 2007; Teece, 2007).
- Market connection - connecting to the market can make the difference between a good idea and a successful product, since without marketing and sales, a product innovation or a new service wouldn't attract the interest of customers (Igartua, Garrigós and Hervas-Oliver, 2010).
- External networks - the creation of innovation networks allows companies to reduce the costs or risks involved in developing new technologies or entering new markets, achieving economies of scale, reducing the time to develop and sell new products and to promote the exchange of knowledge (Tidd, Bessant and Pavitt, 2005).
- Performance measurement - as with any other management aspect, innovation management requires adequate measurement systems to enable managers to calculate the impact of innovation activities on company performance (Adams, Bessant and Phelps, 2006; Saunila, 2016).

2.3 Innovation Management Standard

In Portugal, according to the Community Innovation Survey 2014, the SMEs were the companies that showed the lower rate of innovation activities and innovation results when compared with large companies and this survey also showed that they had more obstacles to innovate (DGEEC, 2016). To facilitate the innovation management process, the Portuguese Quality Institute created the Portuguese Standard 4457:2007 (NP4457) in 2007. The Standard presents the necessary requirements for a Research, Development and Innovation Management System (RDIMS). These requirements act as guidelines for organizations that recognize the importance of innovation. The standard is based on the Chain-linked Interactive Model, it is applicable to any organization, to any type of innovation and it is oriented towards continuous improvement (IPQ, 2007).

The NP4457 is divided into four sections. In the first section - Management Responsibilities, it is necessary to establish a Research, Development and Innovation (RDI) policy that guides the entire organization, and which must be aligned with organizational strategy. The RDI policy must be deployed in measurable objectives, to which are given responsibilities and methodologies for its implementation, so that later the organization's situation can be reflected and re-evaluated in the face of the results.

The RDI planning section involves planning for the detection of threats and opportunities through the interfaces, how you will capture and evaluate the ideas or opportunities arising and the management of the resulting projects.

The third section encompasses the implementation and operation of the RDIMS. At this point, RDI management activities that must be carried out by organizations, such as portfolio management and idea management, are identified by the standard. The organization shall also ensure the establishment of

appropriate external and internal communication procedures, as well as registration and control of all documentation relevant to the RDIMS.

The fourth section refers to the evaluation of results and improvement and indicates that the organization should implement procedures to evaluate the results of the innovation process. One requirement of the standard is that internal audits must be conducted, by people who aren't auditing their own work.

3. Research Methodology

This study aims to create a set of proposals that support the management of innovation in the company Gelado Colorido (which means Coloured Ice Cream), based on the NP4457 standard. This is a small company, belonging to the food industry. It was created in 2012, with the intention of offering its customers functional ice creams (an ice cream that has some health benefit). Given the high level of RDI associated with this type of products, the company intended to structure a RDIMS to facilitate the innovation process.

During the study, the perspective adopted was essentially positivist and the nature was essentially exploratory, insofar as it was based on established concepts and theories, although the approach is predominantly qualitative. In this case study, the collection of data mainly involved documentary analysis. The documentary analysis included the selection, treatment and interpretation of existing information in documents and was carried out in a systematic way and it was fundamental for the creation of the proposed system. This analysis mainly involved the NP4457, COTEC's guide to good practices for innovation management, the RDI activities manual by COTEC and the strategic analysis of the organization. Since the investigation took place in a business environment, and as a way of completing or confirming the information gathered in the documentary analysis, participatory observation and unstructured interviews were used. Participatory observation allowed to analyse the routines and procedures currently developed in the organization, while unstructured interviews allowed to understand the perception that employees had about innovation in the organization, specially the administration and the quality department.

4. The Innovation Support System

After analysing the reality of the company, an Innovation Support System was presented, divided into three components: Strategic Definition, Innovation Process and RDIMS Evaluation. This system is based on the Stage-Gate Model, on the Chain-linked Model and on selected recommendations and adjustments of the Portuguese Standard 4457:2007, which were deemed more adequate to the small firm under study. The Strategic Definition defines all the guidelines to the innovation process according to the organizational strategy. The Innovation Process includes four phases: Interface Management, Idea Management, Project Evaluation and Selection and Project Management. The phases aren't sequential, since the interfaces represent all internal and external communication of the organization's knowledge, and function as support elements to the internal process of innovation. The different phases are divided into several stages and control points/gates, which must be established during the Strategic Definition phase. The stages represent the work done, while gates represent the decision making, which ensures compliance with the requirements necessary to move to the next stage. Given the high level of uncertainty to which innovation projects are associated, these divisions can mitigate uncertainty and control costs and time during their implementation. The number of stages and gates must be adapted accordingly with the uncertainty associated with the projects. Finally, the RDIMS Evaluation aims to detect all the failures and suggesting improvements, working as an input to the Strategic Definition.

The following sections will define more clearly each phase, which were designed to address specific difficulties that a small firm faces and that can contribute to improve substantially the management of innovation in resource constrained firms.

4.1 Strategic Definition

The Strategic Definition delimits the scope of RDI activities and should have a reach not only in the short term but also in the long term. In order to make the system work, an RDI policy must be established and documented to help ensure the alignment of RDI activities with the organization's strategic objectives. In addition, the organization must define the RDI objectives. These objectives should be consistent with the RDI policy and should be SMART (SPI, 2013), specific, measurable, achievable, realistic and time-limited. The RDI policy and objectives should be regularly reviewed and updated, communicated and understood by the entire organization (COTEC, 2010).

The Strategic Definition also has the purpose of delegating the responsibilities of those involved in innovation, who need to ensure that all activities are carried out in accordance with the strategy established for the success of innovation in the organization. In addition to the person responsible for RDI, the evaluation committee should also be defined, which will be responsible for decision making during the innovation process.

The Strategic Definition should include the definition of strategic axis, so that the RDI portfolio isn't limited and can guide the employees at the time of suggesting ideas. The choice of strategic axis helps to delimit scope and can vary, for example in relation to the type of innovation, the degree of novelty or the level of risk/uncertainty. During the selection of the strategic axis, the resources must be allocated to each one of them, as well as the control points and their criteria and methods for selection should be defined. The criteria need to consider the type of projects it is evaluating, because not all projects are technology-based innovations or market related.

4.2 Innovation Process

4.2.1 Interface management

The first phase aims to manage the different interfaces presented in the Chain-linked Interactive Model, to ensure the circulation of knowledge between the organization and the environment that surrounds it. This analysis seeks to identify the agents of the external environment (macro and micro) that interact with the organization for the production of knowledge, as well as to detect the opportunities and threats that the organization faces. During this analysis it is also necessary to define which activities are crucial for the exchange of information, ensuring that these are planned, implemented, maintained and updated. Finally, it is important to establish procedures for collecting, documenting, analysing and treating, disseminating and valuing information.

The Chain-linked Interactive Model presents three distinct interfaces (technological, market, organizational) for capturing knowledge, and the organization should define the activities for each of them. The activities chosen for Interfaces Management will act as support activities for the internal process of innovation.

The Technological Interface encompasses all the activities used to guarantee Technological Surveillance, Cooperation and Forecasting. Technological Surveillance consists in the systematic observation of the surroundings with respect to the existing technology in the market and the technological advances. Technological Cooperation encompasses partnership activities with other institutions and organizations, with a view to sharing technical and scientific information and joint development of products and processes. Finally, the Technological Forecast consists of prospective activities focusing on the development of technologies of potential economic interest.

The Organizational Interface defines the activities or tools necessary to guarantee the creation or exchange of organizational knowledge, through Internal Creativity, Organizational Capacity and Knowledge Management. Internal Creativity includes the practices of harnessing and stimulating the internal creativity of the innovative company. Organizational Capacity refers to the design strategies for innovation. Knowledge management consists of the practices of generation, validation, codification and diffusion of existing knowledge in the innovative company and management of external knowledge needs.

The management of the Market Interface consists in the identification of Internal and External Analysis activities, Intellectual Property and Analysis of New Clients, to ensure the necessary knowledge about the market. The Internal and External Analysis consists of analysing the internal and external context of the innovative company and its positioning considering relative strengths and weaknesses in the environment. New Customer Analysis covers observation and analysis of potential customers and new user markets. Finally, Intellectual Property refers to the management of the possibilities offered by intellectual property regimes for the protection, exploitation and dissemination of the results obtained in the innovation process.

4.2.2 Idea Management

The Management of Ideas comes from the Management of Interfaces, that is, many of the ideas proposed arise through threats or opportunities detected in the environment in which the company is inserted. In an

innovative company internal creativity must be encouraged, and therefore everyone must have the opportunity to give their opinion, as well as to receive feedback on ideas submitted.

Initially the employees should record all their ideas, so that in the future it is possible to evaluate the route that the idea had during its existence. The collection of ideas should allow the creation of a database or a repository which, in turn, will allow evaluation and selection based on the same criteria, and hence constituting pre-projects. The recording of ideas and the creation of the idea repository makes it easier for the organization to collect data needed for the evaluation of the RDIMS. At this stage, the criteria for the evaluation must be wide-ranging since there isn't much information about the idea. The criteria may be related to the strategic framework, the opportunity that the idea can give to the organization or the adequacy of the resources of the organization to the idea.

4.2.3 Project Evaluation and Selection

The Project Evaluation and Selection phase precedes the development of the innovation and should confirm the attractiveness of the project before there is a greater investment. This phase begins with the division of ideas into the strategic axis, so different types of projects can be separated and follow their paths according to the Strategic Definition.

During this phase business plans should be created, which must translate the customers' needs into technically and economically viable solutions, for product innovations. Innovations that aren't product related should present their advantages to the organization considering the criteria defined for their selection, focusing on technical and economic feasibility.

The selection of the projects must be made according to the strategic axis. The use of scoring models is recommended, once it allows a broader assessment, according to strategic objectives, than evaluations that are made only based on financial indicators. With the use of a scoring model, the selection criteria in the different axis can be adjusted to the characteristics of the innovations to which they refer. But pre-projects that are on the same axis should be compared according to the same criteria. The selection of the projects also depends on the resources that are available for each of the axis, as well as the number of pre-projects that are in each one. If there are no pre-projects on one axis, or the existing pre-projects don't spend the resources available, those resources can be transferred to another axis.

Pre-projects passing Project Evaluation and Selection will now be called RDI projects. At this stage it is still necessary to define the acceptance criteria for approval in the next phase/stage, as well as the role of project leader. Pre-projects that don't pass this phase are archived.

4.2.4 Project Management

Project Management involves all the activities that go from the initiation phase to the closing of the project. It is at this point that most of the project's resources are going to be spent. Each project is unique so the criteria to the gates must be adjusted to the projects. The initiation takes place during the project selection, with their approval. After initiation the project plan must be defined. According to the NP4457 each project plan must contain:

- description of the project, including identification of the problem to be solved, improvement, competitive advantage or anticipated benefits;
- identification of the team, necessary resources and estimated timeframes for the accomplishment of the project mentioned in the expected results (milestones);
- verification and validation activities, including, when appropriate, criteria for review, selection and approval of result;
- methods of controlling changes;
- identification of expected results;
- documentation of intellectual property necessities.

After planning, it comes the execution. Any kind of change that occurs in the project will require re-planning so that it is possible to analyse the impact it has on the project. Monitoring and control activities should be put in place to avoid as much as possible deviations. At the end of the project lessons learned should be presented,

which should include a project performance analysis in relation to planning, considering the objectives, time frame and budget.

The stages recommended for this phase are represented by Development, Validation and Implementation or Commercialization. The Development, as its name implies, encompasses the development of innovation and it may include updating of marketing plans and financial analysis and resolution of legal issues. The Validation tests all feasibility of the project and it opens the door to the Commercialization or Implementation of the innovation, but there is still the possibility of the project failing or returning to Development. Lastly, the Implementation or Commercialization of the innovation.

4.3 RDMIS Evaluation

The purpose of the RDIMS evaluation is to verify the benefits achieved with the implementation of the innovation system, as well as the identification of proposals for improvement in the various processes, since the system isn't static and should be adapted according to the reality of the organization.

The organization should establish procedures that allow to evaluate the innovation system, as well as the results from each RDI project. In relation to the evaluation of the innovation system, the organization should ensure that there are methodologies for regularly documenting, monitoring and evaluating RDI activities and outcomes. It is necessary to understand if the RDI policy was understood and followed, and the RDI objectives were achieved.

For the evaluation to be implemented effectively, it is advisable to evaluate the tools used, as well as to define metrics and indicators of innovation that help to perceive the state of innovation and the expected results in relation to the objectives initially proposed. When defining the metrics, it is necessary to consider the whole process.

According to NP4457, the organization should perform internal audits at planned intervals to determine if the RDIMS follows the provisions outlined and is maintained effectively. The organization should define those responsible for audits and ensure that they aren't evaluating their own work, and the selection of auditors should ensure objectivity and impartiality to the audit process.

The auditors should prepare a report that should include corrective actions for detected nonconformities and their causes, as well as the deadlines for their implementation. After the audit and according to the established deadlines, the results must be verified and reported. Audits play a key role in the analysis of RDIMS, and its results should be included in the evaluation of results. The results can be divulged to demonstrate the progress made by the organization in this area.

5. Conclusion

The innovation system created here is a starting point for the organization, and it must be adapted over time. The systematization of the innovation process can contribute to the growth of the company and its continuous improvement. Some of the advantages that stand out are: the better capture of ideas and valorisation of knowledge, the direction of innovation activities according to the established strategy and a better control over the various phases from the generation of ideas to the projects and the respective results. These are all aspects that are generally not properly managed in SMEs.

To make the most of this type of system, it is recommended to follow a set of best practices. Cooper and Edgett (2012), using studies carried out to companies in different areas on the best ways to manage the process between the generation of ideas and the launching of new products, suggest that: the process must be documented and actually used, should be made available all necessary resources to carry out the projects, compliance checks should be applied to confirm that the process is followed and the process should be adaptable. The decision makers should be defined, vary according to the risk associated with the decision and should prepare and be present at the meetings to contribute to the decision making. To improve the efficiency of the process, criteria must be defined for decision making, as well as the deliverables at each stage and the decisions taken must be supported by facts.
The system proposed here, although it was created for Gelado Colorido, is based on generic references and doesn't involve specific activities or characteristics of the organization or industry for which it is intended,

which makes it possible to adapt it to other SMEs that are interested in improving innovation management performance and/or in the NP4457 certification.

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References

Adams, R., Bessant, J. and Phelps, R. (2006) 'Innovation management measurement: A review', International Journal of Management Reviews, Blackwell Publishing Ltd , Oxford, 8(1). doi: 10.1111/j.1468-2370.2006.00119.x.

Amabile, T. M. (1988) 'A model of creativity and innovation in organizations', Research in organizational behavior, 10(1), pp. 123–167.

Bessant, J. (2003) 'Challenges in innovation management', The international handbook on innovation. Elseiver, Oxford, pp. 761–774.

Caraça, J., Ferreira, J. and Mendonça, S. (2006) 'Modelo de interacções em cadeia: Um modelo de Inovação para a economia do conhecimento', Relatório para o projecto "Desenvolvimento Sustentado da Inovação Empresarial.

Cooper, R. G. (2011) 'Perspective: The innovation dilemma: How to innovate when the market is mature', Journal of Product Innovation Management, Wiley Online Library, 28(s1), pp. 2–27.

Cooper, R. G. (2013) 'Where are all the breakthrough new products?: Using portfolio management to boost innovation', Research-Technology Management, Taylor & Francis, 56(5), pp. 25–33.

Cooper, R. G. and Edgett, S. J. (2012) 'Best practices in the idea-to-launch process and its governance', Research-Technology Management. Taylor & Francis, 55(2), pp. 43–54.

COTEC (2010) Guia de Boas Práticas de Gestão de Inovação, COTEC Portugal - Associação Empresarial para a Inovação, Porto.

Damanpour, F. and Gopalakrishnan, S. (2001) 'The dynamics of the adoption of product and process innovations in organizations', Journal of Management studies, Wiley Online Library, 38(1), pp. 45–65.

DGEEC (2016) Sumários Estatísticos | CIS 2014 Inquérito Comunitário à Inovação, Direção-Geral de Estatísticas da Educação e Ciência, Lisboa.

Drucker, P. F. (1985) 'The Discipline of Innovation', Harvard Business Review, 80(8), p. 95.

Hamel, G. (2006) 'The why, what, and how of management innovation', Harvard business review, 84(2), p. 72.

Hidalgo, A. and Albors, J. (2008) 'Innovation management techniques and tools: a review from theory and practice', R & D MANAGEMENT, Blackwell Publishing, Oxford, 38(2), pp. 113–127. doi: 10.1111/j.1467-9310.2008.00503.x.

Igartua, J. I., Garrigós, J. A. and Hervas-Oliver, J. L. (2010) 'How innovation management techniques support an open innovation strategy', Research-Technology Management. Taylor & Francis, 53(3), pp. 41–52.

IPQ (2007) NP 4457:2007 - Gestão da Investigação, Desenvolvimento e Investigação. Requisitos do sitema de gestão IDI, Instituto Português da Qualidade, Monte da Caparica.

Kline, S. J. and Rosenberg, N. (1986) 'An Overview of Innovation', in The Positive Sum Strategy: Harnessing Technology for Economic Growth. National Academy Press, Washington DC, pp. 275–305.

Leite, A., Albuquerque, A. and Leal, M. (2007) Economia do Conhecimetno e Empresas, Sociedade Portuguesa da Inovação, S.A., Porto.

Miguel, A. (2013) Gestão Moderna de Projetos, 7a Edição, FCA - Editora de Informática, Lisboa.

Mitchell, R., Phaal, R. and Athanassopoulou, N. (2014) 'Scoring methods for prioritizing and selecting innovation projects', in Management of Engineering & Technology (PICMET), 2014 Portland International Conference on. IEEE, pp. 907–920.

OECD (2005) Oslo Manual: Guidelines for collecting and interpreting innovation data. 3o. Paris: OECD and Eurostat.

Roberts, E. B. (2007) 'Managing invention and innovation', Research-Technology Management. Taylor & Francis, 50(1), pp. 35–54.

Saunila, M. (2016) 'Performance measurement approach for innovation capability in SMEs', International Journal of Productivity and Performance Management, Emerald Group Publishing Limited, 65(2), pp. 162–176.

Schilling, M. A. (2005) Strategic management of technological innovation, McGraw-Hill Irwin, Boston.

SPI (2013) Manual ' Estruturação de atividades de IDI de acordo com os requisitos da norma NP 4457 : 2007 – Propostas e Recomendações para PME ', Sociedade Portuguesa da Inovação, S.A., Porto.

Teece, D. J. (2007) 'Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance', Strategic management journal, Wiley Online Library, 28(13), pp. 1319–1350.

Teece, D. J., Pisano, G. and Shuen, A. (1997) 'Dynamic capabilities and strategic management', Strategic management journal. JSTOR, pp. 509–533.

Tidd, J., Bessant, J. R. and Pavitt, K. (2005) Managing innovation: integrating technological, market and organizational change, John Wiley & Sons, Chichester, West Sussex, UK: Chichester: Wiley.

Research on Innovation Processes at a Firm Located In a Country Averse To Uncertainty

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Abstract: Innovation is increasingly more relevant to researchers. Following a literature review, which revealed that research on innovation processes in a country averse to uncertainty (e.g. Portugal), and thus inhibiting of innovation, is still lacking, a focus group was performed at a product development firm, as well as a survey of the firm's employees, with 48 valid answers. The case is of a firm which develops innovative products and services for the telecommunications and information technology market. The firm is situated in central Portugal and the focus group involved six employees – one from each operational department (pre-sales), plus two employees from sales. How innovation is managed at the firm was a main topic of discussion in the focus group. The results revealed a corporate culture focused on teamwork, where employees are free to innovate in areas not directly linked to their job description, and where innovative ideas, however disruptive, are welcomed. No formal or informal recognition is given, to more innovative employees, and there is a desire by employees to change this. At a firm where product innovation older than 24 months may no longer be seen to be innovation, numerous tools to promote innovation are used, namely: brainstorming, scrum, agile, focus groups, and design thinking. Operating in a business-to-business market, innovation is continuous and open, also involving, for example, universities. Business cases are constructed for each product, customers are surveyed for their satisfaction, all ideas are valued and none are rejected. Despite an innovation-welcoming atmosphere at the firm tact and common sense are still needed to communicate new ideas. External competition by rivals is considered at all times. Internal competition, between colleagues, however, is not seen to be healthy, and work is done towards the common good. Knowledge sharing platforms abound and include internal blogs, workshops, and the registering of projects on specific knowledge-sharing platforms. Finally, product pricing will depend on a number of factors, including the degree of innovativeness of the product in question. The main influence on pricing is, however, the market – an extreme effort must be made to make product prices fit in with what the market is prepared to pay for a technology.

Keywords: telecommunications, Portugal, pricing, innovation results, innovation process.

1. Introduction

A number of authors in the second half of the 20th century have done research about the nature of the basic problems of societies, ascertaining that culture has different dimensions (Hofstede, 2011) and is linked to development. This article is of interest as it discusses innovation processes at a successful Portuguese firm in a country not naturally receptive to new ideas, uncertainty, and innovation in general (Hofstede, 2001). The external environment in Portugal is also one where consensus and harmony are sought out, which may work against results in the innovation field (Hofstede et al., 2010).

In a list of the 50 most innovative countries, Portugal is ranked 30th (Jamrisko & Lu, 2018), which means that there is much room for improvement.

According to the Pordata database, in 2017 the Eurozone economic growth (19 countries) stood at 2.3%, while Portugal's growth stood at 2.7%. However, according Caetano (2018), despite a slight improvement, compared to 2017, Portugal remains among the worst developed countries. The "Comparative Performance: IDI (Inclusive Development Index) versus GDP (Gross Domestic Product) – Advanced Economies" is based on a scale of 1 (the worst value) to 7 (the best value). Only Greece, as stated by the World Economic Forum (Forum, 2018a) is below Portugal in the list of developed countries, with 3.7 points versus 3.97 points. Portugal is thus referred to as a "slowly retreating" country. The index is led by Norway (with 6.08 points), followed by Iceland and Luxembourg, in second and third place (both had scores of 6.07); Switzerland appears in fourth with 6.05 points; and Denmark in fifth place with 5.81 points. "Designed as an alternative to GDP, the Inclusive Development Index (IDI) reflects more closely the criteria by which people evaluate their countries' economic progress" (Forum, 2018b).

Throughout this paper, we will try to understand how a Portuguese company does or does not manage to escape the norm, whereby firms innovate slowly and ineffectively in the country. How does this company avoid the supposed unwritten rules of Portuguese national culture?

The field research involved a focus group as well as a survey – both of which with the firm's employees. Below, following the literature review, we shall discuss the methodology followed in both instances as well as the results arrived at. The firm is not named herein, for confidentiality purposes, and thus remains anonymous.

2. Literature Review

National cultures are centered on values which are acquired in the family, in the community, and at school. On the other hand, corporate cultures are differentiated by practices learned from socialization in the work environment.

Portugal is a country shaped by its traditions, its religion, and customs, and is thus a traditional country. Also, Portugal is a country where individuals prefer to act in a group and whereby individuals care about the general well-being of society, thus being a country where solidarity reigns (Hofstede, 2001; Hofstede et al., 2010).

According to Hofstede Insights (2018), Portugal stands out because it shows high power distance, which means that different incomes, for example, exist and are accepted. For example, in corporations a type of hierarchy is often seen whereby top management exercises considerable power over subordinates. Be that as it may, innovation and technology do not only come from the perhaps brilliant minds that exist in top management. The process of generating more innovative new ideas and processes comes from minds that are bright, visionary, and, above all, believe that it is possible to create something new and successful. However, there must be an opening for these to appear and be harvested, from whatever the level in the organisation.

Nowadays, many employees work in an open space to promote collaboration. In Portugal, the organizational climate may be improved by such a practice because there is a collectivist culture in Portugal (Hofstede et al., 2010) and there is relatively little competition between colleagues. One of the weaknesses of the national culture in Portugal is its aversion to risk because a negative emotional experience is created when the pre-established pattern is not followed. This may explain why Portugal is not so well ranked in the list of the most innovative countries (Jamrisko & Lu, 2018). Portugal is a country where conflict is avoided and, above all, a country that is averse to uncertainty, where consensus is promoted, thus making it much more difficult to innovate and embark on new ideas, inhibiting innovation.

Culture has been a main topic of focus for anthropologists studying different groups, cultures and societies. Only quite recently have the links between culture, organizational performance, behaviour, and the attitudes of people in companies been discovered and it is increasingly becoming a concern for leaders in power. Lou Gerstner, the former president of IBM, stated: "I came to see, in my time at IBM, that culture is not just one aspect of the game, it is the game. In the end, an organization is nothing more than the collective capacity of its people to create value" (Gerstner, 2002, as quoted by AZ Quotes). However, Gerstner also points out that even if leaders recognize the importance of culture, they are unlikely to be aware of the significant role that culture can play in the success or failure of an organization because they may not have the training, or the knowledge needed to build cultures. Hence, the sensitive and hidden line separating good from bad management (Warrick, 2017).

In current knowledge-intensive economies, companies must face strong and dynamic challenges, such as instability, uncertainty, and rapid technological change, and they need to demonstrate to their clients that they have a constant flow of innovation (Fernandes, Cesário, & Barata, 2017). It is important that companies are open to external opinions, especially from their customers, but also related to the competition (however these opinions may arrive – for example, from the *media* or from industry reports), so that they can gather all of the available information. Economic performance is also reinforced by the ability to offer solutions that meet the changing needs and infrastructures. Some companies recognize that change is not only important, but it is also obligatory since the market is constantly and rapidly changing (Fernandes, Cesário, & Barata, 2017).

According to Zhao, Teng, & Wu (2018), there are several definitions for the corporate culture concept, which involves, for example, rules and values which are widely shared, as well as strongly maintained, throughout the organization. This definition shows that culture is much more than a verbal exchange of information and involves widespread actions at the company level. Corporate culture represents a tacit code of communication, where culture is a convention that helps to coordinate people within the company (Guiso, Sapienza, & Zingales, 2015). Thus, corporate culture is the sharing of values and norms among workers of a company, guiding their professional lives and behavior within the company. Most importantly, corporate culture helps in reducing and containing the anxiety of dealing with uncertainty and unpredictability (Zhao, Teng, & Wu, 2018). Moreover, in addition to competing for resources that create value, companies must also compete for funds and resources, which are not easily imitated, negotiated, or replaced. Corporate culture may thus be a fundamental organisational variable.

Corporate culture may vary, especially if the company is public versus private. While public companies are subject to the norms and rules imposed by the government, private companies have the freedom to cultivate their own cultures, keeping in mind their ideals and objectives (Zhao, Teng, & Wu, 2018).

Corporate culture has an impact on business performance. For example, Apple's corporate culture is closely linked to technology and innovation, while at Walmart ostentation is almost a sin, which ultimately promotes a corporate culture more directed towards integrity (Gurovitz, 2011). According to Zhao, Teng, & Wu (2018), the country where the company is located can also influence corporate culture.

Corporate culture can benefit companies in three ways: better coordination and control within the company, better alignment of goals and objectives, and greater employee effort (Zhao, Teng & Wu, 2018). Without some type of control system within a company nothing would be done, so when the traditional incentive control system is not having the necessary effect, corporate culture plays a very important role (Guiso, Sapienza, & Zingales, 2015). It should also be noted that a company's corporate culture can lead to a sustained competitive advantage (Zhao, Teng, & Wu, 2018).

The pricing of innovative products was also analysed herein. Price is a marketing mix element, and relates to the monetary value customers will pay for a product or a service. In recent years, the importance of pricing decisions in companies has significantly increased (Homburg, Kuester, & Krohmer, 2013). Achieving the best price level requires an investment in time, effort, technology and in the team (van der Rest, Roper, & Wang, 2018) and only after some years do benefits start to show and accumulate.

Markets are increasingly showing signs of saturation and overcapacity, with price being used as a differentiating factor. Due to globalization, and due to the entry into international markets of a growing number of foreign companies (including from low-wage countries), the pressure on prices has intensified. It should also be noted that the products supplied by competitors are becoming more and more similar in quality, which makes price an increasingly important decision criteria for buyers.

When comparing price to other marketing mix elements, some things should be underlined: its rapid implementation; that is, decisions can be implemented and launched relatively quickly; hardly reversible, since it acts as a point of reference that customers use to evaluate subsequent price changes; its great impact on customer behavior since it can be the main reason or the main impediment of a purchase. Price is a key mechanism to generate value between the company and the client – and the internal organizational efficiency level allowing for low prices, for example, gains importance in such a scenario.

According to Töytäri, Keränen, & Rajala (2017) there are three types of prices in the literature:

- Based on cost – involving the calculation the company's own costs as a price reference and then adding a margin to arrive at the final price;
- Based on the competition – whereby the competition felt controls the prices of similar offers that exist in the market; and fixes the price by focusing on the characteristics of the offer and its competitive position in the market;
- Based on value – characterized by long-term exchanges. It requires a deep understanding of business models because it is based on what customers value.

Nowadays, we are increasingly facing a competitive scenario that includes strategic discrepancies and disequilibrium conditions. Due to new technologies with a significant impact, or the emergence of new markets, a lack of definition of industry limits, and hypercompetitive markets, an extreme emphasis on price exists, which will be linked to the continuous growth of innovation and learning, among others (Hitt, Haynes, & Serpa, 2010). It is up to managers to balance this need for stability so that planning can be conducted effectively, and decisions made with the due flexibility, so that the company can adapt to the dynamic environment and create bonds with partners to grow. The concept of globalization has become more widespread and brought about a change in companies that became increasingly multipurpose, reaching multiple markets (Hitt, Haynes, & Serpa, 2010). Competitiveness is inevitably increasing, leading companies to pay close attention to the value of the price offered to their customers.

In the 1980s, Porter introduced generic strategies for cost leadership and differentiation, arguing that companies should not implement both strategies simultaneously. The conflicting requirements that are needed to have cost leadership and to gain competitive advantage could cause companies to feel lost and ultimately fail to achieve a differentiated position in the market. The increasing trends of price, quality, and satisfaction of consumer needs – accompanied by the significant increase in competitive rivalry and new technologies – has led companies to develop an integrated system: a low-cost differentiation strategy (Hitt, Haynes, & Serpa, 2010).

All these factors make innovation increasingly important and continued technology development puts pressure on innovative companies. Companies must focus on learning, on building internal knowledge and on managing knowledge flows, as well as increasing the investment to create innovation (Hitt, Haynes, & Serpa, 2010).

3. Research questions

The research questions of this paper are the following:

1. How does an innovative firm innovate in Portugal, which is not seen to have an environment which welcomes innovation?
2. How should innovative products be priced, in the format of a formula, and in a standardized fashion ["one-size-fits-all"], if possible, and considering a cost leadership or differentiation strategic focus, or an integration of both?

4. Methodology

To answer the research questions above, a mixed methodology was followed (Bryman & Bell, 2011). This research is exploratory, having used both qualitative and quantitative research methods.

Firstly, a focus group was performed, involving eight people, six belonging to the company's different departments. The other two focus group participants were the moderators and are two co-authors of this study. The focus group was held on March 15, 2018, and had a duration of two hours. Audio recording was not allowed. Thus, hand-written notes were taken by the focus group moderators.

The main goal of this focus group was to understand how the company sees and treats innovation; and to analyse internal opinions about the generation of innovation. Problems were discussed and suggestions for improvement given. The role of customers for the company was also a topic of discussion, as was the pricing of products. How the company handles the competition and how employees see top management were also a part of the interview script questions. The focus group participants were carefully chosen in advance. Participants were given the necessary space to show their different opinions, despite the existence of an interview script.

Furthermore, an online questionnaire was administered to the whole firm. It was sent to the company's internal community and 48 valid responses were received. The survey was conducted over two weeks, from March 29, 2018, to April 16, 2018. The questions presented in the questionnaire fell into three categories: open, multiple-choice and with a Likert scale of 5 points (to measure the agreement with the statement presented) (Remenyi, 2013). The main goal of this process was to gather as many responses as possible in order to achieve a greater diversity of opinions/perspectives.

5. Presentation of the study and discussion

5.1 The focus group and the survey

This study was developed in a technological and innovative company located in a main Portuguese city, where new telecommunications technologies are the main focus of the company.

According to the focus group data, in this company collaboration and group work are preferred and competition between workers is not well received. Encouraging workers to be a part of team projects promotes cooperation. According to the focus group data, teams are coordinated amongst themselves, and individuals are motivated to try to make the most of their skills. However, those who are entrepreneurial and innovative may not feel so motivated. Although they are not excluded by the company for acting in a "different" way, one focus group participant believed that there is pressure in groups due to the different points of view. The innovative ideas that are investigated, studied and worked on are given attention, but only a few are implemented. As concerns improving the process of innovation at the firm, this is a daily concern. Continuous improvement, in an open environment, is the basis of the company. The firm's main customer is seen to be the head office (the owner of the firm), to whom they sell the new products developed. Customers are regularly surveyed for their satisfaction levels. As concerns innovation, yes Portugal is seen to be problematic. International partnerships exist for the development of certain products.

In the questionnaire (which was answered by 28 men and by 20 women, aged between 18 and 60 years of age), 58% of the respondents were of the opinion that there is a good environment for innovation in Portugal. Furthermore, 54% of the respondents are of the perspective that their firm is an innovative company. About 40% of the respondents stated that senior management accepts innovation even if it challenges the *status quo*. However, just over 21% stated that senior leadership does not accept innovation if it challenges the *status quo*. This may be worrying. Additionally, a total of 35% of the respondents think that the company is hierarchical and somewhat an authoritarian one.

In this company, cooperation between colleagues seems to work. Around 69% of the interviewees stated that the company prefers that workers work as a team rather than alone, promoted by the freedom to create teams in addition to those already created by top management. Also, encouraging dynamic alliances between workers governed by the same rules produces healthy competition. Through teamwork, workers feel more devoted to achieving mutual goals and end up being more committed to the team itself, since individual contribution turns out to be important and meaningful. Moreover, teamwork leads to better performance in activities, since each one of the employees maximizes his or her own skills in order to produce the most unique and productive work. Furthermore, 58% of the respondents agree that innovative and entrepreneurial people have different habits, stating that they like these type of people because they can create a new path for the team, motivating the team to implement new ideas.

Overly competitive workers was another important topic. Overly competitive workers create a certain environment in the company, motivating other workers to develop certain skills that may prove to be important. For the respondents, trying to work together will always be the preferred option when compared to having competition between colleagues. Around 40% of the respondents said that internal competition is important, while around 50% believe that competition is not healthy.

Finally, an association was found (chi-square test statistic at the 5% level of significance) between the age of the respondents and senior management accepting innovation, even if the innovation challenges the *status quo*. The older respondents (46-60 years of age) stated that senior leadership is receptive to innovation, whereas the younger respondents (18-30 years of age) do not have the same opinion.

5.2 The paper manager

At the end of the focus group interaction, a game was played: the paper manager. The objective was to perceive how the participants saw top management. Top management is often the main motivation and the deciding factor for workers to progress in their careers.

The "paper manager" had to be created by the focus group participants, with body parts provided beforehand, thus showing the work environment that is felt as relating to top management. Based on certain meanings, of each body element, respondents had to choose the size of the head, eyes, nose, mouth, ears, body, heart, and

legs. Of note is that only one of the six interviewees created the "paper manager" on a green work environment (a very productive work environment) (image 1), and all the other five respondents chose the white work environment (a neutral work environment when it comes to being productive).

The manager with the green environment (image 1) had a middle-sized head, meaning top management is perceived as being more or less innovative; medium-sized eyes with the gaze directed forward, meaning that top management gives some autonomy to its workers and is somewhat observant; a large-sized nose meaning that top management exercises fairly intuitive management; a small-sized mouth meaning that top management does not communicate much; medium-sized ears meaning that top management does not always listen to its colleagues; a medium-sized body meaning that the organization follows a bureaucratic line, but is also agile and entrepreneurial; a medium-sized heart meaning that some empathy is generated between colleagues and top management; and medium-sized legs meaning that top management moves, at times, through the hallways of the company.

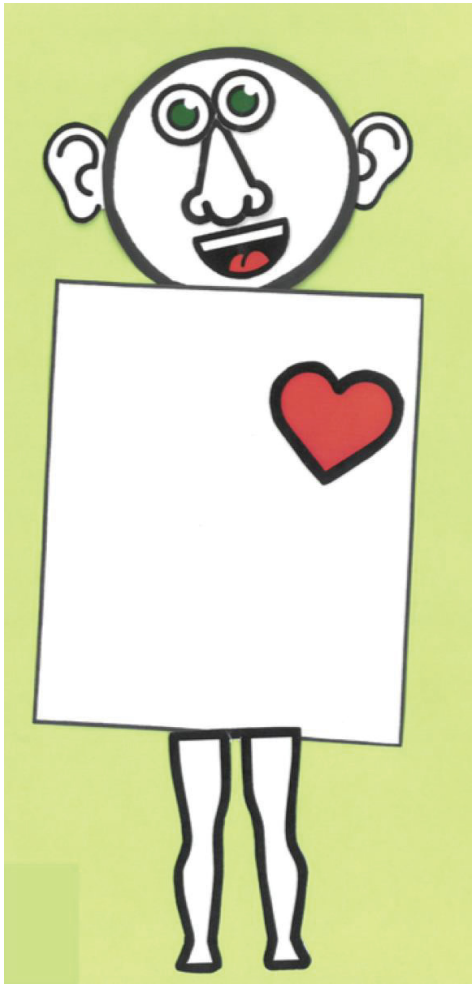

Image 1: The paper manager according to one focus group participant

For all the other "paper managers" built on a white environment, the head was average-sized (top management presents more or less innovative ideas). Regarding the size of the eyes, three respondents chose medium-sized eyes with the “paper manager” looking forward (top management gives autonomy to the workers) while one respondent chose to put the “paper manager” looking downward (management is not only observant but exerts control over workers). Their noses were medium-sized and large-sized, meaning top management follows intuition and the mouth was the bigger element, meaning top management communicates significantly. The ears were medium-sized, meaning that top management does not always listen to workers.

The body element chosen by the interviewees was the average one, which indicates that the company is bureaucratic, but also agile and entrepreneurial.

Two of the respondents (with "paper managers" built on a white environment) chose the large-sized heart, meaning empathy between workers and top management is high. Concerning the legs, one respondent chose large-sized legs, two respondents chose medium-sized legs and one respondent chose small-sized legs, meaning the opinions differ in relation to the movement of top management within the company.

5.3 Rewards

Motivation is a key aspect in the performance of both managers and subordinates. Motivation may be increased by the existence of rewards in the workplace. Through rewards, workers are encouraged to act in a certain way. In addition, rewards must also be capable of influencing workers to improve their performance and feel rewarded when completing goals (Björk & Holopainen, 2005). Mutual goals allow workers not to feel so alone even if top management rewards collaborators individually, motivating workers to develop their own skills but also to share rewards (Björk & Holopainen, 2005) while stimulating teamwork.

There are two types of rewards: formal rewards, that are real and palpable (i.e. cash, extra holidays or bonuses) and informal rewards that are more abstract and raise the workers' self-esteem (i.e. symbolic recognition, distinctions or symbolic certificates) (Björk & Holopainen, 2005). According to the questionnaire data, around 83% of the respondents stated that there is no formal reward for workers, and the remaining 17% partially agree.

The researchers also asked if workers thought they should be formally rewarded, to which 83% of respondents gave positive answers. As regards informal rewards, 77% of the workers think they should exist.

When questioned if workers would receive a recommendation after presenting something innovative to the company, 90% of the respondents gave a negative answer.

5.4 The prices of innovative products

Concerning the pricing of innovative products, this is a daunting though essential organisational task. The company follows the practice of meeting the market-established price and in so doing controlling the fixed and variable costs involved. During the focus grupo, it was mentioned that establishing the price of a product is quite complicated since there are several variables to be taken into account. Market prices need to considered and, if necessary, one may need to lower the price to be able to sell. In one of their most objective ways to formulate prices, the company takes into account the requests of customers; a certain price is established for the number of working days of a specific profile of workers; the cost of raw materials and the margin that the company establishes are also considered. Thus, a formula may be defined, as follows:

$$Price = ([\mathrm{C(rm)} + \mathrm{C(prod.)}] + [\mathrm{C(fc)} \times \mathrm{D}] + [\mathrm{C(R\&D)} \times \mathrm{K})]) \times \mathrm{M}$$

To the cost of raw materials [C (rm)], the cost of production [C (prod)] is added. The cost of fixed costs [C (fc)] is multiplied by the distribution (D) per product (varying from product to product); additionally, the cost of research and development (C(R&D)] is multiplied by the factor K (the distribution of the company's R&D costs by product, ranging from product to product). All of this will then be multiplied by the margin (M) established by each department of the company.

The company has some big competitors, some of whom are also customers, which is not an easy thing to balance. Having the customers' opinion is very important for product development. The department responsible for communicating with customers is also the first to receive their feedback and it is their responsibility to pass the feedback on to the rest of the company in order for it to be interpreted and communicated to the product managers. The different ideas coming from customers are analysed, the cost of implementation calculated, and which may later be accepted by customers. If, in the long run, the idea is not very advantageous for the company, usually it is integrated in a personalised product and sold to a particular customer. If the idea is good, the integration can be made in several products and the cost will end up being divided between all of the customers. However, in the focus group, it was mentioned that product innovation does not always reach all customers at the same time. Much of the innovation will only arrive at certain customers when there are malfunctions in a product and it has to be repaired.

6. Conclusion

A company's values influence teamwork and decision-making (Hartnell, Or, & Kinicki, 2011). Certain behaviours lead to desirable collective attitudes by workers as they create a setting for a united and responsible community.

In our study we have discussed the importance of national and corporate culture and the effects of these on innovation. In order to shed light on how the firm analysed innovates, a firm not long ago considered to be a "shining star", in the midst of other Portuguese technological enterprises, we performed a focus group and a survey.

The internal environment of the company analysed is based on collaboration, teamwork and on the exchange of ideas and opinions. Thus, internal competition, between colleagues, was considered by focus group members as being negative for the firm. Thus, the firm's workers labour towards a common shared objective and mainly working in groups (groups were actually referred to as being "the only way to work").

Indeed, we ascertain that the company is innovative as it works in a collective fashion as suggested in the literature (Hofstede, 2001; Hofstede et al., 2010) that Portugal favours. The firm is also somewhat autocratic, similarly in line with what the literature has to say about how Portugal functions (at the level of its national culture) (Hofstede, 2001; Hofstede et al., 2010).

Most of the respondents said that there should be formal and informal rewards (in a meritocratic environment) for those who can think differently and are able to be more innovative. However, the literature states that such practices will have a negative effect on innovation output (Poskela and Martinsuo, 2009).

We have discussed the Paper manager exercise and how different views of senior management exist.

We have also discussed how the pricing of innovative products is done at the firm, a topic which is lacking in the literature.

One is tempted to state that the firm is successful because it chooses to work intelligently, in groups and in a somewhat autocratic fashion, thus favouring the prevailing national culture, rather than going against it (Nguyen, 2016).

References

AZ Quotes (n.d.). Lou Gerstner quotes. Available at: http://www.azquotes.com/author/5452-Lou_Gerstner, accessed on 19-06-2018.

Björk, S., & Holopainen, J. (2005). Patterns in game design . Hingham, Massachusetts: Charles River Media, INC.

Bryman, A., & Bell, E. (2011). Business Research Methods. New York: Oxford University Press.

Caetano, E. (2018). Portugal no fundo da tabela do crescimento inclusivo. Observador. 22nd January. Available at: https://observador.pt/2018/01/22/portugal-no-fundo-da-tabela-do-crescimento-inclusivo/, accessed on 19-06-2018.

Fernandes, S., Cesário, M., & Barata, J. (2017). Ways to open innovation: Main agents and sources in the Portuguese case. Technology in Society, 51, 153-162.

Forum (2018a). The Inclusive Development Index 2018. Tables. World Economic Forum. Available at: http://reports.weforum.org/the-inclusive-development-index-2018/tables/, accessed on 18-06-2018.

Forum (2018b). The Inclusive Development Index 2018. Executive summary. World Economic Forum. Available at: http://reports.weforum.org/the-inclusive-development-index-2018/executive-summary/, accessed on 18-06-2018

Guiso, L., Sapienza, P., & Zingales, L. (2015). The value of corporate culture. Journal of Financial Economics, 117 (1), 60-76.

Gurovitz, H. (2011). O poderoso Wal-Mart. Revista Exame .

Hartnell, C. A., Ou, A. Y., & Kinicki, A. (2011). Organizational Culture and Organizational Effectiveness: A Meta-Analytic Investigation of the Competing Values Framework's Theoretical Suppositions. Journal of Applied Psychology, 677-694.

Hitt, M., Haynes, K., & Serpa, R. (2010). Strategic leadership for the 21st century. Business Horizons, 437-444.

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviours, institutions and organizations across nations. 2nd Edition. Sage Publications, Thousand Oaks CA.

Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context. Online Readings in Psychology and Culture, vol. 2(1).

Hofstede, G., Hofstede, G.J., Minkov, M. (2010). Cultures and organizations: Software of the mind. Revised and Expanded 3rd Edition. McGraw-Hill.

Hofstede Insights (2018). Country comparison. Available at: https://www.hofstede-insights.com/country-comparison/portugal/, accessed on 15-06-2018.

Homburg, C., Kuester, S., & Krohmer, H. (2013). Marketing Management: a Contemporary Prespective. Berkshire: McGraw-Hill Higher Education .

Jamrisko, M., & Lu, W. (2018). The U.S. Drops Out of the Top 10 in Innovation Ranking. Bloomberg Technology .

Nguyen, T. (2016). 10 Habits of the Most Innovative People. Huffington Post. 19th of October. Available at: https://www.huffingtonpost.com/thai-nguyen/10-habits-of-the-most-innovative-people_b_8318896.html, accessed on 18-06-2018.

Poskela, J., & Martinsuo, M. (2009). Management Control and Strategic Renewal in the Front End of Innovation. Journal of Product Innovation Management, 26, 671-684.

Remenyi, D. (2013). Field Methods for Academic Research: Interviews, Focus Group & Questionnaires. Reino Unido: Academic Conferences and Publishing International.

Töytäri, P., Keränen, J., & Rajala, R. (2017). Barriers to implementing value-based pricing in industrial markets: A micro-foundations perspective. Journal of Business Research, 76, 237-246.

van der Rest, J. P., Roper, A., & Wang, X. L. (2018). Why is a change of company pricing policy so hard to implement? nternational Journal of Hospitality Management, 69, 30-40.

Warrick, D. D. (2017). What leaders need to know about organizational culture. Business Horizons, 395-404.

Zhao, H., Teng, H., & Wu, Q. (2018). The effect of corporate culture on firm performance: Evidence from China. Journal of Accounting Research.

How Traditional Companies can Foster Innovation through Collaboration with Startups

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Abstract: Established businesses are facing enormous challenges in order to ensure their long-term growth and their overall competitiveness. The speed of innovation has increased significantly and due to digitization, they are threatened by innovative startups which arise in their initial business area. To obtain and expand their competitive advantage, they are forced to identify innovation opportunities and realize new products in a faster sequence. To do so, they often rely on startups as a source of innovation. The thesis evaluates, if the process of identification, evaluation and realization of innovation opportunities, is transferable to corporates in the case of collaboration with startups. Besides, it describes common cooperation models, identifies challenges and gives practical implications for managers. The theoretical part includes a comprehensive literature review regarding the relevant concepts whereas the empirical section contains qualitative interviews with managers of established companies and experts operating in the intersection of these two parties. The findings indicate that the process is transferable to established companies, but more likely to occur in business units that are independent from the core organization. Furthermore, the thesis reflects that the abilities to identify and evaluate innovation opportunities are particularly important for collaboration success. The presence of an overarching vision, as well as the encouragement of entrepreneurship within the company, are highly important. Both should be initiated and supported by executive-level decision makers. The research identifies organizational and cultural differences, as well as non-existent internal processes and structures, as the main challenges during collaboration. Cultural distinctions primarily occur in form of different structures, working methods and speed. The research results indicate that startup guides are a possible solution. The thesis links the concepts of open innovation and knowledge entrepreneurship and answers the question if the cooperation with startups could support traditional companies to overcome The Innovators Dilemma described by Clayton Christensen. Furthermore, it outlines challenges and influencing factors during collaboration and gives practical implications to corporates. The research is especially relevant for managers of traditional businesses who want to increase their company's level of innovation in the long term.

Keywords: knowledge entrepreneurship, entrepreneurship, open innovation, startup-corporate collaboration, organizational learning

1. Problem statement

Established companies are currently facing several challenges in order to ensure their long-term growth and their overall competitiveness. One urgent issue is linked to the growing demands associated with the digital transformation. The restructuring of the global business landscape through the rise of digital technologies, formally known as *The Big Shift*, is challenging existing organizational models (Hagel III, 2016). Another issue emerges from the radical changes in the current innovation landscape. Docherty (2015) describes the situation with the assertion “The old definition of innovation is dead” and states that growth is no longer generated by innovation in the core business, instead, it arises through the discovery of new sources and platforms (p. 7).

This transformation is being brought about by the increasing customer demand regarding the novelty and uniqueness of products as well as the speed in which they are being replaced (Docherty, 2015, p. 8). In addition, established organizations are being threatened by highly innovative startups. This has been confirmed by Hamel (1999) with the statement “Out there in some garage, an entrepreneur is forging a bullet with your company's name on it. You have only one option: you have to shoot first.”.

One explanation for the difficulties is *The Innovators Dilemma* described by Christensen (1997). Bower and Christensen (1995) describe a consistent pattern in companies: “they often fail when they stay on top of their industry and technologies or market changes” (p. 43). Another widely known concept is the idea of organizational ambidexterity. It outlines the ability of a firm to improve its core business while simultaneously searching for new business segments. O’Reilly and Tushman (2004) regard this ambition as a crucial factor for the long-term success of a firm (p. 76).

The sources of innovation are increasingly being generated through the cooperation with external partners (Chesbrough, 2003). The opening of corporate boundaries has been associated with a significant rise in innovation opportunities. Due to rapid technological change, they arise in a faster sequence (Hamel III, 2016). According to these new requirements, companies need to enable their employees to identify these opportunities, evaluate them and integrate them into their existing processes and structures (Hamel III, 2016). These skills belong to the core competencies of an entrepreneur (Hamel III, 2016; Senges, 2007, p. 299). Therefore, entrepreneurs are getting even more important in the corporate context (Hamel III, 2016).

Based on the above stated facts, the paper addresses the following research questions:

- Is knowledge entrepreneurship transferable to established companies and to what extent does it have to be adapted in order to meet the special needs associated with cooperations with startups?
- What influencing factors of knowledge entrepreneurship are most relevant when it comes to collaboration with startups?
- What challenges and further influencing factors arise within the cooperation between established companies and startups?

The thesis builds on literature analyses and an empirical section conducting interviews with experts of established companies as well as selected experts operating in the intersection of these two parties. The research aims to identify the extent of which knowledge entrepreneurship is transferable to established companies in the case of collaboration with startups. On the one hand, it takes a closer look at the components of the knowledge entrepreneurship model and which of them are more or less relevant when it comes to collaboration. On the other hand, it analyzes goals, common challenges and further influencing factors during the cooperation and provide some practical recommendations.

2. Theoretical framework

The subject of organizational learning is a crucial precondition for internal knowledge acquisition and processing and it is an opportunity for companies to remain competitive in a changing environment (Moingeon, 1996, p. 7). Nonaka and Takeuchi (1995) are regarded as some of the most influential contributors to this field of study. They differentiate between tactic and explicit knowledge (Nonaka, Takeuchi, 1995, p. 59).

Tactic knowledge is personal, context-specific and cannot be communicated or articulated (Nooteboom, 2001, p. 38; Nonaka, Takeuchi, 1995, p. 59). It is found in the culture of a company (Nooteboom, 2001, p. 38). Explicit knowledge, therefore, can be formulated, reproduced, and described by words and numbers (Nonaka, Takeuchi, 1995, p. 59). The interaction between these types continuously increases the knowledge base of a firm (Nonaka, Takeuchi, 1995, p. 70). This interaction is accompanied by a change between the four different modes of knowledge transformation.

An organization cannot produce knowledge on its own since the tactic knowledge of the individuals is required (Nonaka, Takeuchi, 1995, p. 72). For this reason, the authors understand knowledge production as a spiral, starting at the individual level and moving across divisions or business boundaries and continuously expanding the knowledge base (Nonaka, Takeuchi, 1995, p. 72).

The concept of knowledge entrepreneurship closes the gap between organizational learning and innovation (Figure 1). It describes the ability of an individual or an organization to identify opportunities and to take action with the aim to realize new products or practices (Senges, 2007, p. 5). In contrast to traditional economic entrepreneurship knowledge entrepreneurship is not driven by monetary means, but rather relies on the identification of possibilities to optimize products and to accelerate knowledge processing (Senges, 2007, p. 31).

Figure 1: Knowledge entrepreneurship as a link between organizational learning and innovation

(Source: Own representation, based on Senges, 2007, McDonald, 2002)

The capability of knowledge entrepreneurship is influenced by different factors. On the one hand the current condition of the corporation, described through its culture, leadership and ability to engage in organizational learning is classified as a crucial factor (Senges, 2007, p. 34). On the other hand, the abilities to identify, evaluate and apply innovation opportunities is described through five parameters. The factors environmental awareness and communication influence the ability to identify innovation opportunities (Senges, 2007, p. 300f.). Whereas risk tolerance and vision and strategy affect the capability to evaluate them (Senges, 2007, p. 300f.). Finally, the new project support influences the realization of these opportunities (Senges, 2007, p. 302). The interaction of the competences is described in figure 2.

The concept of innovation appropriation is used as a conceptualization and practical implementation of knowledge entrepreneurship in this research (Senges, 2007, p. 47). The approach describes the process of integrating an innovation into the organization and is based on the model of absorptive capacity by Cohen and Levinthal (Senges, 2007, p. 47; Cohen, Levinthal, 1990). Due to its non-economic orientation and dependence on the activities of individuals, the concept is classified as suitable for this study (Senges, 2007, p. 47).

3. Research Design

The research is divided into a theoretical and an empirical part. The first section includes a comprehensive literature review regarding the concepts of the learning organization, knowledge entrepreneurship and open innovation as well as the collaboration between startups and companies.

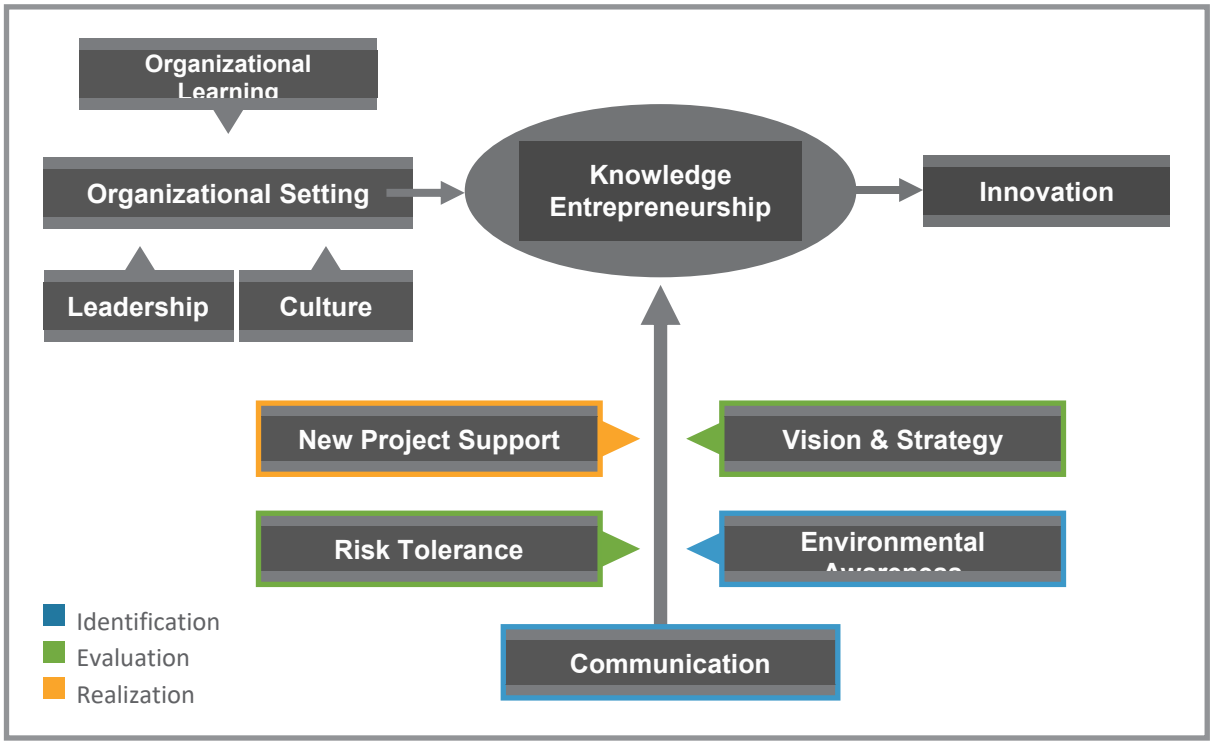

Figure 2: The knowledge entrepreneurship model

(Source: Own representation, based on Senges, 2007)

The second, empirical section, contains interviews with experts of established companies as well as interviews with selected experts operating in the intersection of these two parties. The analysis is exploratory and based on grounded theory. Therefore, no hypotheses are developed at the beginning (Glaser, Strauss, 2006, p. 2).

4. Interpretation of results and conclusion

The findings indicate that the process of identification, evaluation and realization of innovation opportunities is transferable to established companies, but more likely to occur in business units that are independent from the core organization. Furthermore, the thesis reflects that the abilities to identify and evaluate innovation opportunities are particularly important for collaboration success. The presence of an overarching vision, as

well as the encouragement of entrepreneurship within the company, are highly important. Both should be initiated and supported by executive-level decision makers. The research identifies organizational and cultural differences, as well as non-existent internal processes and structures, as the main challenges during collaboration. Cultural distinctions primarily occur in form of different structures, working methods and speed. The research results indicate that startup guides are a possible solution.

The results suggest that knowledge entrepreneurship is not explicitly supported in any of the companies investigated in this study. Instead the author found different firm structures to identify, evaluate and act on innovation opportunities.

In the following paragraph the three research questions are formally answered.

- Is knowledge entrepreneurship transferable to established companies and to what extent does it have to be adapted in order to meet the special needs associated with cooperations with startups?

The research states that knowledge entrepreneurship and the underlying influencing factors are transferable to established companies. In the case of cooperation with startups, it turns out that knowledge entrepreneurship is more likely to occur in business units that are separated from the core organization.

Through the separation of the unit, different business structures and internal processes support the development of knowledge entrepreneurship. The ability of an organization to optimize its core business while simultaneously looking for new innovations, also described as the concept of organizational ambidexterity, assumed to act as a suitable precondition for knowledge entrepreneurship to occur (O'Reilly, Tushman, 2004, p. 76). Christensen, Raynor and McDonald (2015) are also convinced that companies have to establish separate units for the development of disruptive ideas. These units should operate under the protection of the company management (Christensen, Raynor, McDonald, 2015). The study could not verify the need for the adaptation of the model with regard to cooperation with startups. Apparently knowledge entrepreneurship is suitable to increase the innovative capacity of an established organization.

- What influencing factors of knowledge entrepreneurship are most relevant when it comes to collaboration with startups?

The research found that the parameters environmental awareness as well as vision and strategy are particularly important when it comes to collaboration with startups. Given the fact that the startup environment is highly dynamic, the continuous monitoring of the direct and extended environment through events and networks is of great importance. The factor vision and strategy is another important prerequisite as it includes the presence of an overarching vision as well as the internal encouragement of entrepreneurship.

Both should be initiated and supported through the executive level. Further it was found that companies operating within an outsourced unit have a more distinctive attitude towards entrepreneurship and are more likely to defend their competitiveness by increasing their innovation opportunities. The factor risk tolerance is rather low among all investigated companies. None of the companies deliberately take risks. Potential risks are still associated with negative feelings. The communication in the investigated companies takes place very individually and usually without predetermined structures. Even the interaction with startups is highly project-dependent and includes different channels. When it comes to the initiation of long-term relationships the process is characterized by a high level of bureaucracy and low speed. None of the investigated companies has implemented specific processes to accelerate the launch of new projects or long-term relationships. The new project support parameter is consequently rather low.

- What challenges and further influencing factors arise within the cooperation between established companies and startups?

In terms of cooperation with startups, the research found that organizational and cultural differences as well as challenges regarding internal processes and structures were the main challenges. Cultural distinctions primarily occur in form of different structures, working methods and speed. These contrasts can become critical if they are accompanied by inadequate management. Startup guides are a possible solution for this challenge. These are well-chosen employees with an entrepreneurial mindset. These guides operate at the

interface between startups and companies and can minimize the impact of cultural differences by mediating challenges arising during the relationship. In addition to the guides, the organizational unit itself can act as an intermediary.

Furthermore, the research found that none of the companies had adapted their structures to the special needs of the smaller partners. When it comes to the processes of initiating of cooperations and the transition into long-term partnerships, all companies adapt the proven procedures for all types of service providers. These operations go along with reduced speed, high complexity and the involvement of various business units.

Therefore, the use of separate organizational units for identification, evaluation and integration of innovation opportunities become even more essential. These units are more likely to create structures and processes that deviate from the core business. In addition, companies have to set up separate processes for the collaboration with startups that meet their particular needs.

All in all, corporates have to speed up when it comes to collaboration with startups. A proven approach obtaining quick decisions is the integration of the top-management through a pitch or demo day. It also promotes the commitment of the management level, which has proven to be a relevant influencing factor within the cooperation.

5. Concluding remarks

Even if companies create all the structural prerequisites for successful identification, evaluation and realization of innovation opportunities, ultimately the employees themselves have to apply these processes. In order to enable this, employees need the freedom and responsibility to act independently as entrepreneurs within the company context. With regard to cooperation with startups, it is essential that the contact person has an entrepreneurial mindset and is given the competencies to act independently and responsibly. Thus, challenges relating to differences in culture, speed and organizational structures become less relevant and less critical for success.

Taking a look into the future, joint innovation programs with a range of large companies are getting more relevant. Within these so-called shared accelerators, several companies are working with startups. This promotes exchange across company boundaries since the partners often work on similar challenges that are not primarily related to an industry or market structure.

Finally, it can be said that collaboration with startups is a key innovation potential for traditional companies.

Ultimately, the organization itself always determines whether and how innovation opportunities that arise from the collaboration result in innovative products that have the potential to ensure the long-term success of the company.

References

Accenture (2015). Harnessing the Power of Entrepreneurs to Open Innovation. Retrieved from https://www.accenture.com/t20151005T162506__w__/us-en/_acnmedia/Accenture/next-gen/B20/ Accenture-G20-YEA-2015-Open-Innovation-Executive-Summary.pdf.

Bannerjee, S, Bielli, S. & Haley, C. (2015). Scaling together. London: Nesta. Retrieved from https:// www.nesta.org.uk/sites/default/files/scaling_together_.pdf.

Bessant, J. R., Venables, T. (2008). Creating wealth from knowledge: Meeting the innovation challenge. Cheltenham: Edward Elgar.

Bower, J. L., Christensen, C. M. (1995). Disruptive Technologies: Catching the Wave. Harvard Business Review, January-February, 43–53.

Chesbrough, H. W. (2003). Open innovation: The new imperative for creating and profiting from technology. Boston, MA: Harvard Business School Press.

Christensen, C. M. (1997). The innovator's dilemma: When new technologies cause great firms to fail. Boston: Harvard Business School Press.

Christensen, C. M., Matzler, K. & von den Eichen, S. F. (2013). The Innorators Dilemma. Warum etablierte Unternehmen den Wettbewerb um bahnbrechende Innovationen verlieren. Munich: Verlag Franz Vahlen GmbH.

Christensen, C. M., Raynor, M. & McDonald, R. (2015). What is disruptive innovation? Retrieved from https://hbr.org/2015/12/what-is-disruptive-innovation.

Cohen, W. M., Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. Administrative Science Quarterly, 35 (1), 128–152.
Docherty, M. (2015). Collective disruption: how corporations & startups can co-create transformative new businesses. Boca Ratan, FL: Polarity Press.
Ebers, M., Huxham, C. & Ring, P. S. (2008). The Oxford handbook of inter-organizational relations. Oxford: Oxford University Press.
Glaser, B. G., Strauss, A. L. (1967). The discovery of grounded theory: strategies for qualitative research. Chicago: Aldine Pub. Co.
Glaser, B. G., Strauss, A. L. (2006). The discovery of grounded theory: strategies for qualitative research. Chicago: Aldine Pub. Co.
Gläser, J., Laudel, G. (2010). Experteninterviews und qualitative Inhaltanalyse. 4. Edition. Wiesbaden: VS Verlag für Sozialwissenschaften.
Goldmann, L. (2016). Sag mal, ... kannst du mir helfen? Retrieved from https://www.brandeins.de/archiv/2016/vorbilder/hype-start-up-kultur/.
Hagel III, J, Brown, J. S. & Davidson, L. (2009). The Big Shift. Measuring the forces of change. Harvard Business Review, July-August 2009, 86-89.
Hagel III, J. (2016). We Need to Expand Our Definition of Entrepreneurship. Retrieved from https:// hbr.org/2016/09/we-need-to-expand-our-definition-of-entrepreneurship.
Hamel, G. (1999). Bringing Silicon Valley Inside. Retrieved from https://hbr.org/1999/09/bringing- silicon-valley-inside [09.04.17]. 12
KPMG (2014). New Horizons 2014. Corporates & Startups: Hip, but not happening. Retrieved from https://assets.kpmg.com/content/dam/kpmg/pdf/2016/05/new-horizons-2014-1.pdf.
KPMG (2015). New Horizons 2015: On the road to corporate-startup collaboration. Retrieved from https://assets.kpmg.com/content/dam/kpmg/pdf/2016/04/On-the-road-to-corporate-startup- collaboration-16-12-2015.pdf.
McDonald, R. E. (2002). Knowledge entrepreneurship: linking organisational learning and innovation. University of Connecticut.
Minshall, T. (2006). Partnerships between technology-based start-ups and established firms: making them work. University of Cambridge, IfM Briefing, 1(1).
Minshall, T., Mortara, L., Valli, R., & Probert, D. (2010). Making “asymmetric” partnerships work. Industrial Research Institute, Inc.
Mocker, V., Bielli, S. & Haley, C. (2015). Winning Together. Retrieved from https://www.nesta.org.uk/sites/default/files/winning-_together-june-2015.pdf.
Nonaka, I. (1991). The Knowledge-Creating Company. Harvard Business Review, July–August 2007, 162–171.
Nonaka, I., Takeuchi, H. (1995). The knowledge-creating company: how Japanese companies create the dynamics of innovation. New York: Oxford University Press.
Nooteboom, B. (2001). Learning and innovation in organizations and economies. Oxford: Oxford University Press.
Nooteboom, B. (2008). Learning and innovation in inter-organizational relationships. In: Cropper, S.,
Retrieved from https://www.unternehmertum.de/files/Handbuch_Collaborate.pdf.
Schaettgen, Dr. N., Mur, S. (2016). The Age of Collaboration. Wien: MM Ventures GmbH.
Schönenberger, Dr. H. (2014). Collaborate to Innovate. Garching: UnternehmerTUM GmbH,
Senges, M. (2007). Knowledge entrepreneurship in universities: Practice and strategy in the case of internet based innovation appropriation. University Oberta de Catalunya.

What Makes my Wine E-Shop Stand Out: Evidence from the Online User Experience Research

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Abstract: In the digital age, people are surrounded by a vast of possibilities to buy things online. They receive hundreds of information and have many choices. Therefore, it appears more difficult for e-commerce to optimize the customer experience and encourage them to make a purchase. The main goal of this paper is to examine the behavior of wine e-shop customers and to analyze which website components influence their process of online shopping. The research deals with the importance of user´s experience and examines the question of the optimal combination of individual elements in the wine e-shop. The focus is on three areas: specific filters, graphic design and product descriptions; which are essential for purchase decision making in the process of online shopping. In order to reach the goal and examine the aforementioned areas, we looked at the following: Product impact, that includes the product information on the website; Orientation impact, including filter functions and orientation on the website and Customer service impact, that depicts the general information about the e-shop and related fees presented on the website. To achieve this, we did an A/B testing on two variants of the website, created as prototypes for this research. We combined it with „think aloud" method in order to define connections between used elements and customer behavior. Our results show the optimal combination of elements that guide purchase decision making in the case of wine e-shop, and improve the customer online shopping experience. The contribution is both academic and practical. Academia can benefit from acquiring additional knowledge regarding online customer behavior and decision making factors in online purchases. Practically, the results are useful for wine shop owners, especially those selling online, when choosing the innovative and optimal website interface to enhance customer experience and induce purchase.

Keywords: user experience, e – commerce, think aloud, online consumer behavior, online shopping

1. Introduction

The internet is growing rapidly in popularity with estimations of 3, 58 billion users worldwide (Statista, 2017). In the Czech Republic there are currently 41 047 e-shops, which expand the assortment. Compared to the number of inhabitants, Czech Republic has the highest number of e-shops within the EU (Ceska-ecomerce, 2018).

At the beginning of 2000, the researchers believed that the primary goal of e-commerce website was to facilitate economic actions, not to provide information (Brewer, 2005). However, applying internet in the commerce has grown exponentially, and it has created an efficient and effective way for retailers to maintain shopping experiences. It enables customers to make purchase decisions anywhere and at any time, thus influencing retail growth (Wei, 2016). As wine has become everyday customer good (Brewer, 2005), it is common to purchase it online nowadays. Nevertheless, the online shopping experience occurs differently than the in-store purchase, as we may talk about the online consumer response. Brewer (2005) explained that wine is an information-sensitive product and that this actually presents retailers with the opportunity to design websites that provide the right type and amount of information about their products.

This said, there is a chance that the wine consumers may have different habits and impose different behavior online. The present research is dealing with the question of how consumers behave and make decisions in wine e-shop and what do they prefer in terms of design and content.

1.1 Research aim and research question

The aim of the research is to uncover an optimal selection of individual elements in the wine e-shop that helps potential customers during their purchase and enhances user experience online. The research will explain the importance of components such as graphic design, specific filters, product descriptions and their influence on preference, user experience and purchase decision making in online shopping.

The main problem that we want to solve is how elements of the wine e-shop influence user experience and purchase decision making. Out of this statement, we have developed several research questions to answer within this research:

1. Do filters on the website enhance user experience?
   - Do filters on the website influence purchase decision making?

2. How do the product descriptions influence user website experience?
   - What are the users' preferences in terms of product descriptions?
   - Do product descriptions influence purchase decision?

3. In which way graphic design and overall orientation influence the user experience and purchase decision?

2. Theoretical background

Constantinides (2002) supposed that the traditional marketing mix paradigm is basically incompatible with e-commerce. The following marketing mix perspectives are consequently dominant in the online situation (Constantinides, 2002):

- product – the website itself is a brand image of the online shop and the prime online product
- price – the website price lists of the products work as the price of the physical product
- promotion – the website is the promotional medium and promotional content creator
- place – the website is concurrently counter, sales outlet and helpdesk where the actual transaction going on.

Since this approach, there has been a wave of studies focused on achieving a greater understanding of consumer behavior online (Merrilees & Fry, 2003). Thus, we can nowadays talk about the trends that indicate how marketers need to identify the determinants of online consumer shopping process. In this respect, theorists do recognize the rapid expansion of e-commerce, but at the same time, the limited understanding of the e-consumer (Wei, 2016). Wei (2016) concludes that the decision-making during online shopping appears to be different from that in other purchasing methods and environments. The main differences could reflect in perceived risk, brand choice, price sensitivity, delivery time, or interaction with the product (touch, smell, etc.). In addition, it is well known that online shopping is intangible, so consumers are concerned about the uncertainty including transaction, delivery and refund (Wei, 2016).

User experience in this context is perceived as effects felt by a user as an outcome of interaction with, and the application (usage) context of, system, device, or product, including the influence of usability, usefulness, and emotional impact during interaction (Hartson & Pyla, 2012). We can talk about the cognitive processes behind, as an important indicator and predictor of the interaction and behavior. For instance, the purchase decision making is influenced by decision biases- the phenomenon in which consumers show inconsistent preferences or choices when identical attribute information of products is differentially described either positively or negatively (Jin et al, 2017). Jin and colleagues (2017) describe the study from 2014 where the eye tracking method was applied to uncover the purchase intentions. The study showed that the eye movements were more active with negative frames and there and function attributed induced a greater number of those movements (Lin & Yang, 2014). Another study, therefore, explored the role of attribute framing in information processing and purchase decision making and confirmed that negative framing messages result in greater cognitive conflict and decision difficulty (Jin et al, 2017). However, to the authors' knowledge, there was no study researching the influence of positive framing and different design elements on purchase decision making and preference in wine e-shop. Previous research has suggested that insights on how exactly to attract customers to a wine retail website and retain them may be the benefit of further research in wine e-shop behavior and trends (Bruwer, 2005).

Some researchers argue that wine as a product might not be particularly suitable for online retailing (Richardson, 2002). In support of this, the characteristics of products may determine the propensity of people to shop online, meaning familiar or standardized products lead to higher customers' intention for online shopping (Wei, 2016). On the other hand, some allege that wine is an asset for internet retailing on account of

educating with tasting notes and search capabilities for special wines (Lockshin, 2000) and that it represents information-sensitive product (Brewer, 2005). Brewer (2005) further explained that visits to low-involvement product websites such as wine will have a shorter duration and generate a shorter website clickstream pattern than that of high-involvement product website. Generally speaking, elements of the consumer response process, such as perception, cognition, affection/emotional response, association, persuasion, decision-making and behaviour are important phases and points in consumer response process and can occur simultaneously.

This is especially present in the digital environment, where Hanekom et al. (2007) explain that the online consumer response levels do not necessarily follow each other in the proposed sequence, but may overlap with some even being omitted during certain response situations. In addition to this, the digital environment is an open space and it is possible for consumers to exchange and share information with all stakeholders, including the organisation and other consumers. This all affects the final attention patters, attitude formation and the decision making (Hanekom, Barker and Angelopulo, 2007).

According to Bruwer (2005) the website functionality has primary importance for the success of online wine retailers as are the security aspect of the transactions, quick fulfilment of orders and perception of online consumers that the pricing is fair. The website should provide just enough information necessary for purchase decision making. Wei (2016), argues that there are two major sources of information including the website marketing efforts and the sociocultural influences; and besides the information search, the online customers also do price comparisons and promotion evaluation much more than the customers in the stores. Online experience may play a major role in the offline consumer behavior.

3. Method

To answer the research question, a combination of two methods was applied. At first, a quantitative experimental study was implemented, through processing and comparing two similar but slightly different prototypes. The A/B test was chosen for this comparison. A significant part of measuring the possible differences was collecting data from both experimental groups. A/B testing presents each unique user with one of two versions of a design-the A version or the B-version and conversion rates for each version is compared to see which one performs best (User Testing, 2017).

Participants were given 5 tasks related to research questions. After completing the tasks, the participants were asked questions related to three areas: specific filters, graphic design and product descriptions. Think aloud method was applied while performing the tasks. Someren et al. (1994) describe thinking aloud such as a method which consists of asking people to think aloud while solving a problem. For better understanding user behaviour we recorded mouse movements and the participants' voices.

Transcript of interviews was created and further coded for obtaining results. This is explained in details in Main Findings chapter.

3.1 Sample

Ten participants (five female, five male) between 26 and 32 years living in the Czech Republic participated in the experiment. The age range was chosen based on the evaluation of the target market of the selected e-commerce wine company. Majority of their customers come from the age group 25-40 so the selected audience was from the same age group. The final selection of the sample was influenced by the contacted individuals' willingness to participate. The participants signed the consent prior to the participating. All participants were familiar with online shopping and were employed for wages. They are from the Czech Republic and Slovakia and currently live in Brno. They are also potential users of the Brno-based online shop.

Nine people claimed that they prefer the computer for shopping (over the smartphone). Five participants shop online once in two weeks, two participants shop once per week, two participants shop less than once per month and one person shop once per month.

3.2 Experiment design and flow

Before the experiment the participants filled in the demographic questionnaire. At the beginning of the meeting, moderator read basic information about the research. Participants signed the consent form and got the experiment task on the paper. At the same time, moderator read the task. The tasks were done without

moderator's help. The interview and the movements of the computer mouse were recorded. After the task was done, the moderator started with the short interview based on the task and research goals.

4. Main findings

Based on the research questions, the authors defined the themes and connected it with the descriptions obtained from the transcripts created from recordings (think aloud method). The themes that we observed were:

- Filters influence on user experience
- Filters influence on purchase decision making
- Product descriptions preferences
- Product descriptions influence on purchase decision
- Graphic design of the website
- Orientation on the website

The first research question is related to filters and their influence on the user experience and purchase decision making. Through the process of coding, we searched for definitions, both positive and negative regarding two aspects- user experience and purchase decision making. Participants did not prefer a large number of filters as they are used to see products on the top of the website and take the first on the list. For example 8 out of 10 point out to fact that they do not like a large number of filters and do not use it all.

They also preferred settings in which the filters help them reach their inner goal or intention. One of the participants had a positive response to filters, because the person uses filters in order to choose narrower and more specific product range. Others' connotations were mostly negative- the filters caused confusion.

However, for all participants the most important filter was related to the varieties of the wine. The second important filter was residual sugar of wine, while the least important was an attribute of wine. One of the website versions included special filters called *real feel of aroma, real feel of the sweetness and real feel of wine body.* These filters could be defined by values 1 to 5. As for these filters in particular, participants responded differently. For some it was something subjectively, others said it is not helpful for them and it is for the experts. Some participants indicated that the wine maker gives them the best clue about the quality of wine and they used this filter in their decision making.

The second research question focuses on product description. As with the previous question, we observed the influence of product descriptions on both user experience (what participants preferred) and purchase decision making. There was a similar number of those who like longer and who like shorter product description, 6 out of 10 points out to preference longer product description. Participants mostly read the parts related to the general impression and taste of the wine. It is important to mention that participants did not read the full descriptions, only small parts of it. For instance, respondents found useful the text about the food and wine combination. Majority of participants enhance the importance of information such as the size of the bottle and the origin of grapes (e.g. specific conditions of the land). On the other hand, they do not find the wine award crucial for their decision making.

In the third part of the research, we observed in which ways graphic design and overall orientation influences the consumer response online. In this respect, we included two random versions of the website- full text and without full text. Full text search means searching for the products by the key words. Full text search was selected in order to find out the importance of these elements for the consumers. Full text search was allowed to 5 participants. Four of them used it to find wine. Respondents who could not use full text search mentioned that they would have used it. Participants liked the graphic design of the website and consider it reliable. For example 10 out of 10 points out that nicely crafted e-shop website effects reliability. Other graphic and orientation elements that participants highlighted were shipping price, personal pick up, an assortment of goods, the reliability of the website, professionalism and the website design. 9 out of 10 point out that they take into account shipping price before purchase. The website design, according to the participants, also influence the purchase decision making because it creates the feeling of trust.

5. Discussion of the results

Considering the online consumer response, we may talk about purely psychological and individual points of view. According to the results, the large number of filters may cause the confusion and the information overload, which harms the user experience and purchase decision making. Previous research shows that the simple interface was preferred over the complex in the meaning of interface usability utility (Warden, et al, 2006). Respondents in our research explained the confusion were caused by displaying a larger number of filters, and the first products were seen after longer scrolling. As indicated in the Findings, the participants preferred filters that helped them reach the inner goal. Wei (2016) explains that as the amount of attributes on the website is narrowed down, consumers could find the 'best' option easier and more quickly.

However, some filters in our research appear to be crucial, such as the type of wine. Survey of the Wine Fund shows that 60 percent of Czech consumers prefer wine produced in their own country (Press release for Wine Fund, 2017). In addition, consumers choose the familiar wine which is produced in the Czech Republic. Consumer behavior study for wine says that regions or grape varieties with larger market shares have been more trustful (Lockshin & Corsi, 2012). Based on the 2017 survey (Wineofczechrepublic, 2017) Czechs consumers prefer the wine which they know and have already tasted. Because of that, people take into account the attribute of wine and in the most cases, the origin of wine they choose is the Czech Republic.

Many articles concerning wine choice behavior research items such as taste, alcohol content, type, age, price, brand, package and region of origin (Corduas, et al, 2012). At last, culture, lifestyle and traditions influence consumption behavior across countries and, the relevance that consumers give to the various wine characteristics (Goodman et al., 2007, 2008; Goodman, 2009).

In the case of product descriptions, the preferences between longer and shorter descriptions did not vary much in our research. The arguments for longer description were simplicity to make choice and less need for clogging. On the other hand, respondents preferred shorter descriptions. They explained that they do not read a lot of text. Easiness of navigation and choice is important for the online users in reducing their cognitive load.

In the study written by Quiroga (2004) it was concluded that the cognitive load incresed with the amount of information. Information filtering is substantial in reducing cognitive load (Quiroga, 2004). As people are used to changing their approaches to decision making due to different environment and situations, they will always try to reduce the effort related to the cognition of decision making (Wei, 2016).

As one of the important results, we highlighted the fact that participants did not read the whole descriptions. They preferred information that they considered useful, which is also related to fulfilling the goal. If we observe our sample, all of them belong to the Generation Y cohorts, which are also recognized in the literature as Millenials. In terms of content perception, some statistics show that Generation Y differs from older generations in terms of reading habits; they do read, but it is different (Millenial Marketing, 2018). In other words, they are reading for information and they are information hunters. Barber and colleagues (2006) concluded that descriptions such as ''floral'' or ''essence of peaches and dried apricots" did not add a real value for the customer who is not an expert and may be uncertain about the wine choice. Simple and basic information such as how sweet or dry is the wine, what the grape is and what foods will go well with the wine are preferred by customers (Barber et al, 2006).

The purchase decision making was influenced by engaging descriptions, which participants related to impressions, top products and similar products. Similar and related products should help people find the best option which fit their taste. Other decision elements were price and design. Some studies indicate that there is a relation between price and quality, especially in the consumers' minds. For instance, a famous study carried out by Plassman et al. in 2008 concluded that the value of a product (price of a wine bottle) had an impact on the perception regarding the quality of the product (Plassmann et al., 2008). The results of some studies confirmed that an important role in wine's promotion and presentation for consumption was overall packaging (Bloch et al. 2003; Chaney, 2000; Jennings and Wood, 1994). These studies indicate that the design can play a decisive role in consumption process.

Finally, the overall orientation on the website and the speed of the search was important for enhancing the user experience. Even those participants who did not have the access to full text search, claimed that they

would have used it. We therefore concluded that allowing the full text search is beneficial for the wine e-shop and improves the experience on the website. Some studies state that visitors are highly motivated to use site search because they exactly know what are they looking for (Moth, 2013).

One of the significant aspects of the present research is the trust that consumers need to have towards the brand, products, manufacturer and the website. Panula (2017) states the concept of trust is not so simple because it can be an individual phenomenon. The preferences based on which the trust is built can vary. There is probably no simple solution to generate customer trust in an online environment and one method is not enough. Combinations of efforts and specific steps should be beneficial (Panula, 2017). Online wine retailers should aim for a customer-oriented interface through the internet. Wine is an intensively branded, differentiated and internationally traded experience product (Brewer, 2005).

6. Conclusions and recommendations

Even our research advocates that there are inevitable motivators for consumers to shop online. According to Wei (2016), customers can shop comfortably in their familiar environment, have time to find attractive alternatives and browse. The interaction between digital environment and consumers is well explained by the online consumer response model. As the model suggests, there are different phases of this process and they may be different for different online users (Hanekom et al, 2007). Perceived exposure or the perception level in online consumer response is related to the process by which participants of the study received the information through their senses (in this case- vision) and assigned meanings to it. The information aggregation achieves further abstraction such as object recognition, semantic interpretation, and the combination of multiple objects (Barnett & Cerf, 2017). The authors explored these by thinking-outloud experiments and simultaneous questioning.

The results from the present study point out some significant elements of the wine e-shop. One of the significant elements is composition and number of filters which influences user experience. The results of the present study show that a large number of filters do not allow people to see the first products. Next important element of the website is product description which influences the purchase decision. There is no significant difference between the long and short type of descriptions. The results indicated that participants mostly read general impression and taste of the wine. They were also interested in information about the size of the bottle and the origin of grapes. The third important element of the wine e-shop is overall orientation and graphic design. The study also turned out the importance of the full text search, especially in cases when people search for a specific product. This part includes communicated information such as shipping price, personal pick up, an assortment of goods, the reliability of the website, professionalism and reliable design of the website. All these elements create the trust that consumers need to have for final purchase. The above mentioned factors influence user experience and purchase decision making.

According to the results of this study, we made several suggestions for the e-shop we did research with. We predict that the wine e-shop should adjust the website in order to enhance and affect user experience and induce purchase. Those adjustments are as follows:

- Narrow down the selection of filters to avoid confusion and information overload;
- Create compelling and informative product descriptions;
- Have simple but creative website interface;
- Present clear information about shipping price and personal pick up;
- Product descriptions should include the suggestion for wine and food combination.

6.1 Limitation of the study

The study is not without limitations. First of all, the sampling method was through personal and professional networks. The participants were from the Czech Republic and Slovakia. The sample is a representative of the target audience of the observed wine seller and e-commerce website. Another downside related to the sample was the limited number of participants. Even though, the experiment that includes qualitative data gathering does not require large samples, if the experiment included more participants, the results may have been more representative. Therefore, the future studies that may tackle the same question may think about enlarging the sample size. The experiments and interviews were done in the Czech and Slovak language, due to the easiness of communication. Therefore, the limitation of this research may be that some meanings were lost in

translation. However, we do trust that the crucial conclusions are valid in the present research. Finally, the limitation may be the experiment itself, because the participants were not in their natural environment for their online purchases. This could have caused some bias. Nevertheless, we do believe in participants' honesty in their answers and opinions.

Despite the aforementioned limitations, the results of the present research have important value for both theory and practice. From the theoretical perspective, the results may serve as a starting point to more thorough and larger research in the cases of wine e-shops and consumer preferences. On the other hand, it brings an additional understanding of online consumer response to a particular case study of an e-shop. The overall contribution of the study is principally bringing additional knowledge for e-commerce sector, especially for wine e-shops. In the practice, this research should help e-shops owners to create and modify their e-shops in order to enhance user experience and induce optimal purchase decision making and finalizing purchase. The results show significant elements which play an important role in the purchase process.

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References

Barber, N., Almanz, B. A., and Donovan, J. R. (2006) "*Motivational factors of gender, income and age on selecting a bottle of wine*", International Journal of Wine Marketing, Vol. 18, No. 3, pp. 218–232. http://dx.doi.org/10.1108/09547540610704774

Barnett, S. B. and Cerf, M. (2017) "*A ticket for your thoughts: Method for predicting content recall and sales using neural similarity of moviegoers*", Journal of Consumer Research, Vol. 44, No. 1, pp. 160–181. doi: 10.1093/jcr/ucw083.

Bloch, P., Brunel, F. and Arnold, T. (2003) "*Individual differences in the centrality of visual product aesthetics: concept and measurement*", Journal of Consumer Research, Vol. 29, No. 1, pp. 551-65.

Bruwer, J. (2005) *The Australian Online Wine-buying Consumer: Motivational and Behavioural Perspectives*, Journal of Wine Research, Vol. 16, No. 3, pp.193-211, doi: 10.1080/09571260600556666.

Ceska-Ecommerce (2018) "The size of the e-commerce market", Ceska Ecommerce [online], https://www.ceska-ecommerce.cz/

Constantinides, E. (2002) "*The 4S web-marketing mix model*", Electronic Commerce Research and Applications, Vol. 1, No. 1, pp. 57-76.

Corduas, M., Cinquanta, L., Ievoli, C. (2012) "*The importance of wine attributes for purchase decisions: A study of Italian consumers' perception*", Food Quality and Preference, Journals Elsevier, Vol. 28, No. 2, pp. 407-418.

Goodman, S (2009) "*An international comparison of retail consumer wine choice*", Journal of Wine Business Research, Vo. 21, No. 1, pp. 41-49.

Goodman, S. L. Lockshin, L., Cohen, E. (2007) "*Influencers of consumer choice in a retail setting more international comparisons*", Wine Industry Journal, Vol. 22, pp. 40-46.

Goodman, S., Lockshin, L., Cohen, E. (2008)"*Influencers of consumer choice in the on-premise environment: More international comparisons*", The Australian & New Zealand Grape-grower and Wine-maker Journal, pp. 76-78.

Hartson, R., Pyla, P. S. (2012) "*The UX Book: Process and Guidelines for Ensuring a Quality User Experience*", Boston: Elsevier, c2012. ISBN: 978-0-12-385241-0.

Hanekom, J., Barker, R. and Angelopulo, G. (2007) "*A theoretical framework for the online consumer response process*", Communicatio - South African Journal for Communication Theory and Research, Vol. 33, No. 2, pp. 117–139. doi: 10.1080/02500160701685441.

Chaney, I. M. (2000) "*External search effort for wine*", International Journal of Wine Marketing, Vol. 12 No. 2, pp. 5-21.

Jennings, D. and Wood, C. (1994) "*Wine: achieving competitive advantage through design*", International Journal of Wine Marketing, Vol. 6, No. 1, pp. 49-62.

Jin, J., Zhang, W. and Chen, M. (2017) "*How consumers are affected by product descriptions in online shopping: Event-related potentials evidence of the attribute framing effect*", Neuroscience Research, Vol. 125, pp. 21-28, doi: http://dx.doi.org/10.1016/j.neures.2017.07.006.

Lin, H.H., Yang, S.F. (2014) "*An eye movement study of attribute framing in online shopping*", Journal of Marketing Analytics, Vol. 2, No. 2, pp. 72–80.

Lockshin, L. (2000) "*Wine marketing in the new millennium*", Australian Wine Industry Journal, Vol. 15, pp. 89-90.

Locksin, L., Corsi, A. M. (2012) "*Consumer behaviour for wine 2.0: A review since 2003 and future directions*", Wine Economics and Policy, Vol. 1, No. 1, pp. 2-23.

Merrilees, B. and Fry, M.-L. (2003) "*E-trust: the influence of perceived interactivity on e-retailing users*", Marketing Intelligence and Planning, Vol. 21, pp. 123-128.

Moth, D. (2013) "*14 ways to improve the UX of on-site search results*", [online], https://econsultancy.com/blog/63781-14-ways-to- improve-the- ux-of- on-site- search-results/

Millenial Marketing (2018) "*Do Millennials Read? Yes, But They Read Differently*", [online], http://www.millennialmarketing.com/2010/05/do-millennials-read-yes-but-they-read-differently/

Panula, I. (2017) "*Building trust in e-commerce*", School of Business and Culture Degree Programme in International Business. [online], https://www.theseus.fi/bitstream/handle/10024/133517/Thesis_Iiro_Panula3.pdf?sequence=1&isAllowed=y

Quiroga, L. M., Crosby, M. E., Iding, M. K. (2004) "*Reducing Cognitive Load*", University of Hawaii at Manoa, Hawaii International Conference on System Sciences, IEEE, DOI: 10.1109/HICSS.2004.1265328, ISBN: 0-7695-2056-1.

Richardson, O. (2002) "*Utilisation of the World Wide Web by wine producers*", International Journal of Wine Marketing, Vol. 14, No. 3, pp. 65-79.

Someren, M. W. van., Barnard, Y. F., Sandberg, J. A.C. (1994) "*THE THINK ALOUD METHOD: Practical guide to modelling cognitive processes*", Academic Press, London, ISBN 0-12-714270-3.

STATISTA, The Statistics Portal (2018) "Number of internet users worldwide from 2005 to 2017", [online], https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/

User Testing (2017) "*The UX Research Methodology Guidebook*", [online], https://info.usertesting.com/UX-Research-Methodology-Guidebook.html

Warden, C. A., Wu, Wann-Yih, Tsai, D. (2006) "*Online Shopping Interface Components: Relative Importance as Peripheral and Central Cues*", CyberPsychology & Behavior, Vol. 9, No. 3, pp. 285-296.

Wei, L. (2016) "*Decision-making Behaviours toward Online Shopping*", International Journal of Marketing Studies, Vol. 8, No. 3, pp.111-121, doi:10.5539/ijms.v8n3p111.

Wineofczechrepublic (2017) "*Press release for Wine Fund*", [online],

https://www.wineofczechrepublic.cz/akce-a- novinky/aktuality/pro-tisk/6895- pruzkum-vino- pijeme- casteji-a- vice-za-nej-utracime.html

Work in Progress Papers

Identity-Transition into Entrepreneurship: A Two-Phase Theory to Explain the Propensity-Capability Paradox

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Abstract: In view of the call by the European-Commission (2013) for more entrepreneurs and for more high-growth enterprises, this project investigates the development of entrepreneurial propensity among individuals who possess strong entrepreneurial capabilities. Scholars have modelled the development of entrepreneurial behavior by adopting the theory of planned behavior and later by applying identity transition theory (Ibarra, 2005) to entrepreneurial career transitions. More recently, Hoang and Gimeno (2010) added the construct of role-identity-complexity to the identity transition model in order to explain the likelihood of a successful transition into the entrepreneurial founder role. There is, however, a need for theory to enlighten why objective entrepreneurial capability has not shown up as a favorable explanatory variable when modelling entrepreneurial intention and career transition behavior (Bayon, Vaillant, & Lafuente, 2015). This article and this poster present a model to respond to this need and to extend the theory on developing entrepreneurial behavior by showing how objective entrepreneurial capabilities can intervene in paradoxical ways. More specifically, we broaden the identity theory for entrepreneurial career transitions by distinguishing two phases. The point where entrepreneurial intention is established separates these two phases. We argue that constructs like self-complexity, the complexity of the envisaged founder-role and objective entrepreneurial capability have opposite effects in both phases. If these factors have an inhibiting effect on generating intention and have a favorable effect on turning intention into actual behavior, then this explains why individuals who are expected to have the necessary capacities to do well in the second phase can struggle to develop entrepreneurial intention in the first place. We conclude by suggesting further quantitative and empirical research and possible practical implications.

Keywords: Entrepreneurial intention, Entrepreneurial capabilities, Identity transition, Self-complexity

1. Introduction

Policy makers envisage encouraging entrepreneurship (European-Commission, 2013) and consensus is growing that actions promoting entrepreneurship should aim beyond the mere creation of more entrepreneurs (Blanchflower, 2004; Burke, FitzRoy, & Nolan, 2000) and that these actions should focus on ambitious start-ups with high growth potential (Shane, 2009). In support of this call, scholars continue to address the following questions: firstly, what determines whether an individual decides to step into active entrepreneurship and secondly, what are the characteristics that make an individual more competent to successfully fulfil an ambitious entrepreneurial role? Dams and Segers (2018) refer to the answers to these two questions as the antecedents of entrepreneurial propensity and entrepreneurial capability. They review the most researched antecedents of these two constructs and conclude that the majority of antecedents can have opposite effects on entrepreneurial capability and propensity (Figure 1).For three of these factors: need for achievement (Begley & Boyd, 1988; Jain, 2011; David C. McClelland, 1961); innovativeness (Frese & Gielnik, 2014; Jain, 2011); and creativity (Mcmullan & Kenworthy, 2016), no references to opposite effects on entrepreneurial propensity and entrepreneurial capability were found. For the other nine most researched factors, earlier research reveals opposite effects on entrepreneurial propensity and capability. This study of the literature does not provide a quantitative proof of significantly negative correlation coefficients. However, if factors like the need for independence (Caliendo & Kritikos, 2011; Hessels, Van Gelderen, & Thurik, 2008; Mcmullan & Kenworthy, 2016; Van Gelderen & Jansen, 2006), self-efficacy (Bayon et al., 2015; Chen, Greene, & Crick, 1998), optimism (Hmieleski & Baron, 2009) overconfidence (Koellinger, Minniti, & Schade, 2007), risk propensity (Begley & Boyd, 1988; Hao, Seibert, & Lumpkin, 2009), the need for power (De Vries, 1977; David C McClelland, 1975), education (M. Van Praag, Witteloostuijn, & Van der Sluis, 2009), experience (Chandler & Jansen, 1992; Zouhar & Lukeš, 2013), teamwork (Ensley, Hmieleski, & Pearce, 2006; Fadul Ramirez, 2016), financial utility (Hartog, Van Praag, & Van Der Sluis, 2010; C. M. Van Praag & Versloot, 2007), and flexibility (Bingham, Furr, & Eisenhardt, 2014) all can have opposite influences on entrepreneurial propensity and capability, then it seems reasonable to conclude that entrepreneurial propensity and entrepreneurial capability do not go together automatically. On the contrary, the opposite is expected: individuals who engage into entrepreneurial activity might possess antecedents that work against optimal entrepreneurial capabilities,

whereas individuals who score high on the entrepreneurial capability dimension probably possess antecedents that counteract their intention to choose for active entrepreneurship. Therefore it is presumed that the passivity of the capable non-actor is not an exception, and that this passivity, which Ramoglou (2011) says should be respected, is not just a choice, it is upheld by the mechanisms that govern entrepreneurial propensity and capability

This is in line with the conclusion of Bayon et al. (2015), that objective entrepreneurial capability has not shown up as a favorable explanatory variable when modelling entrepreneurial intention and behavior.

Figure 1: Whether or not antecedents of entrepreneurial propensity and capability reveal opposite effects

If, paradoxically, objective entrepreneurial capability does not automatically lead to active entrepreneurial behavior, then this raises the question: "Why do people who are capable of founding and running a business of their own not actually turn into active entrepreneurs?" (Figure 2).

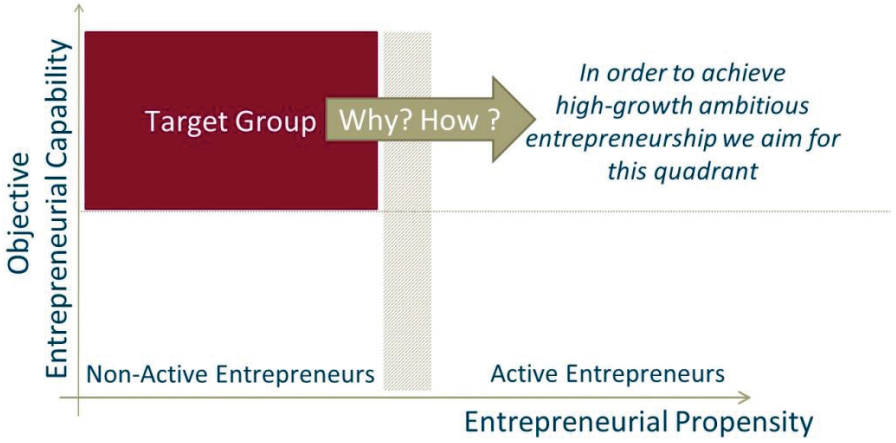

Figure 2: The research question, the target group in the entrepreneurial propensity capability plane

In this paper, we report on the search for theory that can explain why objective entrepreneurial capability does not automatically lead to active entrepreneurial behavior. First, we further analyzed the available theory on the development of entrepreneurial behavior. However, we did not find any theory to elucidate this paradoxical effect. We studied the identity-transition theory applied to the transition into entrepreneurship and we propose how the introduction of the construct of identity-complexity, can produce opposite effects. This offers a model to explain the entrepreneurial propensity-capability paradox.

2. Literature on identity transition and voluntary career change

With respect to entrepreneurial propensity, the theory of planned behavior (Ajzen, 1991) and the entrepreneurial event model (Shapero & Sokol, 1982) have been the two most extensively tested competing theories used to explain entrepreneurial intent (Schlaegel & Koenig, 2014). More recently, Ibarra (2005) has

applied the theory on possible and future selves (Markus & Nurius, 1986) and has described a process of identity transition in relation to a voluntary career change. In Figure 3 we sketch a graphical summary of the process as described by Ibarra (2005). The boxes in this sketch do not necessarily represent different variables they can also represent different states of the same variable, arrows are symbolizing transitions between these different states. The upper part shows the behavioral plane, indicating that a role change is brought into effect after deploying actual role changing behavior. This role change behavior goes together with the presence of an activated new future self in the lower part of the graph. In the lower section we represent how Ibarra (2005) expounds the underlying effects in the cognitive plane. While active in the current role an individual can develop multiple alternative selves that do not immediately culminate in a state of intention-to-change. A liminal state can emerge wherein various, divergent, possible selves co-exist. This liminal state exists until a salient future work-self prevails and becomes activated as part of the self-concept. Not the liminal state but an activated state explains proactive role transition behavior (Strauss, Griffin, & Parker, 2012) and we associate this activated state of the future work-self with the state where the intention to change is established.

In the last decade we can find research that applies identity transition theory to career transitions into entrepreneurship (Figure 4a).

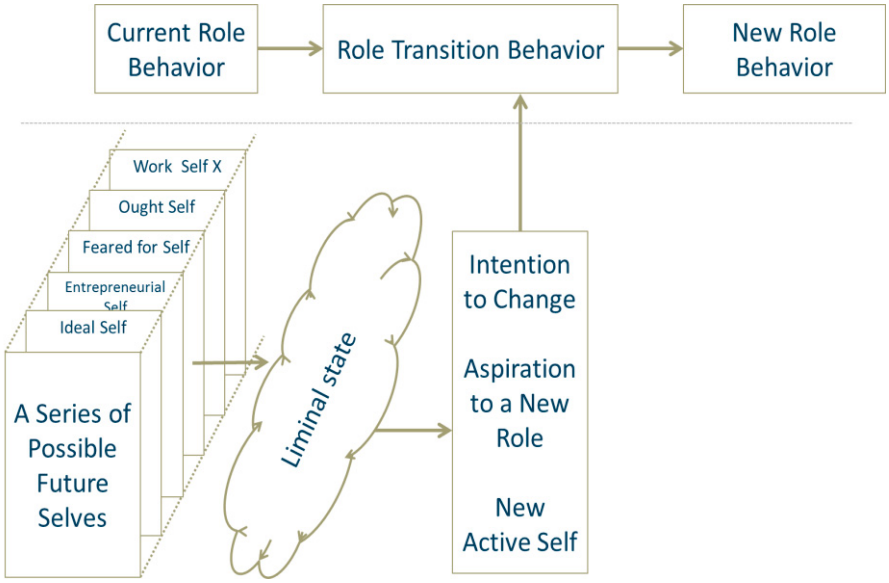

Figure 3: Graphical summary based on the description by Ibarra (2005) of the identity transition process in relation to a voluntary career change.

In view of our research question, we searched for work that applies identity transition theory to career transitions into entrepreneurship. Although a limited amount of work was found with respect to the identity transition into entrepreneurship, we found two studies that introduce constructs which contribute to explain the transitions shown in Figure 3. In Figure 4a the effect on these transitions are depicted with bold arrows [a], [b] and [c]. Farmer, Yao, and Kung-Mcintyre (2011) show empirically that congruence between the perception of the founder role and the self-perception predicts [a] the strength of the aspiration to the entrepreneurial identity. Hoang and Gimeno (2010) address the probability of whether actual role transition behavior occurs given that the identity transition into the founder role has occurred and that entrepreneurial intention is established. They put forward that founder-role-centrality [b] and founder-role-complexity [c] have a favorable effect on the likelihood of developing effective founding behavior. They define that founder-role-centrality describes the individual's strength of attachment to the founder role and that founder-role-complexity captures diversity and richness in individuals' definition of the founder role. Separate from the envisaged founder role, identity-complexity builds on self-complexity, defined as the degree in which the identity is represented by a greater number of cognitive self-aspects and the degree in which a greater distinction among self-aspects is maintained (Linville, 1987).

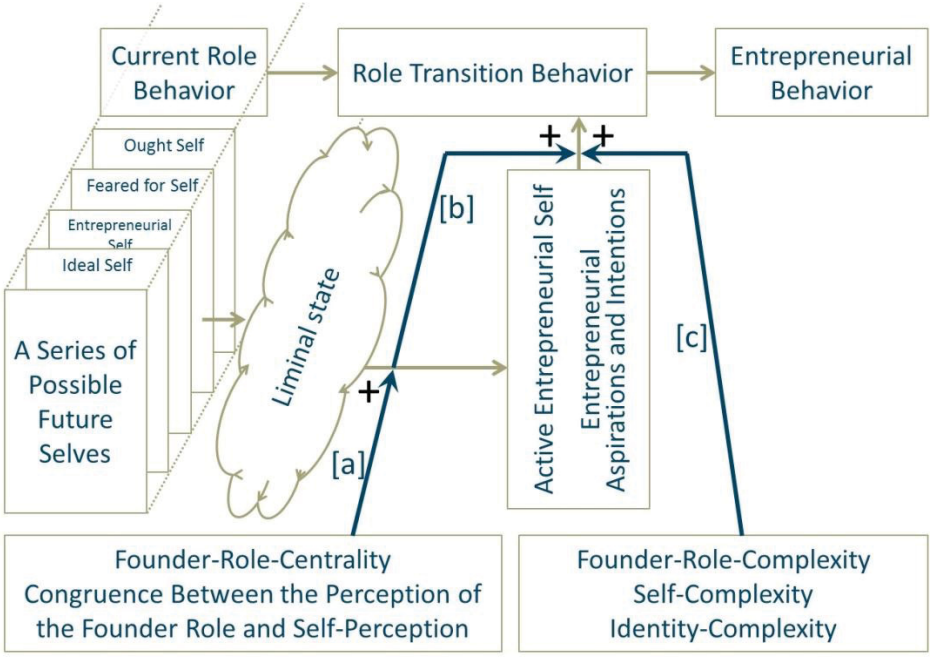

Figure 4a: Graphical representation based on the description by Hoang and Gimeno (2010) of the effect of Identity-Centrality and Identity-Complexity on identity transitions related to career transitions (Ibarra, 2005).

3. Propositions

In order to explain the paradoxical effects between entrepreneurial propensity and capability we suggest expanding the described identity transition theory on entrepreneurship (Figure 4a) using the following propositions. These propositions assign a more crucial role to identity-complexity in the identity transition process. The bold arrows in Figure 4b show how the propositions contribute to explaining opposite influences on the role and identity transitions.

3.1 Proposition 1:

Objective entrepreneurial capability correlates with high identity complexity [α].

3.2 Proposition 2:

Before and after entrepreneurial intention is established [c] and [β], Founder-role-complexity and identity-complexity generate opposite effects on the transitions and on the development of entrepreneurial role transition behavior.

Hoang and Gimeno (2010) state that these complexities of the identity and the future selves of an individual are favorable to turning intention into entrepreneurial behavior as a multifaceted identity is more robust when dealing with negative inputs and setbacks. However, we propose that, before reaching entrepreneurial intention, identity-complexity works against making a match between a complex founder role and a desired future self as: 1) more facets have to match, 2) the match is evaluated at multiple time points in the future and 3) more career alternatives are available. This proposition is supported by the empirical research of Halberstadt, Niedenthal, and Setterlund (1996) on the negative effects of identity complexity in relation to the ease of decision making.

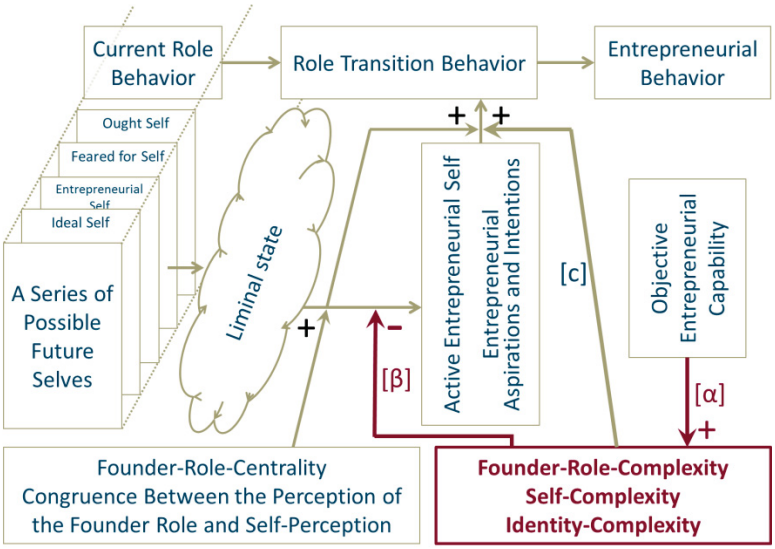

Figure 4b: Graphical representation how the proposed effects of Founder-Role-Complexity and Identity-Complexity can explain opposite influences on the role and identity transitions.

4. Conclusion

This research project proposes a model to broaden the identity theory for entrepreneurial career transitions by distinguishing two phases. The point where entrepreneurial intention is established separates these two phases. We argue that constructs like self-complexity, the complexity of the envisaged founder-role and objective entrepreneurial capability have opposite effects in both phases. If these factors have an inhibiting effect on generating intention and have a favorable effect on turning the intention into actual behavior, then this explains why individuals who are expected to have the necessary capacities to do well in the second phase can struggle to develop entrepreneurial intention in the first place.

5. Limitations, discussion and further research

We have put forward a theoretical model that can explain the paradoxical effect that seems to exist between entrepreneurial propensity and capability. Nevertheless, empirical verification is needed. Therefore, we call for empirical research to measure entrepreneurial capability, entrepreneurial propensity, founder-role-centrality, complexity of the envisaged founder role and identity-complexity in order to validate whether the proposed effects between the constructs can be established. Before setting up quantitative work, the model has to be completed with all relevant known variables that can influence the variables and relations under study. In addition, the following variables need to be operationalized: self–complexity, complexity of the founder role, objective entrepreneurial capability and how close an individual is to a possible identity transition. Self-complexity can be measured with the H statistic (Scott, 1962), however, it is to be analysed whether these propositions do not need an operationalization of self-complexity which is more directed to this specific application or whether the generic operationalization of Scott (1962) can be used. For objective entrepreneurial capability we propose to use the 'Entrespiegel 2.0' survey (Kyndt & Baert, 2015). In order to assess how close an individual is to a career transition we suggest analyzing the work on "the degree of decidedness" (Amir & Gati, 2006) and the "Career Decision-Making Difficulties Questionnaire" by Gati, Osipow, Krausz, and Saka (2000). Finally, we call to explore this empirical verification in samples that cover the entire range of the population in terms of entrepreneurial capability and entrepreneurial propensity.

Furthermore, understanding why the desired entrepreneurial capabilities do not automatically convert into actual entrepreneurial behavior can trigger the development of new strategies for policy makers who want to promote ambitious entrepreneurship among individuals who possess strong entrepreneurial capabilities. For the individual, these modified theoretical insights into paradoxical effects can generate new approaches for career development and career coaching practices.

References

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Amir, T., & Gati, I. (2006). Facets of career decision-making difficulties. British Journal of Guidance & Counselling, 34(4), 483-503.
Bayon, M. C., Vaillant, Y., & Lafuente, E. (2015). Initiating nascent entrepreneurial activities: The relative role of perceived and actual entrepreneurial ability. International Journal of Entrepreneurial Behavior & Research, 21(1), 27-49.
Begley, T. M., & Boyd, D. P. (1988). Psychological characteristics associated with performence in entrepreneurial firms and smaller businesses. Journal of Business Venturing, 2(1), 79-93.
Bingham, C. B., Furr, N. R., & Eisenhardt, K. M. (2014). The opportunity paradox. MIT Sloan Management Review, 56(1), 29.
Blanchflower, D. G. (2004). Self-Employment: More may not be better. National Bureau of Economic Research Working Paper Series, No. 10286. doi: 10.3386/w10286
Burke, A. E., FitzRoy, F. R., & Nolan, M. A. (2000). When Less is More: Distinguishing Between Entrepreneurial Choice and Performance. Oxford Bulletin of Economics and Statistics, 62(5), 565-587. doi: 10.1111/1468-0084.00190
Caliendo, M., & Kritikos, A. (2011). Searching for the entrepreneurial personality: New evidence and avenues for further research.
Chandler, G. N., & Jansen, E. (1992). The founder's self-assessed competence and venture performance. Journal of Business Venturing, 7(3), 223-236.
Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? Journal of Business Venturing, 13(4), 295-316.
Dams, F., & Segers, J. (2018). Entrepreneurial Capability Versus Entrepreneurial Propensity: Why to Take the Non-Actors Even More Seriously? Paper presented at the Proceedings of The 13th European Conference on Innovation and Entrepreneurship: 20-21 September, 2018, Aveiro, Portugal.
De Vries, M. F. R. K. (1977). THE ENTREPRENEURIAL PERSONALITY: A PERSON AT THE CROSSROADS. Journal of Management Studies, 14(1), 34-57. doi: 10.1111/j.1467-6486.1977.tb00616.x
Ensley, M. D., Hmieleski, K. M., & Pearce, C. L. (2006). The importance of vertical and shared leadership within new venture top management teams: Implications for the performance of startups. The leadership quarterly, 17(3), 217-231.
European-Commission. (2013). Entrepreneurship 2020 Action Plan: Reigniting the Entrepreneurial Spirit in Europe: European Commission Brussels.
Fadul Ramirez, E. M. (2016). Team Entrepreneurship: How do Entrepreneurial Founding Teams Form? An Exploration of the Role of Intuition in Entrepreneurial Founding Team Formation.
Farmer, S. M., Yao, X., & Kung-Mcintyre, K. (2011). The behavioral impact of entrepreneur identity aspiration and prior entrepreneurial experience. Entrepreneurship Theory and Practice, 35(2), 245-273.
Frese, M., & Gielnik, M. M. (2014). The Psychology of Entrepreneurship. Annual Review of Organizational Psychology and Organizational Behavior, 1(1), 413-438. doi: 10.1146/annurev-orgpsych-031413-091326
Gati, I., Osipow, S. H., Krausz, M., & Saka, N. (2000). Validity of the career decision-making difficulties questionnaire: Counselee versus career counselor perceptions. Journal of Vocational Behavior, 56(1), 99-113.
Halberstadt, J. B., Niedenthal, P. M., & Setterlund, M. B. (1996). Cognitive organization of different tenses of the self mediates affect and decision making. Striving and feeling: Interactions among goals, affect, and self-regulation, 123-150.
Hao, Z., Seibert, S. E., & Lumpkin, G. T. (2009). The Relationship of Personality to Entrepreneurial Intentions and Performance: A Meta-Analytic Review. Journal of Management, 36(2), 381-404. doi: 10.1177/0149206309335187
Hartog, J., Van Praag, M., & Van Der Sluis, J. (2010). If you are so smart, why aren't you an entrepreneur? Returns to cognitive and social ability: Entrepreneurs versus employees. Journal of Economics & Management Strategy, 19(4), 947-989.
Hessels, J., Van Gelderen, M., & Thurik, R. (2008). Entrepreneurial aspirations, motivations, and their drivers. Small Business Economics, 31(3), 323-339.
Hmieleski, K. M., & Baron, R. A. (2009). Entrepreneurs' optimism and new venture performance: A social cognitive perspective. Academy of Management Journal, 52(3), 473-488.
Hoang, H., & Gimeno, J. (2010). Becoming a founder: How founder role identity affects entrepreneurial transitions and persistence in founding. Journal of Business Venturing, 25(1), 41-53.
Ibarra, H. (2005). Identity transitions: Possible selves, liminality and the dynamics of career change Working paper no. 31/OB, INSEAD.
Jain, R. K. (2011). Entrepreneurial Competencies: A Meta-analysis and Comprehensive Conceptualization for Future Research. Vision: The Journal of Business Perspective, 15(2), 127-152. doi: 10.1177/097226291101500205
Koellinger, P., Minniti, M., & Schade, C. (2007). "I think I can, I think I can": Overconfidence and entrepreneurial behavior. Journal of Economic Psychology, 28(4), 502-527. doi: 10.1016/j.joep.2006.11.002
Kyndt, E., & Baert, H. (2015). Entrepreneurial competencies: Assessment and predictive value for entrepreneurship. Journal of Vocational Behavior, 90, 13-25.
Linville, P. W. (1987). Self-complexity as a cognitive buffer against stress-related illness and depression. Journal of personality and social psychology, 52(4), 663.
Markus, H., & Nurius, P. (1986). Possible selves. American psychologist, 41(9), 954.
McClelland, D. C. (1961). The achieving society: Princeton, N.J. : Van Nostrand, [1961].
McClelland, D. C. (1975). Power: The inner experience: Irvington.
Mcmullan, R. W. E., & Kenworthy, T. P. (2016). Creativity and entrepreneurial performance: Springer.

Ramoglou, S. (2011). Who is a 'non-entrepreneur'?: Taking the 'others' of entrepreneurship seriously. International Small Business Journal, 31(4), 432-453. doi: 10.1177/0266242611425838

Schlaegel, C., & Koenig, M. (2014). Determinants of Entrepreneurial Intent: A Meta-Analytic Test and Integration of Competing Models. Entrepreneurship Theory and Practice, 38(2), 291-332.

Scott, W. A. (1962). Cognitive complexity and cognitive flexibility. Sociometry, 405-414.

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. Small Business Economics, 33(2), 141-149. doi: 10.1007/s11187-009-9215-5

Shapero, A., & Sokol, L. (1982). The social dimensions of entrepreneurship Encyclopedia of Entrepreneurship (pp. 72-90). Englewood Cliffs, N.J. 07632: Prentice-Hall, Inc.

Strauss, K., Griffin, M. A., & Parker, S. K. (2012). Future work selves: How salient hoped-for identities motivate proactive career behaviors. Journal of applied psychology, 97(3), 580.

Van Gelderen, M., & Jansen, P. (2006). Autonomy as a start-up motive. Journal of Small Business and Enterprise Development, 13(1), 23-32.

Van Praag, C. M., & Versloot, P. H. (2007). What is the value of entrepreneurship? A review of recent research. Small Business Economics, 29(4), 351-382.

Van Praag, M., Witteloostuijn, A. v., & Van der Sluis, J. (2009). Returns for entrepreneurs versus employees: The effect of education and personal control on the relative performance of entrepreneurs vis-à-vis wage employees.

Zouhar, J., & Lukeš, M. (2013). No Experience? No Problem–It's All about Yourself: Factors Influencing Nascent Entrepreneurship Outcomes. Ekonomický časopis(09), 934-950.

Using Serious Games to Guide Commercial Success from the Fuzzy Front-End

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Abstract: Despite the vast amount of research carried out on new product development (NPD) tools and techniques, studies have shown that there is a huge gap between their academic prevalence and their industry adoption. While many industrialists admit that the tools developed in academia would be beneficial to their NPD efforts, they believe that the tools are simply not worth the effort required to use them. One way to address this issue is by improving the value offered by these tools, and this research aims to achieve this by implementing the innovation game 'Buy a Feature.' Originally created for portfolio prioritization and adapted for software development projects, this 'serious game' encourages end-users to collaboratively buy and bid on potential features of a product with play money. By providing users with a total budget that is insufficient to buy all the features, it forces them to think about which features are most important to them and to discuss their reasoning behind each choice. This provides product development (PD) teams with a better idea of which features to prioritize based on how much customers are likely to spend, and at a very early stage of the process. The researcher believes that by integrating this game with the traditional NPD process, particularly the Kano Model, it can also be useful for teams developing physical products. To test this, a study was carried out with 29 teams of final year NPD students bringing a product from concept through to production specification. It is expected that teams who used the proposed methodology will have a higher confidence in their product's fit-to-market than teams who did not use it. Indeed, the study has already shown that many teams' assumptions about which features customers cared most about were incorrect. It is also evident that the game will have to be modified to include multiple 'tiers' of bidding for features categorised as 'one-dimensional' in the Kano Model, and teams should apply a 'tax' when setting prices for features to cover hidden development costs and approximate estimations made at such an early stage of the process. Overall, results thus far are very promising.

Keywords: new product development, commercial success, innovation game, serious game, buy a feature, Kano model

1. Introduction:

It is vital that companies fully understand their customers' requirements from the fuzzy front-end, as research shows that 70% of the product entire life-cycle cost are determined in the product design stage of the NPD cycle (Zhu, 2009). It is for this exact reason that academics and practitioners have spent decades researching and developing tools to help PD teams improve their probability of success. These tools range from methods of collecting and analysing the voice of the customer (VoC) to techniques like Quality Function Deployment (QFD), designed to help translate customer requirements into technical specifications.

However, research shows that they are not being adopted by industry. Thia et al. (2005) found that two of the biggest factors influencing a firm's adoption of NPD tools are usefulness and user-friendliness. While there is a general consensus among people working in product development that the tools are useful, many believe that they are not useful enough to outweigh the poor user-friendless, particularly the steep learning curves and complexity to manage them. The authors believe there are two ways to encourage a higher rate of adoption of these tools in industry; one is to increase the value of the output offered by using them, and the other is to improve the usability of them.

This research sets out to increase the value offered by using the NPD tools by making it easier for firms to predict and guide a product's success from the fuzzy front-end. It aims to achieve this by integrating the serious game 'Buy a Feature' with traditional tools in the NPD process, allowing firms to prioritize features and make decisions based on how much customers are likely to spend. The research questions of this study, thus, are: 1) Does 'Buy a Feature' add value to the traditional NPD methodology? 2) Does it integrate well with traditional NPD tools and techniques? 3) How could the new methodology be further improved?

2. Background

While techniques like demand forecasting and the Delphi Method can be used to predict market demand, and tools like the Kano Model can aid feature prioritization, they are not very well integrated with one another, i.e. feature prioritization is not based on demand prediction. While firms can prioritize features based on what

customers claim to be most important to them, it does not provide information about demand. Likewise, predicting demand for a product does not provide the PD team with much guidance on which features should be prioritized in order to achieve this demand.

Buy a Feature is a solution at the intersection of these approaches as it allows teams to prioritize features based on how much customers are likely to spend. Developed by Hohmann (2006), it is an innovation game whereby typically 5-8 potential customers/end-users are invited to purchase features of a potential product using 'play' money. The players are only provided with enough money to collectively purchase 40-50% of the features, forcing them to negotiate and pool their money together to bid on and purchase features. PD teams can then prioritize features based on which ones were bought/bid on first and why, and it is reported that the discussions between players when negotiating and justifying their spending can be even more insightful.

Feldmann, Adam and Bauer (2014) have proven the game's use in portfolio prioritization within companies. They found it to be an effective method for assessing ideas and reported high user engagement and enjoyment with the game – critical requirements when bringing end-users into the development process.

Ghanbari, Similä and Markkula (2015) have tested the game's use in software requirements elicitation and found it to be effective for prioritizing customers' requirements based on business value and the cost and effort needed to develop each feature.

3. Proposed new methodology

The author believes that the best way to implement the game in physical NPD is by integrating it with the traditional NPD tools in the fuzzy front-end, particularly the Kano Model and QFD. The Kano Model is a tool used to categorize customer requirements into 'must-be' (have to be included), 'one-dimensional' (the more, the better), 'attractive' (provide satisfaction if present but do not cause dissatisfaction if absent), and 'indifferent' (do not affect satisfaction and so are essentially money sinks) requirements. Meanwhile, QFD is a tool used to translate customer requirements into technical specifications that fulfil them.
The new process, thus, is as follows:

1. Collect and analyse VoC.
2. Use the Kano Model to categorize requirements.
3. Use QFD to generate technical specifications that satisfy the customer requirements.
4. Use these technical specifications to estimate development costs and prices for the various features.
5. Play Buy a Feature with potential customers, *offering only one-dimensional and attractive features*.
6. Enter product design stage with features prioritized based on how much customers are likely to pay.

The key innovation here is in step 5, where only one-dimensional and attractive features are offered as part of the game. This is essential as must-be features simply have to be included in the product regardless, and indifferent features do not add any value. Seeing which one-dimensional and attractive features players bid on (and how quick they are to do so) should help the team to prioritize the features based on maximising profits.

If players are quick to purchase a one-dimensional requirement then it likely needs to be highly implemented, but if it's slow to be bought or bid on, it is likely that the feature only needs to be implemented to a minimum level. Meanwhile, if an attractive feature is quickly bought it is likely that the value perceived by the customer outweighs the cost of implementation for that feature. If the feature is not bought or even bid on, the team should not waste resources implementing it as the Kano Model will have shown that it is not going to cause dissatisfaction if absent.

4. New methodology evaluation

To test this new methodology, a study was carried out with 29 teams of final year students from design, engineering and technology backgrounds as they completed an NPD project. These students were deemed to be suitable participants for the study as they will soon be working on product development within companies and so will be the target audience for many of the NPD tools discussed in this research. The students would normally be required to use tools like VoC, Kano and QFD with potential customers as part of the project, and this time Buy a Feature was made optional. The teams were provided with a document detailing the proposed

new methodology, the potential benefits of Buy a Feature, and instructions for an online version of the game (See Figure 1).

Figure 1: Screen capture of game being played online shows players bidding on potential features.

At the end of the project the students were asked to rate their confidence that their product design satisfied the customers' demands, and their confidence in their prioritization of features, based on their understanding of the customers' wants. It is expected that teams who used Buy a Feature will score higher in both of these areas than those who did not. The teams' reports are also being analysed to observe how they used the tool, how it influenced the direction of their product development, and any comments they had on their experience using it.

5. Results and discussion

While results are still being collected and analysed, some interesting findings have already been noted. All 19 teams that used Buy a Feature found it very useful, with many reporting that they were surprised by which features the players purchased/bid on first. Teams also stated that the discussions which took place between players provided valuable insights and these two aspects combined gave them confidence in prioritizing features based on actual data, rather than assumptions. 10 teams deemed the game unsuitable for their project. Some of the rationales include: having a concept that is too simple, developing a B2B rather than B2C product, and working with end-users who have disabilities.

Some limitations to the game are also apparent at this early stage of results analysis, though these should be seen as good opportunities to develop and adapt the game more in future research, rather than reasons to inhibit it. First, future games would likely benefit from offering 'tiers' of purchasing options for requirements that have been identified as one-dimensional by the Kano Model. Second, when estimating development costs for features and assigning corresponding prices, teams may benefit from implementing a 'tax' or 'wallflower,' as described by Weiss (2011). This is essentially a buffer that helps to cover hidden costs within that feature, as well as the fact that teams will likely under/over-estimate costs at this early stage of the product development.

Finally, it was noted that every player in the study spent all of their budget. It is not realistic that customers will spend all of their money on a product and so future research should endeavour to find a way of discouraging this. Overall, the results so far are very promising.

References:

Feldmann, N., Adam, M.T.P. and Bauer, M., 2014. Using Serious Games for Idea Assessment in Service Innovation. In ECIS.

Ghanbari, H., Similä, J. and Markkula, J., 2015. Utilizing online serious games to facilitate distributed requirements elicitation. Journal of Systems and Software, 109, pp.32-49.

Hohmann, L., 2006. Innovation games: creating breakthrough products through collaborative play. Pearson Education.

Thia, C.W., Chai, K.H., Bauly, J. and Xin, Y., 2005. An exploratory study of the use of quality tools and techniques in product development. The TQM Magazine, 17(5), pp.406-424.

Weiss, M., 2011, August. Pay to play or requirements prioritization in collectives. In Requirements Patterns (RePa), 2011 First International Workshop on (pp. 28-31). IEEE.

Zhu, Y.M., 2009. Cost-benefit of interface management improvement in design-manufacturing chain. Journal of Shanghai Jiaotong University (Science), 14(3), pp.380-384.

Application of SME Marketing Model within Higher Education Entrepreneurial Teams

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Abstract: This work-in-progress paper draws upon the Contextual Marketing (CM) theory (Carson and Gilmore, 2000; Deacon and Harris, 2011) and aims to explore the entrepreneurial marketing skills of student entrepreneurs who work and study within the entrepreneurial teams at Northumbria university in the UK. Little is known about how marketing is learnt and implemented in the entrepreneurial practices by entrepreneurs studying for a business degree. This lack of knowledge is also present in the entrepreneurial team context, which despite the growing attention remains unexplored in relation to the development and application of marketing skills in business venturing by teams. In order to fill this gap, this study adopts the SME marketing model developed by Carson & Gilmore (2000) and looks into whether entrepreneurial students apply the elements of contextual SME marketing namely Standard Textbook Marketing Frameworks, Competency Marketing, Networking Marketing and Innovative Marketing when create and develop new start-ups in teams. The data gathered in the form of observed and recorded workshops reveal the tendency among the entrepreneurial student teams to network extensively in order to expand their social capital for business purposes but cautiously apply other elements of SME marketing in their practices. This suggests that entrepreneurial students could focus more on building entrepreneurial marketing competence through integration of theoretical knowledge and activities that foster innovative and creative skills needed for entrepreneurial venturing. A synthetizing approach to teaching and learning entrepreneurship can bring greater results to both parties within enterprise education with students being better prepared to compete in the job market (Brown, 2017) and enterprise education developers contributing to the economy by supporting the creation of new start-ups and student self-employment (Rae, 2017). This work-in-progress paper expands the theory of CM with the empirical findings derived from the contextual, educational and teampreneurial settings. It will shed light on whether marketing processes exercised within the entrepreneurial teams differ from the processes applied in the usual SME settings.

Keywords: contextual marketing, SME marketing model, entrepreneurship, entrepreneurial marketing, entrepreneurial teams, enterprise education

1. Introduction

Entrepreneurial research agrees that entrepreneurs so as SMEs tend to market small business ventures in less conventional ways than big organisations do (Carson and Gilmore, 2000; Martin, 2009; Miles *et al*., 2015). The entrepreneur shapes the SME's behaviour and thinking, therefore marketing by small firms tends to be more individualistic and less standardised, with limited evidence of traditional marketing being applied (Carson and Gilmore, 2000; Deacon and Harris, 2011). In addition, the context within which SMEs operate (i.e. the life stage of SMEs, the industry norms and the characteristics of SMEs or the entrepreneur), plays a crucial role in determining the marketing style of SMEs. According to Carson and Gilmore (2000), SMEs therefore adopt Contextual Marketing (CM) or SME marketing when market their firms.

CM model will be discussed in the following section of this work-in-progress paper before revealing the methodological design of this study and the application of the model and its practicality in the educational context of novice entrepreneurs who set up and run entrepreneurial firms when studying for the Entrepreneurial Business Management degree in the UK. The paper will conclude with further research plans and potential contribution to the educational, practical and theoretical fields of entrepreneurship.

2. Contextual or SME Marketing framework

CM is defined as a "situation specific" approach to marketing. It is contextualised to the needs of the firm and thus unique and complex at the same time (Deacon and Harris, 2011). "A pivotal issue is that this uniqueness is not uniqueness to the "generic" small firm but a uniqueness to the "individual" small firm..." (Deacon and Harris, 2011, p. 151). It corresponds to the thinking and doing of the entrepreneur/owner of the firm (Groves *et al*., 2008) and his/her belief and understanding of the appropriateness and suitability of the marketing approach for the firm (Carson and Gilmore, 2000; Deacon and Harris, 2011).

While most of entrepreneurial literature agrees that entrepreneurial practices are creative, opportunistic and spontaneous in comparison to large organisations (Hills and Hultman, 2013; Martin, 2009), there is an argument which suggests that successful entrepreneurs adopt a balanced approach to decision-making

(Groves *et al*., 2008). According to Groves *et al*. (2008), entrepreneurs take actions on the basis of both linear (for example, rational, logical and analytical) and non-linear (creative, intuitive, imaginative and emotion-driven) style of thinking. This suggests that marketing in the entrepreneurial context is practiced through a combination of strategic and more innovative and intuitive methods.

Carson and Gilmore (2000) explain their idea of "marketing in context" through the pragmatic model of SME Marketing (Figure 1. below). This model consists of a few components (i.e. Adapting Standard Textbook Marketing Frameworks, Competency Marketing, Network Marketing and Innovative Marketing) and offers practical solutions to the development of entrepreneurial business. It goes in line with the thinking style of the entrepreneur (Groves *et al*., 2008), who is very much concerned about how to do business, therefore the SME Marketing framework is a model of "how to-do-marketing" rather than "what-marketing-is" (Carson and Gilmore, 2000, p. 2).

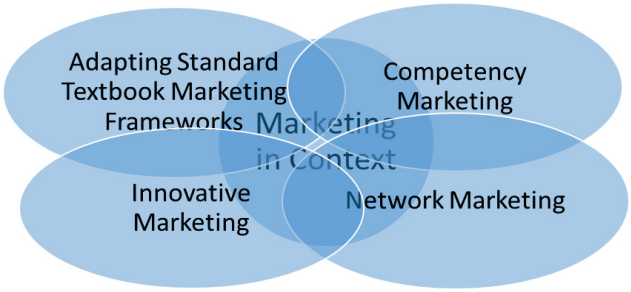

Figure 1: Carson &Gilmore's (2000) SME marketing model.

2.1.1 Adapting Standard Textbook Marketing Frameworks

According to Carson and Gilmore (2000), the implementation of theoretical knowledge of marketing in SME practices is contextual and of practical nature. Concepts are applied if they hold some relevance to the entrepreneur and the business. For example, marketing planning, which usually involves the evaluation of the external business environment, company's internal capabilities, future strategy and tactics (Blythe and Megicks, 2010), in the SME context will consider only those factors that are relevant to the small firm and suit its unique entrepreneurial capabilities (Carson and Gilmore, 2000). Thus, marketing frameworks are applied loosely and intuitively, and the planning process reflects the intrinsic characteristics of the firm or the entrepreneur (Carson and Gilmore, 2000).

2.1.2 Competency Marketing

The second component of CM is Competency Marketing. It refers to the entrepreneur's skills of "doing" marketing. "To do marketing means anything that impacts upon, or which influences marketing, as well as actually performing marketing activity" (Carson and Gilmore, 2000, p. 3). It involves both inherent and acquired skills as well as analytical and creative competency categories (Carson and Gilmore, 2000). Previous research has highlighted the importance of developing competence in marketing entrepreneurial ventures since business progress and success depends on these skills, in particular the use of personal and formal networks for business growth (Hill and McGowan, 1996).

Competency marketing is based on experiential learning. Kolb (1984) defined experiential learning as the process during which knowledge is created through experience. In the entrepreneurial marketing context, it involves experience, knowledge, communication and judgement that are all needed for running the entrepreneurial business (Carson and Gilmore, 2000). Therefore, marketing competency in SMEs can be described as "*learning acquired through experience and developed as an accumulation of knowledge and experience built upon and from communication and judgement*" (Carson and Gilmore, 2000, p. 4). Carson and Gilmore (2000) add that since marketing competency of SMEs develops together and through experiential learning, thus its effectiveness grows with the quality of experiential learning. However, it is important to mention that Kolb's (1984) theory of experiential learning constitutes not only of experience but also involves reflection, thinking and acting (Pittaway *et al*., 2015), therefore, competency in any business area, including marketing, grows if the entrepreneur engages in all fours stages of the experiential learning cycle.

2.1.3 Network Marketing

Network Marketing is defined as a natural and acquired ability of the entrepreneur (Carson and Gilmore, 2000) to build social ties for the benefit of the entrepreneurial business. Through networking, entrepreneurs not only expand their social ties but also strengthen their personal, financial and technological capabilities (Karataş-Özkan and Chell, 2010). Professional and personal networks serve as sources for knowledge and information acquisition without which the understanding of business environment and market opportunities would be limited (Hills and McGowan, 1996). Therefore, the wider the network, the more progress can be achieved and more value can be created for and with business stakeholders.

Entrepreneurial literature argues that networking process in the SME context is personal, informal, disjointed, opportunistic, spontaneous and chaotic (Carson and Gilmore, 2000; Hills and McGowan, 1996), and can be proactive and passive, overt and covert depending on the proximity of the relationship between the entrepreneur and another party involved (Carson and Gilmore, 2000). It also varies in time dimensions as it can be continuous and frequent or seldom and occasional. Given the transiency and volatility of the SME business, it is important to develop a rational approach to relationship building and make social links more diverse, planned and formal (Hills and McGowan, 1996). This helps to improve the quality of network (Hills and McGowan, 1996) and strengthen the entrepreneurial and marketing skills of the entrepreneur.

2.1.4 Innovative Marketing

Innovative Marketing is the fourth component of the CM and is inseparable from the SMEs processes. It is often assumed that innovative marketing primarily relates to product innovation since the latter is the core essence of the entrepreneurial business. Yet, innovative marketing is more versatile and goes beyond product or service marketing given that innovation in product or service is usually not much different from the competitors (Carson and Gilmore, 2000; O'Dwyer, Gilmore and Carson, 2009). Innovative marketing, as suggested by Kleindl, Mowen and Chakraborty (1996), is "doing something new with ideas, products, service, or technology and refining these ideas to a market opportunity to meet the market demand in a new way" (p. 214). It can be argued that this definition of innovative marketing widens the dimensions of marketing practices through differentiation in value creation, the delivery of the offer and the overall service that can be achieved thanks to the unique characteristics of the SME's manager, owner or the entrepreneur (Carson and Gilmore, 2000).

3. Methodology

This ongoing research through a qualitative interpretivist approach explores the marketing skills of nascent entrepreneurs who develop their enterprises whilst studying for the Entrepreneurial Business Management degree at Northumbria University in the UK. The initial thematic analysis of two out of nine observed and recorded workshops, during which entrepreneurs worked in teams, reveal a tendency among the students to network for the growth and development of entrepreneurial business. However, the application of other components, in particular theoretical frameworks, of the CM model in students' practices is rather limited.

This suggests that entrepreneurial marketing in the SME context is informal and bound to the competencies, knowledge and experiences of the SME's owner. "Formal marketing may be interesting to the entrepreneur but it is unlikely to relate closely enough to his/her situation specific requirements or solve company problems" (Carson, 1993, p. 194).

Although this research has been conducted in the educational context with the participants of the study setting up and running their businesses within the premises of the higher education institution, the preliminary results are in line with previous research and suggest that students, despite available support, develop their marketing skills and entrepreneurial practices through experience.

4. Conclusions

This paper has provided initial insight into the marketing skills of the entrepreneurs studying for the entrepreneurial degree in the UK. More analysis is required to finalise the findings of this study in order to draw comparisons with other research conducted in the SME context. It will reveal whether entrepreneurs with and without entrepreneurial education practice CM in a similar way and whether their business management methods need to change in order to diminish the gap between informal and formal marketing.

This knowledge can then be used by both practitioners and marketing and entrepreneurial educators to make entrepreneurial marketing more applicable to both small and large businesses.

References

Blythe, J. and Megicks, P. (2010). Marketing Planning: Strategy, environment and context. London: Prentice Hall.

Brown, A. (2017) Embedding research and enterprise into the curriculum: Adopting Student as Producer as a theoretical framework, Higher Education, Skills and Work-Based Learning, Vol. 8, No. 1, pp 29-40.

Carson, D. (1993) "A Philosophy for Marketing Education in Small Firms", Journal of Marketing Management, Vol 9, pp 189-204.

Carson, D. and Gilmore, A. (2000) "Marketing at the interface: Not 'what' but 'how'", Journal of Marketing: Theory and Practice, Vol. 8, No. 2, pp 1-7.

Deacon, J.H. and Harris, J. (2011) "Contextual marketing: A conceptualisation of the meaning and operation of a language for marketing in context", Journal of Research in Marketing and Entrepreneurship, Vol. 13, No. 2, pp 146-160.

Groves, K.S., Vance, Ch.M., Choi, D.Y and Mendez, J.L. (2008). An examination of the nonlinear thinking style profile stereotype of successful entrepreneurs. Journal of Enterprising Culture. Vol. 16. No. 2, pp. 133-159.

Hill, J. and McGowan, P. (1996) "Marketing Development through Networking: A Competency Based Approach for Small Firm Entrepreneurs", Journal of Small Business and Enterprise Development, Vol. 3, No. 3, pp 148-156.

Hills, G.E. and Hultman, C. (2013). Entrepreneurial Marketing: Conceptual and Empirical Research Opportunities. Entrepreneurship Research Journal, Vol. 3, No. 4), pp. 437-448.

Karataş-Özkan, M. and Chell, E. (2010) Nascent Entrepreneurship and Learning. Cheltenham and Northampton: Edward Elgar.

Kleindl, B., Mowen, J., and Chakraborty, G. (1996) „Innovative market orientation an alternative strategic orientation in marketing research at the marketing/entrepreneurship interface", Paper read at Research at the Marketing/Entrepreneurship Interface, University of Illinois at Chicago, Chicago.

Kolb, D. (1984). Experiential learning. Englewood Cliffs, NJ: Prentice-Hall.

Martin, D. (2009) "The entrepreneurial marketing mix", Qualitative Market Research: An International Journal, Vol. 12, No. 4, pp 391-403.

Miles, M., Gilmore, A., Harrigan, P., Lewis, G. and Sethna, Z. (2015) "Exploring entrepreneurial marketing", Journal of Strategic Marketing, Vol. 23, No. 2, pp 94-111.

O'Dwyer, M., Gilmore, A. and Carson, D. (2009). Innovative Marketing in SMEs: an empirical study. Journal of Strategic Marketing, 17 (5), pp. 383–396.

Pittaway, L.A., Gazzard, J., Shore, A. and Williamson, T. (2015). Student Clubs: experiences in entrepreneurial learning. Entrepreneurship & Regional Development, Vol. 27, No. 3-4, pp. 127-153.

Rae, D. (2017) "Entrepreneurial learning: peripherality and connectedness", International Journal of Entrepreneurial Behavior & Research, Vol. 23, No. 3, pp 486-503.

The Value of Accelerator Programmes in the Internationalization of Norwegian International New Ventures

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Abstract: This paper explores the role of accelerator programmes for participating entrepreneurs and the internationalization of their startups. Our theoretical point of departure is effectuation theory, arguing that entrepreneurs' decisions are developed on the basis of who the entrepreneurs are, what they know, and who they know (Sarasvathy, 2001). Building on Andersson (2011), we investigate how participation in an accelerator program influence personal qualities of the entrepreneur, how and with whom they interact in idea/strategy development, and progress of the internationalization process. We apply explorative case study research to examine Norwegian startups that have participated in governmental acceleration programmes organized by Innovation Norway, a state organization that supports innovation and growth in Norwegian industries. The findings indicate that participation increases the entrepreneur's self-confidence, provides new knowledge, and increases understanding of risk/resource considerations related to international issues. Thus, participation may accelerate or slow down the internationalization process. This study contributes to the literature on accelerator programmes, as well as the entrepreneurship literature.

Keywords: INVs, internationalization process, entrepreneurial process, entrepreneur, accelerator programme

1. Introduction

Most economies depend on growth-oriented firms to prosper, and the presence of entrepreneurs and entrepreneurial activities are important in this respect (Shafritz et al. 2015). Of particular interest are startups seeking international markets right after inception, referred to as international new ventures or INVs (McDougall et al. 1994). The entrepreneur's decision to enter foreign markets from inception is a decision with high risk in an uncertain situation (Andersson, 2011). Many new ventures suffer from high failure rates given their liabilities of newness and smallness, which imply limited resources and numerous investment needs, including R&D, organization building, and market development (Battistella et al., 2017). Awareness of these liabilities has given rise to various governmental policies, including accelerator programmes (Miller and Bound, 2011, Cohen and Hochberg, 2014, Pauwels et al., 2016). Accelerator programmes are designed to increase the speed and upscaling of new ventures by providing entrepreneurs with new knowledge, tools, and training that increase the likelihood of making more well-informed decisions (Cohen and Hochberg, 2014, Stiberg-Jamt et al., 2016). Previous research on governmental policies supporting entrepreneurs with international ambitions has focused on incubators and export-promotion programmes (see Leonidou et al. (2015) for a review). As accelerator programmes are a relatively new phenomenon, there are few empirical studies on such programmes (Cohen and Hochberg, 2014, Sarmento et al., 2016).

The aim of this paper is to address this gap and shed light on the effects of participation in accelerator programmes on entrepreneurs' capabilities (who they are, what they know, and who they know) and how this influences internationalization decisions, building on effectuation theory. An advantage of effectuation theory is its explicit concern with both the individual entrepreneurs and the new ventures (Andersson, 2011). The context for this research is two Norwegian accelerator programmes intended to accelerate the growth of startups with international potential.

2. Theoretical Framework

2.1 Entrepreneurial learning and decision-making

The foundation of INVs involves consecutive decision-making as opportunities emerge (or diminish) in high-risk situations. The ability to identify and seize new opportunities, and how the entrepreneur organizes and

manages the company, depend on the entrepreneur's knowledge and skills (Politis, 2005). Entrepreneurial learning is described as a continuous process that facilitates the development of the necessary knowledge required to effectively start up and develop new companies (Politis, 2005, Wang and Chugh, 2014). This involves skills in sales and pitching of the idea, the ability to build a strong product, and ability to lead a company in development (Kuivalainen et al., 2010). The entrepreneurial learning process is a social, contextual, and an experience-based phenomenon where the entrepreneur or team of entrepreneurs learn through interaction with various stakeholders (Sarasvathy, 2001, 2008). Still, most of the research on entrepreneurs' learning and assessment of opportunities involves a static perspective, largely ignoring the possibility that the way that entrepreneurs react to opportunities changes as they achieve new knowledge (Shepherd et al., 2015).

An exception is Sarasvathy's work on effectual decision-making, suggesting that there is a mutual relationship between changes in entrepreneurs' knowledge and resources and changes in their assessment of opportunities.

According to Sarasvathy (2001, 2008), entrepreneurs start with a generalized aspiration for their firms and seek to satisfy that aspiration using the means at their immediate disposal, i.e. who they are (traits, abilities, etc.), what they know (knowledge), and who they know (networks), and this will affect their decisions (Sarasvathy et al., 2014). Andersson (2011) argued that the means will vary between decision makers, e.g. previous international experience or startup experience. Entrepreneurs following an effectuation approach are likely to adjust their goals and strategies as the situation develops based on the resources at hand, and thereby are associated with more emergent strategies (Mintzberg, 1978) and grounded in a learning-by-doing method. Effectuation implies that the entrepreneurs do not analyse all of the opportunities available for the new venture, but consider the means available and then, based on possible courses of action, decide which goals to pursue. The decisions are made in interaction with others, both inside and outside the organization (Kalinic et al., 2014). Effectuation is based on five principles of entrepreneurial action (Sarmento et al., 2016): 1) decisions based on resources that are available for the entrepreneurs and not on goals to be achieved; 2) identification and administration of an affordable level of loss; 3) partnerships for obtaining resources that are not yet available; 4) transformation of contingencies into opportunity; and 5) co-creation of future conditions through interactions with other agents instead of using techniques that attempt to predict the future. A model of effectuation is presented below in Figure 1.

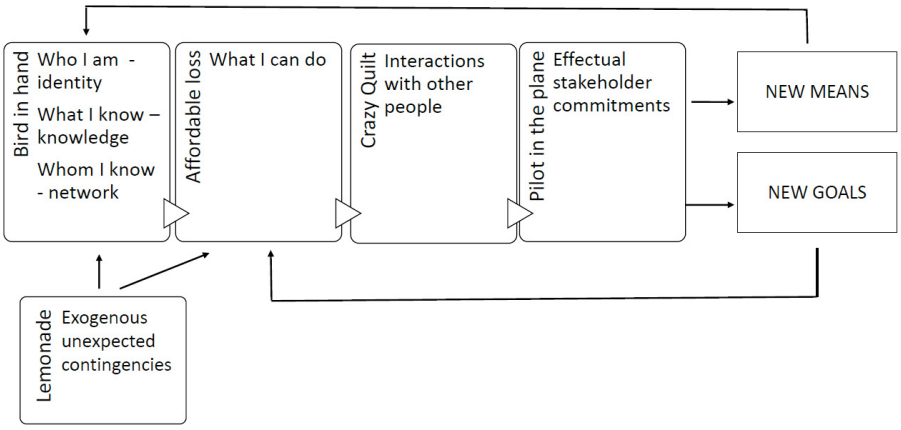

Figure 1: Dynamic model of effectuation, based in Sarasvathy (2008)

Effectuation contrasts causation (Sarasvathy, 2001), as it is assumed that entrepreneurs rule out opportunities that do not lend themselves to ex ante planning based on prediction (Harms and Schiele, 2012, Perry et al., 2012). Causation processes are considered more effective in static environments where the future is possible to predict (Sarasvathy, 2001), something that seldom characterizes the situation for a new venture seeking international opportunities.

2.2 Accelerators as sources of entrepreneurial learning and decisions

Accelerators provide examples of interventions designed to influence entrepreneurial learning and cognitive processes, and enable entrepreneurs to improve their assessment of opportunities. Accelerators are organizations that aim to accelerate venture creation by developing entrepreneurs' skills (Pauwels et al., 2016)

and assisting the entrepreneurs to develop their ideas, and to provide mentorship and access to a network of individuals in different industries, thus leading to quicker growth (Cohen and Hochberg, 2014) and reducing the high failure rates of new ventures (Cohen, 2013). By participating in accelerator programmes, entrepreneurs are exposed to new knowledge and new networks (i.e. what they know and who they know), and this may also alter traits and abilities (who they are). Hence, the accelerator may influence the means that entrepreneurs have at their disposal (Sarasvathy, 2001). Accelerators' programmes provide a time-limited and intense mentorship and educator programme where the entrepreneurs enter and exit the programme as a cohort (Cohen, 2013). The mentors are often earlier entrepreneurs who have experienced success and they are responsible for counselling and other learning activities (Radojevich-Kelley and Hoffman, 2012). The accelerators also provide workshops and seminars delivered by accelerator directors or guest speakers, and the entrepreneurs receive direct feedback that is valuable for avoiding potential pitfalls (Hallen et al., 2016).

Typically, accelerator programmes conclude with participants demonstrating their pitching ability to an audience (Cohen, 2013, Cohen and Hochberg, 2014).

The task of entrepreneurs is to develop opportunities by experimenting and changing directions as they learn and as new information and new knowledge emerge (Chandler et al., 2011). This process is similar to the case of an accelerator. Scant research has looked at the effect of startups participating in accelerator programmes. In a study of new ventures, Cohen (2013) found that participation in accelerator programmes caused accelerated learning compared with usual conditions. Levinsohn (2015) explored learning among social entrepreneurs based on a longitudinal case study involving 24 social entrepreneurs and three accelerators run by the same organization. He found that learning was more a product of co-creation than of effective programme design. Additionally, the characteristics and dynamics of the accelerator cohort had a significant impact on learning, with heterogeneity in terms of industry as a key stimulus. Battistella et al. (2017) investigated how services provided by an accelerator in the UK affected the participating startups from an open innovation perspective. The findings showed that the open innovation environment offered by the accelerator effected successful growth by being an intermediary between the new ventures and external networks of knowledge and resources that support ventures' development processes. This was especially the case for open-minded entrepreneurs. Battistella et al. (2017) argued that the intrinsic characteristics of founder teams, such as personal background and problematic relationship dynamics within the team, were unaffected by participation.

In a rare study of the role of accelerators in the internationalization of new ventures from an effectuation perspective, Sarmento et al. (2016) found that a technology-based startup participating in a Brazilian accelerator programme was able to accelerate its internationalization process by benefitting from the resources and knowledge obtained through the accelerators' network of mentors and international contacts.

This result was based on a single case study. To our knowledge, no studies have investigated how the knowledge obtained through participation in government accelerator programmes influences the entrepreneurs' decision-making processes.

2.3 Positioning of the study

Our literature review reveals that by participating in accelerator programmes, entrepreneurs may develop improved entrepreneurial skills, new knowledge, and new networks, i.e. affecting their means-at-disposal for entrepreneurial growth (Sarasvathy, 2001). According to effectuation theory, a change of means or goals is expected to affect strategic decisions, including international issues (Sarasvathy et al., 2014). Scant research has focused on how participation in accelerator programmes affects entrepreneurs' means-at-disposal and the role they play in decisions related to growth and internationalization of the ventures. The aim of this study is to contribute to an improved understanding of these issues by exploring how accelerator participation affects entrepreneurs' available means and whether (and how) this influences their decisions regarding growth and internationalization.

3. Methods

3.1 Setting

The context of the study is Norwegian entrepreneurs with different levels of experience participating in either of two governmental accelerator programmes organized by Innovation Norway (IN), The Tech Incubator in

Silicon Valley (TINC), and Entrepreneurial Marketing in New York (EM). Innovation Norway is the Norwegian authorities' most important instrument for innovation and development in firms and industries. Their accelerator programmes aim to connect high-potential startups to global networks and expertise in leading hubs around the globe.

Both programmes take place outside Norway, and are shorter and more intensive than most accelerator programmes. They are developed in collaboration with tech-startups, investors, and industry professionals. The programmes are based on the experimental Lean Start-Up methodology (Ries, 2011), described as a product development process emphasizing experimenting over planning, customer feedback over intuition, and interactive development over fixed design (Johansson, 2017, Blank, 2013). The methodology resembles the effectuation logic as described by Sarasvathy (2001) and elaborated in later studies. Figure 2 illustrates the intended participant developmental stage at time of participation.

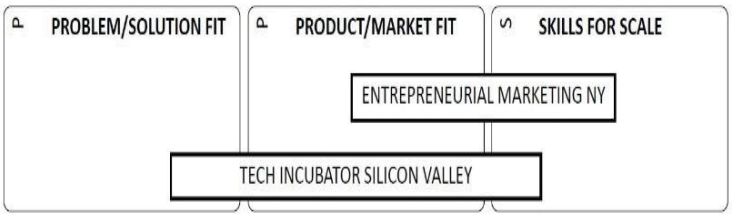

Figure 2: Intended development stage at time of participation, based on Stiberg-Jamt et al. (2016)

TINC was established in Silicon Valley in 2012. It targets Nordic technology startups with a global vision. TINC is based on on-the-job training, as the entrepreneurs work on their own problem/solution fit through several workshops and individual mentoring. Furthermore, the programme provides entrepreneurs with knowledge and simulation of real-life training activities. The programme consists of a two-day preparation at home and a four-week stay in Silicon Valley. Central to the programme is validation of technologies, evaluation of business models, and practice in pitching business ideas to peers and venture capitalists.

EM is a shorter programme in New York, introduced in 2014. The programme's main purpose is to improve the participants' skills, tools, and mindset towards branding, marketing, and selling products and services internationally. The programme is hands-on, with a mix of learning days and doing days, as well as one-on-one meetings with top executives in relevant fields, and evening networking events. The programme includes a two-day introduction in Oslo, 10 intensive learning days in NYC, and a six-month post-participation goal-oriented follow-up programme. EM targets operating companies with sufficient funding in place to access the international market.

3.2 Data collection

We chose an exploratory multiple case-study approach to gain insights that are not available from large sample sizes (Yin, 2013). The approach is well adapted for studying issues in a realistic context and combining inductive and deductive research to develop theory (Eisenhardt, 1989). We used a semi-structured interview guide to ensure consistency (Yin, 2013). The questions were created to identify how participation in the accelerator had changed the entrepreneurs' interpretations of the means and objectives of growing their firms, and were based on research on accelerators, INVs, and entrepreneurial decision-making.

The data were collected during the spring of 2017 by the last two authors (as part of their Master's theses). The informants (entrepreneurs) participated in the accelerator programme in 2015 or 2016. An advantage of recent participation is more accurate memory of the programme, while a disadvantage is that the effects of post-participation decisions may not yet be visible. Six entrepreneurs where chosen as informants, all recruited through IN. Each interview lasted 30 to 60 minutes, was recorded and subsequently transcribed to ensure reliability (Yin, 2013). The primary data were supplemented with secondary data from sources such as websites, newspaper articles, and podcasts.

3.3 Data analysis

The transcripts were imported into NVivo 11 and coded following a thematic analysis (Braun and Clarke, 2006). We started by reading and re-reading the interviews and taking initial notes. First, the respondent characteristics were established. Initial coding was based on a pre-conception of the initial theoretical

framework. As the analysis and interpretation of the data emerged, we analysed patterns in the data, searching for categories and themes. The combination of deductive and inductive analyses resulted in a code tree consisting of three main groups and several subgroups (see Figure 3). The first and second authors conducted the data analysis together, which improved the validity and reliability of the analysis and reduced potential personal bias (Miles et al., 2014, Yin, 2013).

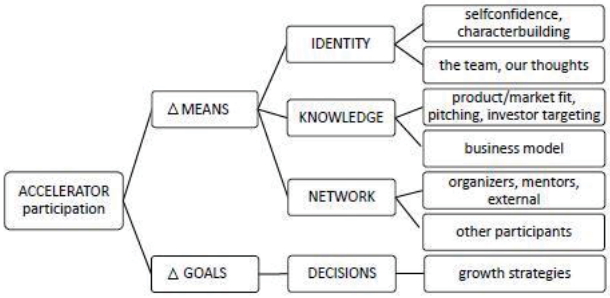

Figure 3: Code tree

4. Results and Discussion

4.1 The ventures and entrepreneurs

The ventures were established between 2012 and 2016 and the founders are still active in the firms. Students participating in entrepreneurial education programmes at a technical university founded three of the firms.

Experienced entrepreneurs with international and industry backgrounds founded two of the firms. The last firm is a spin-off from a closed business. Three of the startups are configured as value networks, two as value chains, and one as a value shop (Stabell and Fjeldstad, 1998). Three of the startups operate in B2B markets, and three in B2C.

Three firms participated at TINC, two at EM, and one at both. Four firms were invited by IN to apply to the programme, and the other two firms initiated their applications based on recommendations from earlier applicants. The startups were encouraged to send multiple delegates to these events, and all but one firm sent an entrepreneurial team. Only two participants had explicit goals for participation, while the others followed the more general approach of "learning as much as possible" in an international environment.

4.2 Benefits from participation: Identity, knowledge, and network

Most informants claimed that participation changed their perception of identity, of who they are. All six informants reported to have achieved some personal development and personal insight. They became more aware of who they are and their own skills. They said they became motivated and inspired through participation in the program and by staying in the business milieu of Silicon Valley and New York for several weeks. It was seen as a valuable experience, and they felt they got into the "American mindset" and business culture, with its focus on ambitions. "*You must dare to think big"* was stated by one informant. Other informants underlined the value of being challenged at a personal level, referring to undisguised and critical feedback on, e.g. presentations and business ideas as "character building". They argued that this would be a valuable experience for them when in contact with potential investors or other stakeholders in the future. All informants reported increased self-confidence and faith in their own capabilities after participation, something that made them believe more in their own ideas and decisions, and made the decision-making process easier.

Contrary to (Battistella et al., 2017), we found that the accelerator affected team development. The informants found this advantageous as the team could develop a more common mindset and work better as a team. This was particularly relevant for members of the founding teams who did not know each other too well beforehand. The participation made them more aware of each others' strengths and weaknesses and they agreed upon who should be responsible for what. The Alpha informant put it this way: *"I felt we managed to sort out how we function as a team and how we can make the most out of our individual skills".*

All informants reported gaining new knowledge and improving their capabilities. While the student entrepreneurs in general reported increased factual competence, the more experienced entrepreneurs became more confident in their existing knowledge and choices. Several entrepreneurs pointed to the

significance of the mentors' capacity to demonstrate the importance of focusing resources and ensuring fit to the problem/solution as well as the product/market. Most informants reported that this affected their choices post-participation. In particular, the student entrepreneurs became more aware of resource constraints and how this had to be taken into consideration for strategic decisions. The Epsilon informant said: *"Our mentor put it this way: if you focus on two products or market segments with a fixed amount of resources, both go at half speed. So we decided for focus".* Sales and pitching skills are emphasized in both programmes and all informants treasured this skill. In particular the more experienced entrepreneurs (informants Alpha and Beta) argued that on-the-spot training was highly valuable and of immediate use. The Alpha informant said it like this: *"I regard this (pitching skills, authors remark) as a direct consequence of TINC. Closing the round, raising the funds, will make us accelerate (sic)".*

Another benefit of accelerators is widening the participants' networks, emphasizing that *who you know* is important for a venture. During the programme, all participants regarded interactions with mentors, organizers, and other participants as important sources of learning and knowledge sharing. Two of the firms had contact with mentors after participation; both of these firms participated at TINC. The Alpha entrepreneurs used one mentor as an advisor on a regular basis, while Epsilon's informant reported occasional contact with two mentors. Yet, all informants believed that the networks of mentors and investors they had met could be mobilized in the future if necessary. Post-participation, four informants emphasized the cohort of other participants as their most active network. They stayed in contact through a Facebook alumni group to exchange information and experiences and to support each other. The other participants thus became a valuable informal network. Eta's informant said: "*The FB group is an arena to share experiences and ask questions*", with Alpha and Delta reporting similar views. This finding is consistent with earlier studies that find learning to be a result of co-creation (Levinsohn, 2015), and willingness to share ideas with others (Galkina and Chetty, 2015, Høvig et al., 2018). Two firms had had no contact with other participants post-participation.

4.3 Post-participation results: New goals and growth strategies

The entrepreneurs developed new skills that affected their understanding of personal and firm resources. This influenced the entrepreneurs' decisions regarding their venture's strategic orientation both during and after participation in the accelerator. The findings indicate that the speed of the internationalization process increased for some (Alpha and Delta in particular), but was reduced for others (Epsilon). Epsilon decided to focus on the Norwegian market first, based on insight and interaction with the accelerator and realized that they were not prepared to enter the American market, "*we have to do our homework first*"—they saw a need for more of a causation approach prior to entry into the American market. Epsilon believed pre-participation, that it would be quite easy to get access to retailers in the USA and Europe to sell their product, but realized that this was not the case. Therefore, they searched for retailers in Norway with international networks that may help the firm to grow internationally, i.e. following an effectual logic by seeking to obtain resources that are not yet available (Sarmento et al., 2016).

Both Eta and Gamma informants focused mainly on the Norwegian market both pre- and post-participation. The entrepreneurs seemed to have no specific international ambitions pre-participation. The Gamma informant mentioned that the American market could be interesting, but it seemed more like a "thought" than an ambition and they soon realized that the American market was not relevant. This does not necessarily imply that participation was without relevance for the firms. Increased confidence and access to new knowledge can increase the chance of survival and accelerate growth in the home market. This appeared to be the case for Gamma, which now seeks to enter the Swedish market, i.e. following an incremental international strategy (Johanson and Vahlne, 1977). Alpha and Delta achieved an accelerated internationalization process after participation, because of increased funding (maybe due to the pitching skills gained through participation), but also because of their improved ability to identify new opportunities and use their prior networks in following an effectuation approach (Sarasvathy, 2008). The major empirical findings are summarized in Table 1.

5. Conclusions

This paper contributes to an enriched and more nuanced understanding of the effects of participation in an accelerator programme, at the individual/entrepreneur and venture levels. Building on an effectuation approach, we identified potential benefits for the entrepreneurs along several dimensions: who I am, what I know, and whom I know (Sarasvathy, 2001). The study confirmed the benefits related to new knowledge reported in previous studies (e.g. Cohen, 2013, Levinsohn, 2015), but identified other advantages such as increased self-esteem, faith in one's own capabilities, and team building skills. We found mixed results on

internationalization. Some entrepreneurs decided to speed up the process, others to slow the process based on new knowledge and interaction with mentors and others taking part in the accelerator programmes. This contrasts with the findings of Sarmento et al. (2016) who examined one firm. More informed risk/resource evaluations that limit speed to market may lead to a higher survival rate for the firms. The same may be the case for higher self-esteem, which can be valuable in future unpredictable situations (Andersson, 2011). The entrepreneurs seemed to become more aware of their available means and the losses they could afford (Sarasvathy, 2001). Furthermore, they were aware of the need for more planning prior to entering some markets, i.e. a mixture of effectuation and causation processes. The results indicate that access to new networks through the accelerator did not influence international decisions, and the networks acquired pre-participation seemed more valuable in this respect.

We argue that the findings have some practical implications for policy makers and participating entrepreneurs. From the accelerator viewpoint, the findings suggest a more cautious recruitment procedure to reach entrepreneurs with international ambitions who are ready to take full advantage of the programme and actually accelerate their firm's expansion. For entrepreneurs, it may be wise to have some goals prior to their participation and be more aware of how to take advantage of the networks they are exposed to in these programmes.

The study has several limitations. First, using only six participants and two accelerators limits the potential for generalization. Second, we collected data shortly after participation and the effects may need more time to manifest. A follow-up of the same firms may give greater insight into the effects of the accelerators over a longer time period. To increase our understanding, a larger sample and different research designs should be used in future studies.

Table 1: Summary of empirical findings

	Venture	**ALPHA**	**BETA**	**GAMMA**	**DELTA**	**EPSILON**	**ETA**
	Accelerator	TINC	TINC	TINC	TINC (EM)	EM	EM
	Attended by	2	2	2	2	2	1
Informants	Learning goals	Clearly expressed	Clearly expressed	General	General	General	Clearly expressed
	Entrepr. experience	Industry, startup, international Entrepr. education	Industry, startup, international	Students Entrepr. education	Students Entrepr. education	Students Entrepr. education	Industry
Identity	Personal develop-ment	Self-confidence; Accept critique	Self-confidence; Ability to accept critique	+ Self-confidence	Self-confidence	Self-confidence; Accept critique	Self-confidence; Accept critique
	Team develop-ment	Aware of individual abilities; Develop common mindset	Develop common values and mindset			Develop common mindset	
Knowledge	Technical knowledge and practical skills	Communication, pitching skills	Toolbox; Pitching practice	Toolbox; Communication , pitching skills	Toolbox; Communication, pitching skills	Toolbox; Communication , pitching skills	Communication , pitching skills
	Business model	Small clarification in existing strategy; +Focus	Small clarification in existing strategy	+Business understanding; Focus, fewer products	+Business understanding; New strategy; Focus, fewer products	+Business understanding; New strategy; Focus, fewer markets	Same strategy, reinforced
Network	Organizers, mentors, invitees	One mentor has become an advisor; Access, so far not used	Contacts with partners and investors; Contacts made pre-participation	No contact	Contact with two mentors; Deals made with pre-participation contacts	Access, but not used	No contact
	Other participants	Knowledge sharing also post-participation; Facebook alumni	Knowledge sharing during participation	Knowledge sharing during participation; No contact post-participation	Knowledge sharing also post-participation; Facebook alumni	Knowledge sharing and learning, also post-participation; Access to network through other participants	Knowledge sharing also post-participation; Facebook alumni
(New) Goals	Growth strategies	International expansion, focus changed from Nordic to Europe/USA; Further expansion, Asia; Global ambition	Internationalizat ion as planned pre-participation (USA & UK); Further expansion a goal	Focus Norway and seek incremental growth to nearby/Nordic markets	International expansion; Prime markets USA & Europe/Germany ; Further international expansion	Focus Norway; Occasional international sales; Postponed international ambitions, USA remain future target	Focus on Norway; Occasional international customers; No particular growth ambitions

References

ANDERSSON, S. (2011) "International Entrepreneurship, Born Globals and the Theory of Effectuation", Journal of Small Business and Enterprise Development, Vol 18, pp 627–643.

BATTISTELLA, C., DE TONI, A. F. and PESSOT, E. (2017) "Open Accelerators for Start-ups Success: A Case Study", European Journal of Innovation Management, 20, 80–111.

BLANK, S. (2013) "Why the Lean Start-up Changes Everything", Harvard Business Review, Vol 91, pp 63–72.

BRAUN, V. and CLARKE, V. (2006) "Using Thematic Analysis in Psychology", Qualitative Research in Psychology, Vol 3, pp 77–101.

CHANDLER, G. N., et al. (2011) "Causation and Effectuation Processes: A Validation Study", Journal of Business Venturing, Vol 26, pp 375–390.

COHEN, S. 2013. What do accelerators do? Insights from incubators and angels. Innovations: Technology, Governance, Globalization, 8, 19–25.

COHEN, S. & HOCHBERG, Y. 2014. Accelerating startups: The seed accelerator phenomenon. Available at SSRN 2418000
EISENHARDT, K. M. 1989. Building theories from case study research. Academy of management review, 14, 532–550.
GALKINA, T. & CHETTY, S. 2015. Effectuation and networking of internationalizing SMEs. Management International Review, 55, 647–676.
HALLEN, B. L., BINGHAM, C. & COHEN, S. 2016. Do accelerators accelerate? The role of indirect learning in new venture development. The Role of Indirect Learning in New Venture Development (January), 19.
HARMS, R. & SCHIELE, H. 2012. Antecedents and consequences of effectuation and causation in the international new venture creation process. Journal of international entrepreneurship, 10, 95–116.
HØVIG, Ø., PETTERSEN, I. B. & AARSTAD, J. 2018. Entrepreneurial Causation vs. Effectuation in a Business Incubation Context: Implications for Recruiting Policy and Management. Entrepreneurship Research Journal, 8, 1–11.
JOHANSON, Jan; VAHLNE, Jan-Erik. 1977. The internationalization process of the firm—a model of knowledge development and increasing foreign market commitments. Journal of international business studies, 8 (1), 23-32.
JOHANSSON, H. 2017. Finding the Product/Market fit: Lean Canvas framework as a tool for establishing customer-validated market orientation in early-stage startup businesses. Turku University of applied sciences. Thesis.
KALINIC, I., SARASVATHY, S. D. & FORZA, C. 2014. 'Expect the unexpected': Implications of effectual logic on the internationalization process. International Business Review, 23, 635–647.
KUIVALAINEN, O., PUUMALAINEN, K., SINTONEN, S. & KYLÄHEIKO, K. 2010. Organisational capabilities and internationalisation of the small and medium-sized information and communications technology firms. Journal of International Entrepreneurship, 8, 135–155.
LEONIDOU, L. C., SAMIEE, S. & GELDRES, V. V. 2015. Using National Export Promotion Programs to Assist Smaller Firm's International Entrepreneurial Initiatives. Handbook of Research on International Entrepreneurship Strategy: Improving SME Performance Globally, 239–252.
LEVINSOHN, D. S. 2015. No entrepreneur is an island: An exploration of social entrepreneurial learning in accelerators. Jönköping University, Jönköping International Business School.
Miles, M. B., Huberman, A. M. and Saldana, J. (2014) Qualitative Data Analysis: A Method Sourcebook, Sage Publications, CA, US.
Miller, P. and Bound, K. (2011) "The Startup Factories", [online], Nesta. http://www.nesta.org.uk/library/documents/StartupFactories.pdf.
MINTZBERG, H. 1978. Patterns in strategy formation. Management science, 24, 934–948.
PAUWELS, C., CLARYSSE, B., WRIGHT, M. & VAN HOVE, J. 2016. Understanding a new generation incubation model: The accelerator. Technovation, 50, 13–24.
PERRY, J. T., CHANDLER, G. N. & MARKOVA, G. 2012. Entrepreneurial effectuation: a review and suggestions for future research. Entrepreneurship Theory and Practice, 36, 837–861.
POLITIS, D. 2005. The process of entrepreneurial learning: A conceptual framework. Entrepreneurship theory and practice, 29, 399–424.
RADOJEVICH-KELLEY, N. & HOFFMAN, D. L. 2012. Analysis of accelerator companies: An exploratory case study of their programs, processes, and early results. Small Business Institute Journal, 8, 54–70.
RIES, E. 2011. The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses, Crown Books.
SARASVATHY, S. 2008. Effectuation: Elements of Entrepreneurial Expertise, Cheltenham, UK., Edward Elgar Publishing Limited.
SARASVATHY, S., KUMAR, K., YORK, J. G. & BHAGAVATULA, S. 2014. An effectual approach to international entrepreneurship: Overlaps, challenges, and provocative possibilities. Entrepreneurship Theory and Practice, 38, 71–93.
SARASVATHY, S. D. 2001. Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. The Academy of Management Review, 26, 243–263.
SARMENTO, C. F. B., DE CARVALHO, C. A. S. & DA ROCHA DIB, L. A. 2016. Effectuation and the influence of social networks on the internationalization of accelerated startups. Internext: Revista Electrônica de Negócios Internacionais da ESPM, 11.
SHEPHERD, D. A., WILLIAMS, T. A. & PATZELT, H. 2015. Thinking about entrepreneurial decision-making: Review and research agenda. Journal of management, 41, 11–46.
STABELL, C. B. & FJELDSTAD, Ø. D. 1998. Configuring value for competitive advantage: on chains, shops, and networks. Strategic management journal, 413–437.
STIBERG-JAMT, R., HANSEN, T. B., BRASTAD, B. & WEIGEL, B. 2016. Flying Start: Evaluering av Global Entrepreneurship-tjenesten. Kristiansand: Oxford Research.
WANG, C. L. & CHUGH, H. 2014. Entrepreneurial learning: past research and future challenges. International Journal of Management Reviews, 16, 24–61.
YIN, R. K. 2013. Case study research: Design and methods, London: Sage publications.

Additional Submission

Industry-University Collaboration for Innovation Promotion in the State of Ceara, Brazil

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Abstract: A market failure exists in the collaboration process between industry and the academy. Although it is expected to bring benefits to both industry and the academy and to the national economy as a whole, such collaboration does not generally take place at an optimal level. The current study shows that the collaboration between industry and academy can be supported by the intervention of an industrial association, which can play the role of a catalyst for change where government intervention does not provide a sufficient response to the market failure. This experimental study was conducted in the state of Ceara in Brazil, in two phases. The first was the elaboration of a diagnosis based on an in-depth investigation of the prevailing constraints and strengths of the local innovation system. This was done through a field study among firms that showed both a desire and preparedness for innovation, but also a lack of practical innovation activity. This led to a second field study, among leaders in the academy, industry, and government, that revealed some of the constraints that prevent innovation. The findings led to the implementation of a methodology for the identification of the local innovation ecosystem. The second phase was the elaboration of policy measures and of the implementation of practical projects oriented towards the solution of the main obstacles identified in the ecosystem. Three groups of measures were adopted and implemented by the local association of industries. The first group includes the organization of structures that contribute to an improved level of communication between industry and academia, with the support of government. In practical terms, a council was established, representing all parties involved, with the objective of devising measures for improved collaboration and exchange of knowledge. This council acts through sub-sectorial groups. A second group of measures is focused on the joint supply of information and knowledge to industry and the academy. A third group of measures includes projects that supply direct support to innovation in individual businesses. Although it is still too soon to make final evaluations, preliminary results show positive trends of increasing innovation activity.

Keywords: innovation, ecosystem, academy, industry, collaboration, promotion, government, market failure.

1. Introduction

In the process of promoting innovation, collaboration between industry and the academy is beneficial to both (Perkmann et.al, 2013). Industry gains access to knowledge and improved professional networks, while the academy gains an opportunity for the empirical application of theories, funds for research and student training, and so on. However, there is a market failure that prevents or restricts such collaboration as a result of cultural differences, a lack of communication channels, and differences in priorities and objectives, beyond the well-known existence of externalities (Garousi, Petersen, and Ozkan, 2016; de Wit-de Vries et al., 2018); Bjursell and Engström, 2017). Consequently, the potential benefits of such collaboration are not always achieved, and innovation opportunities may be missed.

The natural response to market failure in the collaboration process between industry and the academy is external intervention, which is generally expected to come from the public regulator and encourage and enable the interaction between the university and the business sector (Martin and Scott, 2000, Cheng et al., 2018). Unfortunately, such intervention is not always effectual, or at least not sufficiently effectual. The measures taken by the government do not always respond to specific needs and local conditions. Our hypothesis is that an association of industries may be able to perform this role, at least partly, as long as it is trusted by the partners involved (the industrial firms, the universities, and the relevant governmental bodies).

To some extent, an industrial association could be considered a semi-public organization and regulator (Chappin et.al, 2008). Like the government, an industrial association can consider the global benefits of the industrial sector as a whole, even if they are not relevant to specific firms.

In practical terms, we believe that a local industrial association can play the role of a catalyst, linking the actors of the ecosystem and supporting government intervention measures (Nordqvist, Picard, and Pesämaa, 2010; Bessant et al., 2012; Maennig and Olschlager, 2011; Schwartz and Bar-El, 2015). Such an association has the advantage of physical and cultural proximity to the ecosystem actors as well as familiarity with the local economic and social environment (Molina-Morales et al., 2013).

We test this hypothesis through an exploratory experiment performed through a project of the Federation of Industries of the state of Ceara in Brazil (FIEC). This project, called UNIEMPRE, was implemented from 2013, and focuses on the solution of several main elements of the market failure of innovation.

2. Diagnosis

The state of Ceara is one of the 27 states of Brazil and has approximately nine million inhabitants. It is located in the northeastern region, and its capital is Fortaleza, the fourth largest city in Brazil, which has some three million inhabitants. Its GDP per capita is approximately US$6,000, about half the average of Brazil as a whole. The main exports are shoes, cashew nuts, and fruit.

A short survey of industrial firms in the state was conducted, including 57 firms, of which a third are small and the majority medium-sized. Most of their production is focused on the state market. Almost none is exported outside of the state or the country. R&D activity takes place in 60% of the firms, with an average cost of 3% of their expenses.

Almost all the firms implemented some kind of innovation in the last three years. Most of them did so with internal R&D, but about a third of them implemented innovation through the purchase of new technologies. Almost all the firms (95%) expressed a very high level of awareness of the need for innovation, indicating its necessity not only for high-tech firms, but for traditional ones as well.

Furthermore, the firms expressed very positive expectations from the academy as an important element in the development and improvement of products and services, the upgrading of production processes, and increases in quality, efficiency, and growth. They consider the acquisition of services and professional assistance, joint research, and the use of university laboratories to be the most important channels of collaboration with the academy.

However, despite the existence of motivation for collaboration between industry and the academy, the facts reveal the existence of a market failure. A practical evaluation of the level of integration in the local innovation ecosystem resulted in quite weak results. All firm leaders were asked to evaluate on a scale of 1 (very low) to 5 (very high) the level of involvement of various factors in the innovation process of the firm. As can be seen in Table 1, the results indicate the existence of a very weak ecosystem. The main interaction is with the internal employees of the firm (3.6 on a scale of 1 to 5), and, to a much lesser extent, with other firms. The involvement of major ecosystem actors – research institutions, financial institutions, government, public consultancy, and risk capital funds – is virtually nonexistent.

Table 1: Level of involvement of actors in the innovation process: Average level in a scale of 1 (very low) to 5 (very high)

Actors involved in innovation process	Average Level (1-5)
Employees of the firm	3.6
Other firms	2.6
Financial institutions	1.5
Research institutions	1.5
Government	1.5
Public consultancy institutions	1.4
Risk capital funds	1.2

Source: interviews with leaders of 57 industrial firms in Ceara

In order to understand the gap between the needs and motivation of industry, on one hand, and the actual situation, on the other, an additional study was performed, based on 47 leaders who represent the various elements of the innovation ecosystem: business leaders, highly ranked government officers, and leading academic researchers. All of them were asked to evaluate the extent to which given factors are considered

important obstacles to collaboration between ecosystem actors. Table 2 shows the share of respondents that classified each factor as an important or very important obstacle.

Table 2: Obstacles to collaboration between ecosystem actors: % or respondents indicating factor as Important or very important obstacles

Obstacles	%
Lack of communication between industry, academy, and government	68
Lack of information in the academy about opportunities in industry	40
Lack of information in industry about opportunities in the academy	40
Conflicts of interest	36
Cultural differences	32
Lack of clear innovation policy	30
Lack of financial resources	16
Bureaucracy	10
Lack of human resources	4

Source: survey of 47 leaders in the innovation ecosystem of Ceara

A near consensus exists among all the leaders regarding the prevalence of one of the main obstacles to collaboration – the lack of communication between industry, academy, and government (68%). This result is reinforced by a corresponding obstacle – the lack of information regarding opportunities in industry and the academy (40% each). An equally interesting finding is the low importance attributed to well-known obstacles such as lack of human resources and bureaucracy. This finding does not imply that there is an abundant supply of skilled workers or no problem with bureaucracy, but rather reflects a situation in which these obstacles are not yet fully relevant because the most pertinent obstacles mentioned above constrain the innovation process at a much earlier stage. The same applies to the obstacle of the lack of financial resources; in fact, a large proportion of the funds offered by government for innovation are not used as a result of insufficient appropriate applications. The near irrelevance of these three obstacles (lack of financial resources, bureaucracy, and lack of human resources), which represent needs mainly at the second phase of innovation, actually attests to the existence of an immature ecosystem that prevents the incubation of innovation activities.

3. Identification of the innovation ecosystem of Ceara

3.1 The innovation ecosystem actors

As a preliminary step, a listing and classification of the main actors who take part in the process of innovation was performed by a group of researchers at the Federal University of Ceara (UFC). These actors are succinctly enumerated here, divided by the three major elements of the "triple helix" (Mercier-Laurent, 2011, Etzkowitz, 2003, Etzkowitz and Leydesdorff, 2000). A detailed description of the actors can be found in Cavalcante and Bar-El (2014).

The first element includes the universities and research institutions: a federal university (UFC); a state university (UECE); a private university (UNIFOR); a technological institute (IFCE); a nucleus for technological innovation (NIT); a network of universities and research institutions for the support of biology research (RENORBIO); a private network for the support of incubators (RIC); and a civil institute for technology, information, and communication (ITIC).

The second element, the business sector, includes several associations beyond the business firms. One of the most active is the Federation of Industries of Ceara (FIEC), which acts in the field of innovation through divisions for professional training (SENAI), support of the interaction between firms and academic institutions (IEL), and coordination of industrial development programs (INDI). Other organs of the business sector are: a national association for the research and development of innovative firms (ANPEI), a social organization for the promotion of research related to industry (CGEE), and a private-public organization for the promotion of training and innovation in small enterprises (SEBRAE).

The third element, the government, includes the state government of Ceara and the federal government of Brazil. Within the federal government, the Ministry of Science, Technology, Innovation and Communications (MCTI) is active in training, providing infrastructures for scientific research and so on. A national fund for scientific and technological development (FNDCT) that is related to this ministry is involved in the promotion of academy-industry relations. A national bank related to the Ministry of Development, Industry and Foreign

Trade (BNDES) supports technological innovation in specific sectors, including micro-firms and small firms. Banco do Nordeste (BNB) is a federal bank especially focused on the development of the states of the northeastern region of Brazil, where the state of Ceara is located. A unit that supports technological innovation (FUNCAP) operates within the state government of Ceara based on funding provided by the federal government (FIT). A special division (NUTEC) of the Secretariat of Science and Technology operates in the field of certification of management and quality.

3.2 The innovation ecosystem of Ceara

An optimal elaboration of policy measures needed to promote innovation requires the understanding of the mechanism behind the functioning of the innovation process. We used the methodology applied by Frenkel and Maital (2014) in five European countries to identify the innovation ecosystem in Ceara. This methodology was based on an intensive workshop that included 70 experts and high-level leaders from the academy, the business sector, and various government entities in Ceara (see the detailed methodology and results in Frenkel, 2014). The main purpose was to identify the major "anchors" of the innovation ecosystem and the processes used on the basis of these anchors.

The major anchors of the innovation ecosystem of Ceara, which we expected to provide the elements that can nurture innovation, are the following:

- A culture of empowerment: innovation creativity, adaptation ability, and so on
- A culture of entrepreneurship: desire for university-industry cooperation, an atmosphere of innovation, significant motivation of young entrepreneurs
- Market structure: potential demand for innovative products, advantageous geographical location, availability of financial funds for small and medium-sized enterprises (SMEs), and so on
- Institutional infrastructure: organization of incubators, regional dispersion of research institutes, and so on
- Educational infrastructure: availability of public and private universities, relatively good achievements of public schools, and so on
- Technological infrastructure: broadband internet, natural resources, technological networks, and so on
- Government policy: availability of incentives, regulations, access to funds for technological innovation
- Financial institutions: financial resources provided by the BNB (development bank) and the financial agency for research, FUNCAP

The processes identified by the group of experts as defined by the actions actually taken for the advancement of innovation in the state are divided into the following six categories:

- Active collaboration between elements of the ecosystem: promotion of scientific events, elaboration of open innovation projects, and so on
- Government legal and fiscal initiatives: elaboration of rules and laws for the advancement of innovation, incentive and subsidy programs, provision of venture capital
- Joint public-private initiatives: joint seminars and workshops, support for project expansion, and so on
- Skill development: consultancy programs, centers for entrepreneurship and innovation, professional training in the periphery
- Public centers for technological research: established by the Ministry of Science for specific industrial sectors
- Entrepreneurship support: entrepreneurship and innovation courses, sectoral initiatives

The effectiveness of innovation ecosystem's operation is evaluated through the relationship between anchors and processes. Table 3, below, shows a weak relationship between the two.

Table 3: Relationships between anchors and processes

Process Anchors	Active collabora-tion between elements of the ecosystem	Govern-ment legal and fiscal initiative	Joint public-private initiatives	Skill develop-ment	Public centers for technological research	Entrepre-neurship support
A culture of empowerment	+	+	*	+	+	*
A culture of entrepreneurship	++	++	+	++	+	+
Market structure	++	++	+	++	+	+
Institutional infrastructure	+	+	+	+	+/-	+
Educational infrastructure	+	*	+	+	+	*
Technological infrastructure	+	++	+	+	+	*
Government policy	+	++	+	+	+	+
Financial institutions	+	+	+	++	+/-	+

++ strong positive relationship; + weak positive relationship; +/- mixed relationship; * no relationship

As the table shows, active collaboration between the elements of the system is only strongly supported by the anchors of an existing culture of entrepreneurship and a positive market for innovation products, and weakly supported by other anchors. We also see weak responses of most other processes to the prevailing anchors: support for entrepreneurship, public-private initiatives, and the actions of public centers for technological research.

The conclusion of this section is that despite the existence of some anchors for innovation, the actions taken by all entities (government, academy, business) are not yet sufficient and do not optimally use the existing potential. Alternatively, we can state that the prevailing anchors are not yet sufficient and their influence on active measures for innovation is not yet efficient enough.

4. Industry initiatives for the enhancement of the innovation ecosystem

As in any case of the existence of a market failure, the achievement of an optimum can be reached only through an external intervention, normally from the government. The process of identification of the prevailing innovation ecosystem with the participation of government officers, university scholars and industrial leaders has shown to all parties the importance of collaboration, beyond the measures devised by the government. Each individual firm considers its own interests, but all business leaders are conscient of the need for a group action. An industrial association can contribute to the solution of the market failure of innovation, as explained above (McPherson, Smith-Lovin, and Cook,2001; Nordqvist, Picard, and Pesämaa, 2010).

On the base of the diagnosis and of the identified components of the prevailing innovation ecosystem, a set of policy measures could be derived guided by the objective of contribution to the optimization of the ecosystem. A detailed program, called UNIEMPRE, was elaborated and fully described in a book by Bar-El, Leite, and Cavalcante (2014), and academically analyzed in an article by Schwartz and Bar-El (2015).

In broad terms, the main policy measures elaborated with the collaboration of the government and the academy were implemented by the local industrial association with a focus on three main issues identified as impediments to an efficient innovation ecosystem and an optimal advance in innovation activities. The first is the lack of sufficient interactions between the business sector and the academy, as well as the poor accessibility of the business sector to services offered by government. The second is the lack of appropriate, relevant information for all parties involved in the process of innovation. The third, at the micro-level, is the

low level of knowledge and skills that prevents advancement in innovation, mainly among small and medium-sized enterprises.

4.1 Improving interactions between ecosystem elements

In order to reach a better level of communication between all parties involved in the process of innovation, the following measures were initiated by FIEC:

A strategic council was established, with the participation of business leaders, academic researchers, and high-level government officials (Cavalcante and Bar-El, 2014). This council holds regular sessions approximately once a month and conducts deliberations on the best methods of interaction between the three sectors, with the objective of advancing innovation. The social meetings facilitate information flow and openness and foster the desire for joint success.

Sectoral working groups were established, beginning in three sectors (electro mechanics, construction, and chemicals), again with the participation of representatives of industry, the academy, and government (Bar-El, 2014). Such working groups are able to work out the details of collaboration on specific projects.

Regional innovation centers were established in three peripheral regions to reach businesses with low levels of accessibility (Bentolila, 2014). In each region, local academic institutions (mainly part of IFCE, the technological institute), local economic and public leaders, and a local representative of the association of industries participate in the council's activities.

4.2 Information and knowledge provision and sharing

The following actions taken by the industrial sector in collaboration with the academic sector and the government are intended to provide at least partial solutions to the lack of information regarding options for mutual collaboration, existing and new technological knowledge, relevant ongoing research, the needs of the economy, and so on.

An internet site was established for the exchange of information on innovation needs in industry and academic updates on relevant ongoing research. This site also provides current information on new technological developments around the world, economic data on demand trends for new products, and so on.

Annual open conferences on innovation are attended by all interested populations of ecosystem actors, offer presentations by innovation leaders from the state as well as from other states and countries, relevant case studies, and more.

Mapping and continuous updating of the innovation ecosystem takes place following the original identification of the ecosystem as presented above. It is assumed that the ecosystem is dynamic, continuously evolving as a response to exogenous and endogenous changes.

Joint industry-academy courses are developed in accordance with industrial needs. Such programs have already been developed with two universities where most of the students are industrialists. Other programs are intended for regular students, with the collaboration of professional industrial leaders.

Information is provided to firms on public support programs for innovation and firms are assisted in responding to calls for research proposals on innovation. Two hundred firms applied for subsidized governmental programs, but only a small number of firms fulfilled the requirements for financial support. Continuing efforts are being made in order to achieve better results, both in the field of proposal preparation by the firms and in the field of the adaption of public programs to the needs of industry.

4.3 Direct support to firms and startups

A third type of measure implemented by the industrial association in collaboration with the academy is focused on direct support to specific business activities using an outreach approach. The decision to adopt such measures is explained by the existence of one of the major factors that causes market failure in the innovation ecosystem: lack of accessibility and insufficient awareness of the prevailing relevant services and information.

An innovation agents' project was designed and implemented primarily in small and medium-sized businesses (SMEs). This is not a consultancy program in the sense that the agents are not expected to provide professional assistance in the process of creating innovation initiatives. Instead, they are expected to provide all types of support related to integration into the innovation ecosystem. Thus, they assist in such matters as improving access to relevant technological information in the state, the country, or overseas, linking the businesses to relevant researchers, locating appropriate government support and financial programs, finding relevant providers of business and legal services, and so on. Consequently, the innovation agents are not regular business consultants, but rather graduate students who were prepared in a special course designed jointly by local universities and the association of industries.

An open innovation (OI) program was designed and mainly oriented to medium and large businesses. The open innovation strategy is already quite well known and has been implemented in many countries around the world. However, planning and implementing an open innovation project still requires quite complex procedures in the fields of law and regulations, agreements, marketing, and more. The introduction of this strategy into businesses in the state of Ceara is expected to provide a strong basis for the promotion of innovation. The program began as a pilot project with two companies: a cosmetic products company and an electronics company. Both companies launched an innovation competition that invited academic researchers, students, entrepreneurs and regular citizens to propose their ideas, giving them an opportunity to actualize them and introduce them into the market. The competitions offered cash prizes. Both companies received more than one hundred applications, and prizes were awarded to the three best ideas.

5. Conclusion

The case of the state of Ceara in Brazil illustrates a typical example of the existence of a market failure that constraints the potential innovation development and economic growth. Industrial firms are aware of the need for innovation but have only limited access to knowledge created at the academy; the academy is not fully aware of the needs of the industry; the state government operates financial and regulatory tools that do not necessarily meet the needs for innovation and do not lead to a substantive collaboration between the academy and the industry.

The classical approach of the solution of the market failure through the intervention of the government is certainly productive, but apparently not sufficient. This article suggests three probably most important conclusions:

The first conclusion is that the external intervention of the government needed for the solution of the market failure should be complemented by the external (to the firm) intervention of the industrial sector, through its organizations (syndicates, associations). An industrial association has a global interest in innovation (beyond the interest of individual businesses) and possesses the tools for such intervention.

The second conclusion is that the policy measures devised for the advance of innovation should be elaborated jointly by the industry and the academy, in collaboration with the government. Permanent organizational structures (such as a joint innovation council, joint sectoral working groups) have made in the case of the state of Ceara a significant contribution to mutual flows of information between the industry and the academy, and to clear signalization of the needs to the government.

A third conclusion is that the adoption of a clear practical model for the elaboration of a policy for the advance of innovation is vital. The model shown in this research project includes the elaboration of a diagnosis, the identification of the prevailing innovation ecosystem, and the derivation of practical measures.

The case of the state of Ceara shows that such a strategy may actually be efficient. The local association of industries, jointly with the academy and with the government, have the ability to identify bottlenecks in the process of innovation, evaluate the functioning and malfunctioning of the local innovation ecosystem, and devise the measures that can contribute to the wellbeing of the sector as a whole.

This experiment led to a satisfactory improvement of the local innovation ecosystem, with better interaction between the industry and the academy, enabling the elaboration and implementation of appropriate measures focused on the main impediments to innovation. This led to the establishment of a structure of

collaboration between industry and academy, with the support of government, as well as the provision of information and knowledge to all parties involved and the clear identification of specific areas where direct support to specific businesses is most needed.

References

Bar-El, R. (2014) "Comites Executivos Setoriais", in Bar-El, R. Leite, P. S. and Cavalcante, M. C. (Eds.), Inovando no Ceara, FIEC, Fortaleza, pp 197–213 (Portuguese).

Bentolila, D. (2014) "Polos Regionais de Inovacao", in Bar-El, R. Leite, P. S. and Cavalcante, M. C. (Eds.), Inovando no Ceara, FIEC, Fortaleza, pp 293–310 (Portuguese).

Bessant, J., Alexander, A., Tsekouras, G., Rush, H. and Lamming, R. (2012). "Developing innovation capability through learning networks", Journal of Economic Geography, Vol 12, No. 5, pp 929–942.

Bjursell, C. and Engström, A. (2017) "A Lewinian Approach to Managing Barriers to University-Industry Collaboration", Higher Education Policy. pp 1–20, https://doi.org/10.1057/s41307-017-0074-4.

Cavalcante, M. C. and Bar-El, R. (2014), "O Programa UNIEMPRE: Caracteristicas Gerais", in Bar-El, R. Leite, P. S. and Cavalcante, M. C. (Eds.), Inovando no Ceara, FIEC, Fortaleza, pp 161–196(Portuguese).

Chappin, M.M.H., Hekkert, M.P., Meeus, M.T.H. and Vermeulen, W.J.V. (2008) "The Intermediary Role of an Industry Association in Policy-Making Processes: the Case of the Dutch paper and Board Industry", Journal of Cleaner Production 16, pp. 1462-1473.

Cheng, H., Zhang, Z., Huang, Q. and Liao, Z. (2018) "The Effect of University–industry Collaboration Policy on Universities' Knowledge Innovation and Achievements Transformation: Based on Innovation Chain", Journal of Technology Transfer. pp 1–22, https://doi.org/10.1007/s10961-018-9653-9.

Cukier, Daniel, Kon, Fabio, Maital, Shlomo and Frenkel, Amnon (2016) "Innovation and Entrepreneurship in the São Paulo Metropolis: The Role of Its Major University", [online], SSRN: https://ssrn.com/abstract=2834602 or http://dx.doi.org/10.2139/ssrn.2834602.

de Wit-de Vries, E., Dolfsma, W. A., van der Windt, H. J. and Gerkema, M. P. (2018) "Knowledge Transfer in University–industry Research Partnerships: A Review", The Journal of Technology Transfer March 2018, pp 1–20.

Etzkowitz, H. (2003). Innovation in Innovation: The Triple Helix of University-Industry-Government Relations, in Social Science Information, 42 (3), pp. 293-337.

Etzkowitz, H. and Leydesdorff, L. (2000) "The Dynamics of Innovation: from National Systems and "Mode 2" to a Triple Helix of University-Industry-Government Relations", Research Policy, 29 (2), pp. 109-123.

Frenkel, A. and Maital, S. (2014). Mapping National Innovation Ecosystems: Foundations for Policy Consensus. London, Edward Elgar Publishing.

Frenkel, A. (2014), O Mapeamento do Ecossistema de Inovacao no Ceara, Bar-El, R. Leite, P. S. and Cavalcante, M. C. (Eds.), Inovando no Ceara, FIEC, Fortaleza, pp 67–103 (Portuguese).

Garousi, V.; Petersen, K. and Ozkan, B. (2016) "Challenges and Best Practices in Industry-academia Collaborations in Software Engineering: A Systematic Literature Review", Information and Software Technology Vol 79, pp 106–127.

Maennig, W. and Olschlager, M. (2011). "Innovative Milieux and Regional Competitiveness: The Role of Associations and Chambers of Commerce and Industry in Germany", Regional Studies, Vol 45, No.4, pp 441–452.

Martin, S. and Scott, J.T. (2000). "The Nature of Innovation Market Failure and the Design of Public Support for Private Innovation", Research Policy, 29 (4,5), pp. 437-447.

McPherson, M., Smith-Lovin, L. and Cooke, J. M. (2001). "Birds of a Feather: Homophily in Social Networks", Annual Review of Sociology, Vol 27, pp 415–444.

Mercier-Laurent, E. (2011): "Innovation Ecosystems", Wiley.

Molina-Morales, F. X., Capó-Vicedo, J., Martinez-Fernández, M. T. and Expósito-Langa, M. (2013). "Social Capital in Industrial Districts: Influence of the Strength of Ties and Density of the Network on the Sense of Belonging to the District", Papers in Regional Science, Vol 92, No. 4, pp 773–789.

Nordqvist, M., Picard, R. G., & Pesäma, O. (2010). "Industry Associations as Change Agents: The Institutional Roles of Newspaper Associations." Journal of Media Business Studies, Vol 7, No. 3, pp 51–69.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., d'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A. and Sobrero, M. (2013), "Academic Engagement and Commercialisation: A review of the Literature on University–Industry Relations", Research Policy, 42 (2), pp. 423-442.

Perry, M. (2007). A New Look at Industry Associations as Effective Enterprise Networks, Institute for Small Business & Entrepreneurship, Glasgow, Scotland.

Schwartz, D. and Bar-El, R. (2015) "The Role of a Local Industry Association as a Catalyst for Building an Innovation Ecosystem: An Experiment in the State of Ceara in Brazil", Innovation, Vol 17, No. 3, 383–399.