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To cite this article: Tamara Yudina and Islam Geliskhanov 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **497** 012104

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Features of digital platforms functioning in information-digital economy

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Abstract. The Digital Platforms (DP) correspond to the online type of multi-sided platforms (MSP). They carry out the activity as intermediary institutes, providing the organization and facilitating interaction and an exchange between various groups of users. The digital platforms are analyzed in this work by the authors as a complex object of management. Bases for understanding the essence and distinctive features of digital platforms, and also various aspects of digital platforms functioning, including the role, functions, principles, tools and mechanisms of implementation of platform management are given. The authors show that functioning of digital platforms differs from functioning of the traditional organizations. Considering the fact that the main value on the platform is the creation of huge communities of external users, the platform companies shift a focus of their activity from the organization of internal business processes and control over internal resources to the external ones, partially or completely replacing the internal. A distinctive feature of DP functioning is the limitation of powers of authority of DP control side and lack of the centralized bottom-up management. The general DP management is not so much of a control-and-management style, as of an organization-and-stimulating and coordinating style. The conclusion is drawn that the development and deployment of management structure, a number of control mechanisms, pricing models, as well as implementation of other measures coordinated with the stage of life cycle of development, a business model and architecture of a platform are necessary for effective platform development.

1. Introduction

The information (analog and digital) economy is moving in the recent years to a new stage of development, called as the Information-Digital Economy (ID-Economy) by the authors. The digital platforms are the largest data aggregators and beneficiaries of the ID-Economy.

The digital platforms operate at micro-, meso-, macro- and mega-levels in various formats and practically in all areas of human activity.

The platform companies have a number of unique competitive advantages in comparison with traditional pipeline companies.

The digital platforms can gain tremendous market power and become the largest companies in the world within a relatively short period. The issues of effective digital platform management are becoming an extremely relevant and interesting area for research and practice taking into account the high competition between digital platforms and traditional companies, markets, industries, cross-platform competition, as well as the impact of platforms on various aspects of the economic and social life of a huge number of people.



The purpose of this study is to determine the features of digital platform functioning. The digital platforms and ecosystems of platform participants are the objects of research.

2. Methodology

There are no uniform methodological approaches to the definition of the concept, functional and other characteristics, classification of multi-sided platforms (MSP) in the economic literature. We consider it to be a more appropriate approach, according to which the multi-sided platform is a marketplace serving multi-sided markets (MSM).

The digital platforms are cyber-physical structures (organizations, systems, technologies) that focus on value creation by providing and facilitating direct interaction and exchange between two or more groups of external users within a single digital ecosystem [1].

The digital platforms are considered by different researchers both as business models and as technological structures [2, 3, 4].

The digital platforms can be attributed in terms of the institutional economy to a new category of economic institutions [5]. DP can contribute to a significant reduction in various kinds of transaction, transformation and other types of costs [6].

MSM platforms are characterized by the presence of network effects, which can be direct and cross, positive and negative [7, 8]. Network effects can provide a powerful, highly profitable and long-term platform growth [9, 10].

The problem of “chicken-or-egg” arises as a rule when running platforms and network effects, i.e. the need for simultaneous recruitment of a critical mass of users from different sides of the platform [11]. To solve this problem, platform companies use different strategies [12].

The platform can set prices for individual parties of users below marginal costs and even negative prices (discriminatory approach) to maintain and develop network effects.

The main actors on the platform are: sponsors (platform owners, providers (platform managers), complementors (developers of root and peripheral components and applications) and end-users (external DP users, for example, suppliers, consumers, etc.).

Depending on the number of sponsors and providers various DP management models can be formed: proprietary, joint venture, licensing, shared models [12, 13]. These models reflect the degree of DP openness.

The features of functioning digital platforms are significantly different from the functioning of classical organizations.

The main tools for DP management are formal and informal rules (laws and regulations), DP design elements, and market instruments [12]. Various self-management tools are also widely used by DP user ecosystems.

Operational and high-quality information and statistics are necessary for the effective functioning of digital platforms. Key indicators that assess the current state of the platform should be selected in the right way based on the life cycle stage development, the business model and the DP architecture.

3. Results and discussion

Strategic development of digital platforms is carried out according to certain principles and rules, as well as in accordance with the stages of the life cycle of DP development.

A comprehensive analysis of the current phase of the DP development can be determined by using such dimensions for the evaluation of development of technological products and processes, as Dominant design [14], Diffusion curve [15], S-curve and Leapfrogging [16]. The stages of the digital platforms lifecycle based on these dimensions can be as follows (see figure 1):

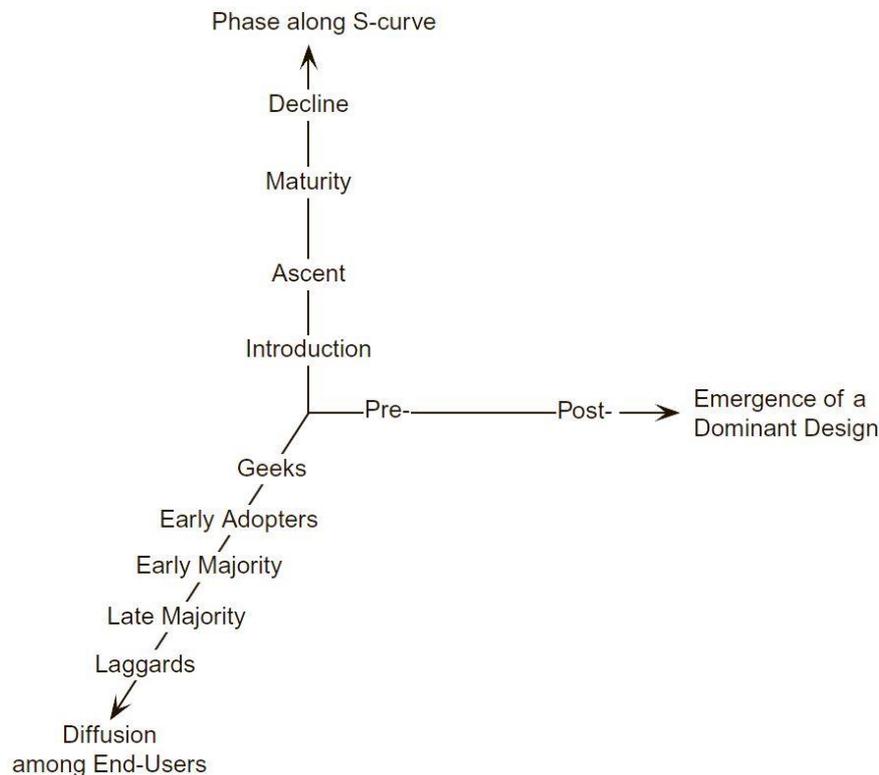


Figure 1. Three dimensions of the platform lifecycle [17].

A distinctive feature of DP functioning is the limited power of the DP manager and the lack of centralized top-down management (in the form of a pyramid), which occurs, as a rule, in traditional companies.

The general style of DP management is not so much control and management, as the organization, stimulation and coordination. This is due, first of all, to the fact that the DP members are not the hired employees, but the free agents. Thus, DP management is constrained to influencing the ecosystem of DP users [17, 18]. In turn, the users can also have some direct or indirect influence on the decision-making system within DP management.

The goal of DP development should be the formation of a platform ecosystem and its impact, rather than the direction control of its development [19].

The DP functioning and management mechanisms depend significantly on its DP architecture. As a rule, the degree of coherence of the management structure with the current lifecycle development stage, the business model and the DP architecture affect the degree of its effectiveness.

At the same time, if the improvement of the architecture is aimed at reducing the complexity of the structure of the DP, improving management can lead to a decrease in the complexity of the DP participant ecosystem, the characteristics of their interaction and behavior [17]. In addition, DP management determines whether the innovation “divisibility” has been improved by using a multi-sided module DP design [20, 21].

In order to ensure an efficient functioning of the ecosystem of users, sponsors and managers of DP (the managing party) should implement the following interrelated measures [17]:

1. Ensuring that the decision-making authority (power and authority, commitment, responsibility zone) is divided between the managing party and the DP members (complementors, end-users, etc.) setting the priority of the first or second party for making specific types of decisions [22].

With the priority of the first party, a centralized decision-making system is observed, with the priority of the second party the decentralized decision-making system is observed. Only centralized or only

decentralized systems are rarely found in practice. Mixed decision-making systems with an orientation toward one of these parties are mainly common.

In order to avoid confusion with a multitude of classes and types of decisions and the distribution of decision-making rights, as a rule, complex sets of rights to make decisions are formed. These can be, for example, the sets of decision-making rights for the issues related directly to the platform, a separate set of add-ons, DP modules and applications, and other types of sets.

2. Formation of DP control handlers for DP participants by the managing party, for example, through combinations of various GPMR mechanisms (Gatekeeping, Process, Metrics, Relational), which ensure the convergence of goals and coordination of activities of various DP participants [17].

These formal and informal mechanisms are designed to provide continuous procedures that reward for positive actions and impose sanction for the negative actions of DP members in accordance with the standards of behavior of DP participants [23].

The formal “Gatekeeping” mechanism consists in the primary filtration of modules, applications, products, services, and even DP members.

In accordance with the formal mechanism of “Process”, incentive and penalty tools for platform users are established based on the degree of compliance with the formal rules and procedures established by the DP.

In order to determine the extent to which additions correspond to the platform, products and services of DP participants (complementors, end users, etc.), the established DP criteria and performance targets use the formal “Metrics” mechanism.

The informal “Relation” mechanism determines the extent to which the DP governing party relies on common norms and values with the DP participants, including the aim of influencing their behavior. The common mission, values and collective goals of the platform ecosystem serve as a “core” and a unifying factor for the platform participants, and also set a definite pathway for the development of the DP. Relational control is a relatively low-cost control mechanism and is used, as a rule, in more open platform models (for example, Wikipedia authors' communities or Linux developers).

3. Formation of a pricing and income distribution policy between the platform and its participants (complementors, end-users, etc.).

As noted earlier, the dynamics of the transactions carried out within the framework of the transaction are significantly influenced by the pricing structure – differentiated prices, set separately for each side of the platform [20, 24]. This approach is similar to price discrimination of the third degree, but it has its differences [1].

In addition to the discriminatory approaches of the platform, combinations of membership fees and transaction fees are also used. The membership fees usually have fixed rates and are not dependent on further activity of the participants (for example, payment of a subscription), transaction fees have dynamic rates [24, 25].

The pricing policy, as well as the management structure, must be coordinated with the business model, the stage of a life cycle and the platform architecture.

Thus, summarizing the above as results, it can be noted that the role and functions of digital platform management are, first of all, in the development of weighted conceptual management decisions on such issues as:

- development of DP management structure and control mechanisms;
- development and improvement of DP architecture;
- determination of the number of DP parties and formation of user networks;
- determination of mechanisms for support and development of network effects;
- development and improvement of pricing models;
- ensuring a high level of interaction and exchange between parties;
- ensuring the movement of information, goods and services between parties;
- ensuring the security, transparency and “density” of the platform markets;
- determination of the optimal degree of DP openness;
- determination of strategies for cross-platform competition;

- management of various risks (reducing the occurrence of “failures” of platform markets, loss of competitive positions, lack of network effects, technical failures, etc.);
- ensuring the internalization of the positive contribution and innovations created by each of the DP participants (developers, manufacturers, consumers, etc.);
- maintaining a balance between freedom and control of platform participants;
- provision of prompt receipt of qualitative information about the platform and ecosystem of users,
- as well as many other issues and problems.

Thus, the distinctive features of the functioning of the DP in the context of ID-economy are reflected as a result of this research:

1. The correlation of successful development of the DP with the lifecycle of the development of the DP as well as certain principles and rules is reflected.
2. Established the limited powers of the governing party of the DP.
3. Established the need to develop a platform ecosystem.
4. The necessity of differentiation of powers and rights between various parties of the participants of the DP is established.
5. Established the need for the formation of control mechanisms for DP users’ networks.
6. The necessity of forming the correct pricing policy and income distribution between the DP and its participants is established.

4. Conclusion

The functioning of digital platforms is different from the functioning of traditional organizations. Taking into consideration that the main value of the platform is to create large communities of external users, platform companies shift the focus of their activities from organizing internal business processes and controlling internal resources to external ones, partially or completely replacing the internal ones.

A distinctive feature of DP functioning is the limited power of the DP managing side and the lack of centralized top-down management. The general style of DP management is not much control and management, as organizational, stimulating and coordinating.

For efficient development of the platform, it is necessary to develop and implement a management structure, a number of control mechanisms, pricing models, as well as implement other measures agreed upon with the stage of the life cycle development, business model and platform architecture.

The optimal management structure for the DP is considered to be a management structure with a minimal complexity that ensures the achievement of the goals of the platform with minimal costs for both the platform and its participants.

5. Directions for further research

As directions for further research, it is planned to study problematic issues:

1. Features of pricing within digital platforms
2. Features of competition between digital platforms in terms of game theory.
3. Institutional factors in the development of digital platforms.

References

- [1] Osipov Y M, Yudina T N and Geliskhanov I Z 2018 *Journal of Economic Strategies* **5** (155) 22–29
- [2] Gawer A, Cusumano M A 2013 *Journal of Product Innovation Management* **31** (3) 417–433
- [3] Gawer A 2014 *Research Policy* **43** (7) 1239–1249
- [4] Saarikko T 2015 Digital platform development: A service-oriented perspective <https://pdfs.semanticscholar.org/31de/f6bce31e14505a4eca3c65429dfbdc487632.pdf>
- [5] Geliskhanov I Z, Yudina T N 2018 *Quality-Access to Success Journal* **19** (S2) 20–26
- [6] Geliskhanov I Z 2018 *Proc. of the Annual Scientific Conference “Lomonosov Readings-2018”* 148–149
- [7] Katz M and Shapiro C 1985 *American Economic Review* **75** (3) 424–440

- [8] Liebowitz S and Margolis S 1994 *The Journal of Economic Perspectives* **8** (2) 133–150
- [9] Hagiu A and Alvarez H 2014 *Investing in online marketplaces* (Boston: Harvard Business School)
- [10] Tauscher K 2016 Business Models in the Digital Economy: An Empirical Classification of Digital Marketplaces, https://www.imw.fraunhofer.de/content/dam/moez/de/documents/Working_Paper/Working_Paper_Digital_Marketplaces_final.pdf
- [11] Caillaud B and Jullien B 2003 *RAND Journal of Economics* **34** (2) 309–328
- [12] Parker G G, Van Alstyne M W and Choudary S P 2016 *Platform Revolution: How Networked Markets are Transforming the Economy and How to Make Them Work for You* (New York: WW Norton & Co)
- [13] Eisenmann T R 2008 *California Management Review* **50** (4) 31–53
- [14] Anderson P and Tushman M 1990 *Administrative Science Quarterly* **35** 604–633
- [15] Rogers E 1995 *Diffusion of Innovations* (New York: Free Press)
- [16] Adner R and Levinthal D 2001 *Management Science* **47** (5) 611–628
- [17] Tiwana A 2014 *Platform Ecosystems: Aligning Architecture, Governance, and Strategy* (San Francisco: Morgan Kaufmann Publishers Inc)
- [18] Schilling M A 2005 *Strategic Management of Technological Innovation* (Boston: McGraw Hill)
- [19] Williamson P J and De Meyer A 2012 *California Management Review* **55** (1) 24–46
- [20] Rochet J-C and Tirole J 2003 *Journal of European Economic Association* **1** (4) 990–1029
- [21] Boudreau K 2010 *Management Science* **56** (10) 1849–1872
- [22] Athey S and Roberts J 2001 *American Economic Review, American Economic Association* **91** (2) 200–205
- [23] Evans D and Schmalensee R 2007 *Competition Policy International* **3** (1)
- [24] Rochet J-C and Tirole J 2006 *The Rand Journal of Economics* **37** (3) 645–667
- [25] Armstrong M 2006 *The RAND Journal of Economics* **37** (3) 668–691