

“Qualified Customer” - Demand Management Model for Research and Development

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Abstract — The article is devoted to the problem of a “qualified customer” model development in Russia as a relatively new tool of state science and technology policy aiming to improve the efficiency of state and extrabudgetary R & D expenditures, as well as to increase the level of commercialization of intellectual activity. The main conceptual provisions of the “qualified customer” model suitable to Russian conditions are identified based on the analysis of Russian and foreign experience in the development of the R & D sector, numerous approaches and attitudes to the subject.

Keywords — *qualified customer, research and development, R & D, science funding*

I. INTRODUCTION

The necessity of increasing the amount of funding for Russian science and creating flexible mechanisms for state participation in the financial support of the R & D sector has been a popular subject of studies for a long period of time. This includes the non-losing relevance of stimulating private investors' activity along with the growth of government spending [1].

However, nowadays, solving the problem of determining the main outlines and content of the research and development financing model, simultaneously introducing the practice of progressively increasing financial support for the R & D sector, it is especially important to answer the question of the distribution of these funds, considering the nature of the links between the various elements of the system. At the same time the correlation of the research work carried out with the goals and objectives set by scientists and developers on the part of the sponsoring organizations being R & D customers has fundamental importance. The main problems lies in setting up the process of placing the order for research and development providing the participation of experts from different sectors

and areas of knowledge according to the modern requirements of the economy and business, followed by the application of the obtained developments in creation of new, high-tech products for domestic and export markets. In addition, the focus on the regional aspect is considered significant while dealing with the processes of research and development studies, requested by interested parties, and the creation of competitive products, taking into account the existing scientific and technological potential and the efficiency of scientific and technical activities of certain territories.

II. MATERIALS AND METHODS (MODEL)

In retrospect of 20-30 years, the financial model of the Russian research and development sector has undergone significant changes, including the link of R & D funding to the final performance of research organizations [2]. In the period of 1992-2004 a trend of reducing the volume of state R & D funding through the ministries and departments has taken place, while the amount of funding for targeted budget funds to support scientific, technical and innovative activities has been growing. Competitive procedures for financing science and technology have been further developed both through funds and within the framework of the state task.

In the last 10-12 years, attempts to increase public budgeting of basic and applied research in Russia have been made. Especially high growth rates are noted for applied research in 2008–2013 [3]. However, the oil crisis of 2014 with the subsequent ruble devaluation, as well as Western sanctions, significantly squeezed the federal budget capacity, which, in the absence of civil science as one of the key priorities of national policy, had a negative impact on state financial support for research and development. This led to a reduction in the growth rate of science expense from the federal budget, and a fall in the volume of federal expenditures

on both fundamental and applied research in 2015-2017. The incoherent federal spending on research developed a reduction in the growth rates of funding for basic research during certain periods with an increase in spending on applied science (2011-2012) and vice versa (2016-2017).

Another problem Russia has been facing for a long time is the concentration of the main volume of domestic expenditures on R & D on the territory of a limited number of country regions, namely three constituent entities: Moscow, the Moscow Region and St. Petersburg. Since 2010 to 2017, the share of domestic R & D expenditures in a number of regions has slightly increased in the total volume, for example, in the Nizhny Novgorod Region (from 6.0% to 7.5%), the Sverdlovsk Region (from 2.4% to 3.2%), the Ulyanovsk Region (from 1.0% to 1.3%), etc. However, Moscow still compiles more than 35% of the total domestic expenditures on research and development in the country, the Moscow region and the city of St. Petersburg combined - more than 20%.

Meanwhile, there are regions in the country with high scientific and technical potential, experiencing imbalance of the research and development expenditures and scientific, industrial and innovative capabilities. Thus, in 2017 the share of the Novosibirsk region in the total country domestic expenditures on R & D was only 2.1%, the Tomsk region - 1.4%; the Tyumen region and the Republic of Tatarstan - 1.6% each; the Rostov region - 1.3%; the Volgograd region - 0.4% [4].

At the same time, the efficiency of scientific and technical activities in federal districts, that include the specified subjects of the Russian Federation, is comparable, and in some cases exceeds the efficiency of scientific and technical activities in Moscow, the Moscow Region and St. Petersburg. Thus, the number of scientific articles, published in journals of the Web of Science database, per 100 researchers represents 11.3 units in the Central Federal District (including Moscow and the Moscow Region), in the North-West Federal District (including St. Petersburg) - 13.2 units, while in the Siberian Federal District (including Tomsk and Novosibirsk regions) - 25.7 units; in the Urals Federal District (including the Tyumen Region) - 10.8 units, in the Volga Federal District (including the Republic of Tatarstan) - 10.7 units, in the Southern Federal District (including Rostov and Volgograd Regions) - 8.6 units [5]. The number of patent applications per 100 researchers and developers in the Central Federal District (including Moscow and the Moscow Region) is 6.2 units, in the North-West Federal District (including the city of Petersburg) - 4.5 units, while in the Siberian Federal District (including the Tomsk and Novosibirsk Regions) - 6.8 units; in the Urals Federal District (including the Tyumen Region) - 4.5 units, in the Volga Federal District (including the Republic of Tatarstan) - 6.9 units, in the Southern Federal District (including Rostov and Volgograd Regions) - 11.3 units [6]

As part of the development of program-targeted budget planning tools for R & D expenditures and the implementation of the Federal Target Program "Research and Development in Priority Areas for the Development of the Scientific and Technological Complex of Russia for 2014-2020" (hereinafter referred to as the FTP, FTP "Research and Development")

requirements for private investors were alleviated. Thus, private investors' share in total amount of planned financial expenses was reduced from 20.5% in 2014 to 19.4% in 2020 [7]. At the same time, in a similar federal program, approved for the period 2007-2013, the share of all planned extrabudgetary expenditures was about 60.6% [8].

The inertia and non-systemic development of the research and development sector in the 90s and early 2000s, as well as the fragmentation of comprehensive measures of its state support in that period, affected the productivity of the modern scientific and technological sphere and its "inclusion" in the country's economy, weak connection of science, government and business [9]. Nowadays there is still a high proportion of state budget financing of the scientific and technological sphere. Occupying the 11th position in terms of gross domestic product among other countries in dollar equivalent, Russia ranks only 27th in the world in terms of exports of high-tech products, while in 2002 the country was 24th via this indicator [10]. Considering the ever-increasing role of technology in production, this trend emphasizes the need to allocate new approaches in public funding of the R & D sector, as well as in the practice of interaction between science, business and the state.

Conducted analysis of foreign experience allows us to conclude that active cooperation between the concerned parties forms the basis of financial policy in the scientific and technological sphere abroad. In many cases, the cooperation of the state, business and science is carried out through scientific foundations, institutions, and venture companies, dispersed over a large number of regions and territorial entities of the country. The role of customer of the results of intellectual activity (hereinafter referred to as RIA) in these projects is offered to business, the role of executor - to the scientific and educational sector, and the role of initiator - to the state. At the same time, the customer, represented by business entities, coordinates and manages specific scientific and technical projects, while the state is given the role of coordinator of scientific and technological programs these projects are carried out for. The network principle of such interaction is noted in the structure that generates constant updates (in the concept of the "triple" models, and then the "quadruple" and "five" spirals) with scientific and educational sector (universities) accepting one of the leading roles [11], and the mechanism of project financing put in use, allowing business to act as an active investor, and the state as a financial guarantor, a party ensuring that private companies receive benefits and preferences [12].

The Strategy for Scientific and Technological Development, approved by Decree of the President of the Russian Federation of December 1, 2016 № 642 [13] (hereinafter referred to as the Strategy), is a strategic document aiming to create a modern management system in the field of science, technology and innovation, ensuring the appeal to the research and development sphere.

In the structure of financing research and development, the entrepreneurial sector reaches 344.8 billion, or about 33.8% of the total internal research and development costs (IRDC) (meanwhile budget funds amount to about 268.8 billion rubles

forming the dominant share) [14]. At the same time, there is a low level of demand for both Russian patents and Russian technologies in the world (only 190 technologies new to the world were created in 2017).

The emerge of new intellectual activity results and their legal protection in foreign markets precedes the material movement of goods and services [15]. One of the fundamental tasks of the state policy in the field of the scientific and technological development of Russia indicated in the Strategy is the “budget funds managers’ transition to the “qualified customer” model (subparagraph “b” of paragraph 34 at the Strategy). That implies the creation of a bilateral artery between business and science through state management controlling the demand formation for the results of scientific activity. The state forms a list of scientific tasks initiated by the business and provides full or partial funding (depending on the stage of the project life cycle) of research projects aimed at solving these tasks by the scientific community. This allows to create scientific results necessary for specific economy sectors development. This model has been partially tested in the FTP “Research and Development”.

However, relevant work experience in corresponding ministries, departments and other state organizations, that are the main investors in the R & D sector in Russia, is only being formed nowadays. So, for example, the result of R & D is a result that can be used in further studies of both fundamental and applied orientation. Often, such results represent only generalized conclusions that do not carry practical significance, contributing to the emergence of a “gap” between the performance indicators of scientific studies and socio-economic problems the state faces, that are supposed to be solved with the support of state funds. The “qualified customer” model should also contribute to the elimination of such “gaps”, including through the balanced development of the regions of the country.

The national project “Science” states the task to create at least 15 world-class scientific and educational centers by 2022 (5 centers - in 2019) within the framework of the development of scientific and research-and-production cooperation in the country, as well as the task to create 14 centers of competence of the National Technology Initiative (hereinafter referred to as NTI) by 2021 [16]. These tasks are to be implemented on the base of integration of universities and scientific organizations and their cooperation with organizations operating in the real economy.

The course to create regional points of growth of scientific and technological development through the large infrastructure projects with the scientific, industrial and educational component seems to be an important decision of the Russian Government, but requires clarification in terms of approaches to the implementation of the stated task. It should be noted that in 2000-2018. Russia has launched a large number of state instruments to support science, technology and innovation in the regions, including the construction of special economic zones of technology-innovative type, the creation of technology parks in the field of high technologies, as well as territorial innovation clusters and industrial parks. However, the task, set by the Decree of the President of Russia

of May 7, 2012 № 596, to increase the share of high-tech products and industries in the gross domestic product by 1.3 times by 2018 compared to 2011 [17], that is to 25.6%, has not been achieved. In fact, the figure increased to 21.6%.

It is necessary to take into account the results of studies confirming the need for targeted support for researchers and developers, including through tax incentives for businesses to invest in R & D [18, 19], as well as the need to effectively develop and use the space of the Russian Federation, including by overcoming imbalances in the socio-economic development of the country (subparagraph “e” paragraph 15 of the Strategy for Scientific and Technological Development). Consequently, it is expedient to implement an integrated approach in the development of the science and technology sphere simultaneously stimulating large infrastructure science and technology projects in the regions of Russia and providing incentives and preferences to innovative companies and scientists in such regions. An integrated approach also implies the need to consider the peculiarities of projects, planned in the constituent entities of the Russian Federation, taking into account their regional characteristics – industrial, personnel, institutional, as well as such a parameter as the effectiveness of regional science.

The nature of the “qualified customer” model as a mechanism aimed at the development of the R & D sector and the commercialization of the RIA simultaneously takes into account the interests of the state, science, business and education and allows to implement the described integrated approach to managing the demand for research and development.

III. RESULTS AND DISCUSSION

Based on the analysis the following conclusions are made.

A. Effective communications and interactions between science, government and business are currently not developed enough in Russia. A new approach to financing the R & D sector is required

Nowadays Russia continues to experience low efficiency of interaction between science, business and the state in the implementation of research projects, along with a high proportion of R & D funding from the state and small amount of high-tech sector in the economy.

B. In the Russian R & D sector the majority of financial resources are concentrated in a limited number of regions, while risks of further underfinancing of the R & D sector in Russia arise

Russian research and development sector in retrospect of 20-30 years is not stable in terms of the dynamics and parameters of financing from the state and business. This condition, worsen by budgetary constraints, creates risks of subsequent decrease of financing of the scientific and technological sphere in Russian Federation as well as its certain entities. The main volume of financial resources (more than 55%) accounts for only three regions of the country – Moscow (more than 35%), Moscow region (more than 10%) and St. Petersburg (more than 10%). Other regions of Russia,

possessing high scientific, technological and production potential and demonstrating high efficiency of scientific and technical activities, represent significantly lower domestic R & D expenditures, even taking into account the growth of this indicator in some regions in the last 10 years.

C. The “qualified customer” model can represent the new approach to financing the R & D sector, that should provide a new level of interaction between science, government and business

The model of a “qualified customer” should include research and educational institutions and organizations of the real sector of the economy, that provide ordering, evaluating and expertise of R & D results and bear financing and commercialization obligations (co-financing) of intellectual property (IP).

D. The principle of partnership between organizations of different fields of activity should be implemented as part of the “qualified customer” model

Within the framework of the creation and development of the “qualified customer” model, cooperation between the state, science, education and business should be based on “partnership” and carried out through a wide range of different types of organizations. Being long-term, this cooperation should include the creation, development and (or) improvement of joint scientific and production enterprises (complexes, centers), as well as the implementation of large state-scale projects.

E. The “qualified customer” model should be based on the expertise of scientific and technical programs and projects

The model of a “qualified customer” should involve participation of experts from different sectors and fields of activity in the process of practical application of gained knowledge and developments, including the creation of high-tech products and services and their further promotion to new markets.

F. The model of a “qualified customer” should include the definition of specific functions for each of its elements, as well as the nature of the relationships between them

State organizations in the “qualified customer” model should exercise a curatorial (coordination) function in managing the research and development process using public funds in terms of determining the priorities of scientific and technological development (set out in the Strategy), as well as partial or full funding of selected projects. In order to implement scientific and technical projects the business sector (organizations of the real economy) acts as a guarantor of commercialization and implementation of the received RIA, and can act as an investor (co-investor). The state might also act as a guarantor of the provision of privileges and preferences for commercial companies in the event of their participation in the “qualified customer” model.

G. The development of world-class scientific and educational centers and competence centers of NTI in Russia should be an incentive for the growth of demand for R & D in the regions, but this development should be implemented within the framework of an integrated approach.

The tasks of the Russian Government to create world-class research and education centers and NTI competence centers should be addressed as part of an integrated approach, taking into account the need for targeted support for innovatively active business through tax incentives for companies investing in research and development. The development of large-scale infrastructure science and technology projects should be carried out via the model of a “qualified customer” and consideration of flexible application depending on regional social, economic, production, scientific and educational features. The amount of funding for research and development in the framework of the creation of world-class research and education centers and the NTI competence centers should depend on the effectiveness of regional science. Among other factors, the performance indicators of scientific and technical activities, comparable with Moscow, the Moscow Region and St. Petersburg, and in some cases exceeding figures in other regions of the Russian Federation, in particular, in the Novosibirsk Region, the Tomsk Region, the Tyumen region, the Republic of Tatarstan, the Rostov region and the Volgograd region, should be noted.

IV. CONCLUSION

The management system in the field of science, technology and innovation with a tendency to the active interaction of science, business, and the state in the Russian Federation is at the stage of active formation. The “qualified customer” model is a promising instrument of the state science and technology policy in the country and its regions, aimed at increasing the efficiency of state and extra-budgetary expenditures on research and development, as well as on increasing the level of commercialization of the R & D sector. The inclusion of the real sector of the economy, representatives of the state, as well as the scientific and educational complex in this model as key elements having specific roles and functions is a necessary condition.

At the same time, there is a need for further development of individual characteristics and properties of model elements variations, that should be made the subject of further research.

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