

Artículo de investigación

Development of mechanisms for state support of innovative activities

Развитие Государственного Стимулирования Инновационных Проектов

Desarrollo de mecanismos para el apoyo estatal de actividades innovadoras

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Abstract

The purpose is to substantiate the development of mechanisms for state support of innovative activities. Methodology: analysis, comparison and integration of data from Rosstat, specialized statistical methods for processing economic data. Results. The authors suggest a basic typology of regulatory operations of government bodies concerning the innovation sphere. The study presents a conceptually structured sphere of formation and implementation of innovative operations in Russian economy functioning with a focus on industrial production. This paper provides the analysis of basic regulatory framework orders in this area along with arising problems considering the typified operators behavioral models materialization and develops innovations in this regulation. The recommendations would provide for the practice of financial services, the implementation of state support for innovation activity in the country, its

Аннотация

Цель исследования: обоснование проекта государственного стимулирования инновационных проектов в Российской Федерации. Методология: анализ, сравнение и обобщение данных Государственной службы статистики Росстата, специализированные статистические методы обработки экономических данных Росстата. Результаты. Авторы предложили первичную классификацию способов регулирования инновационной активности со стороны государственных органов и понятийную сетку сферы создания и осуществления инновационных действий в современных российских социально-экономических реалиях с акцентом на индустриальном секторе. Статья содержит анализ основных регламентов нормативно-правового регулирования в и их производных, а также

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current state assessment as well as the identification of weaknesses and the adjustment of mechanisms for state support for innovative activities. Conclusions. The use of statistical data and empirical research results allows describing the current situation in the field of state support for innovative activities in Russia, which has both positive and negative features. It is necessary to introduce an institution of public order and ensure monitoring of all proposals for scientific research public orders' formation; synthesize scientifically based mechanisms for innovation and legal regulations of its operation. These measures could become meaningful factors in the increasing social and economic stability.

Keywords: Innovative environment, government regulation, legal regulation, competitive organization of innovation processes.

возникающих препятствий; разработаны новые способы регулирования. Практическая значимость. Рекомендации предназначены для практики финансовых служб, осуществления государственной поддержки инновационной деятельности в стране, оценки текущего состояния, а также выявления слабых сторон и корректировки механизмов государственной поддержке инновационной деятельности.

Выводы. Использование статистических данных и результатов эмпирических исследований позволяет описать складывающуюся ситуацию в сфере государственной поддержки инновационной деятельности в Российской Федерации, обладающей как положительными, так и отрицательными чертами; необходимо создать институт социального заказа и обеспечения прозрачности всех инициатив по созданию социального заказа на исследовательские проекты; синтезировать научно обоснованные механизмы инновирования и нормативно-правовых регламентаций его функционирования. Эти меры могут стать значимым фактором повышения социально-экономической стабильности.

Ключевые слова: Среда инноваций; новации; государственный контроль; нормативно-правовое регулирование; конкурсный формат инновационной деятельности.

Resumen

El propósito es corroborar el desarrollo de mecanismos para el apoyo estatal de actividades innovadoras. Metodología: análisis, comparación e integración de datos de Rosstat, métodos estadísticos especializados para el procesamiento de datos económicos. Resultados Los autores sugieren una tipología básica de las operaciones reguladoras de los organismos gubernamentales en relación con la esfera de la innovación. El estudio presenta una esfera de formación e implementación conceptualmente estructurada de operaciones innovadoras en la economía rusa que funciona con un enfoque en la producción industrial. Este documento proporciona el análisis de los órdenes del marco regulatorio básico en esta área junto con los problemas que surgen considerando la materialización de los modelos de comportamiento de los operadores tipificados y desarrolla innovaciones en esta regulación. Las recomendaciones proporcionarían la práctica de servicios financieros, la implementación del apoyo estatal para la actividad de innovación en el país, su evaluación estatal actual, así como la identificación de debilidades y el ajuste de mecanismos para el apoyo estatal para actividades innovadoras. Conclusiones El uso de datos estadísticos y resultados de investigaciones empíricas permite describir la situación actual en el campo del apoyo estatal para actividades innovadoras en Rusia, que tiene características positivas y negativas. Es necesario introducir una institución de orden público y garantizar el seguimiento de todas las propuestas de investigación científica para la formación de órdenes públicas; sintetizar mecanismos con base científica para la innovación y las regulaciones legales de su operación. Estas medidas podrían convertirse en factores significativos en la creciente estabilidad social y económica.

Palabras clave: Entorno innovador, regulación gubernamental, regulación legal, organización competitiva de procesos de innovación.

Introduction

To date, the Russian economy is in a state of permanent systemic crisis, including the innovation crisis. This is due to the critical condition of national innovators and pioneers, as well as operators belonging to the field of specific kind of security innovative activity. (Alandarov, 2017). Based on Rosstat data, the number of Russian enterprises that can act as critical pioneers (producers, donors of innovations) and as critical innovators (consumers, recipients of innovations) (Science and Education Statistics, 2017) is unacceptably low. This applies both to domestic and non-Russian innovation processes.

This circumstance is associated with a catastrophic decrease in managerial capacity of, at least, domestic innovators and pioneers who make management decisions on innovations, as well as the fact that access of domestic enterprises to foreign markets of innovative products is now significantly limited or even closed for some items. This happened due to unresolved qualitative, marketing and reputational issues, as well as due to the existence of direct and derivative self-valued limitations under the anti-Russian sanctions – both implemented and those expected to be implemented. There is no doubt that the global market for innovations for Russian enterprises is still sufficiently open in both directions. However, first, the decisions on innovative projects are not made competently enough, secondly, this market already has forbidden for access and rapidly expanding inaccessible segments of critical innovations, and, thirdly, Russian pioneers and innovators are generally related to the typified characters of the past innovation era.

Literature Review

To date neither selling nor buying any of the most remarkable technologies has been physically available on the global market for a very long time. Unfortunately, there was a noticeable and hardly avoidable reverse technological separation of the Russian economy from economies of the most developed countries. Most technologies used in Russia comprise acquired or copied technological products, often with fundamental simplifications (Alandarov, 2017). Moreover, an increasing number of Russian pioneers and innovators suffer from a significant depletion of financial and economic potential, allowing for an exceptional focus on “short-term” and local innovation projects. The

increased competition even in those regions previously considered unimportant due to Russia's inevitable connection to the WTO regime is another crucial factor.

This situation is fundamentally unacceptable under the social development of the Russian society as well as for ensuring the national security. There could be many ways out of the situation, but an indispensable and essential component of innovation recovery is a competent government policy, which materializes mainly in state regulation of innovation operations.

The issues related to the state regulation of innovation activity began to be widely studied after the Second World War when governmental intervention in scientific and technical sphere has increased. Arrow has made a significant contribution to the substantiation of the need for state support of innovative activities. He created the Arrow-Romer model – an endogenous model of economic growth that shows steady economic growth based on technical progress resulting from on-the-job training of workers (Arrow, 1962). Among Russian scientists involved in solving problems of innovation and government regulation of innovation, we can distinguish Dmitriev's work on strategic problems and areas of progressor rehabilitation of the control systems of the high-tech complex of Russia (2017), Zolotov's program of anti-crisis management innovation in the high-tech enterprise of the Russian industry (2017), and Rysin's suggestions for solving inter-sectoral social and economic problems of an innovative economy formation (2017).

Ryzhakov has developed the ways of solving problems of formation of regional innovation systems and state regulation of their functioning (2017). Savanovich evaluated the state of innovation security in the region based on the use of a system of criteria and indicators (Savanovich, 2017). Sapegno analyzed the formation of agro-industrial clusters as a prospect of the region's innovative development (Sapegno, 2017). Safronova & Yushin demonstrated the role of innovative development of the region in ensuring food security (Safronova & Yushin, 2017).

The researchers tried to answer the question of how government financial incentives affect the company's innovation, but their research results provide mixed results (Carboni, 2017). Some men of science argue that extended government

financial support is often better perceived than the smaller one (Lerner, 2000). However, others suggest that government financial incentives have several shortcomings, such as their role in replacing firms' innovation costs (Zhang & Wu, 2014).

The researchers tried to reconcile these conflicting views in at least two different ways. First, the previous studies showed that the effectiveness of government support for private innovation activity might vary depending on several factors. In particular, studies have shown how industry conditions, institutional factors of countries, and characteristics of firms (for example, type of ownership, size of owned assets, and so on) can interfere with the relationship between government financial incentives and innovation (Lach, 2002; Mani, 2002; Huelgo *et al.*, 2016).

Secondly, scientists have found that the innovative effect of public financial incentives may depend on the level of these incentives. Government financial incentives are positively associated with innovation. Performance is expressed as an inverted U-shaped link between government financial incentives and innovation results up to a certain threshold, above which the incentives positive effect will gradually decrease and become negative over time. The present study takes a different approach to reconcile current conflicts and contributes to the ongoing work of the government in resolving fiscal policies. Governments use a wide range of tools

to stimulate innovation, such as tax credits, research and development subsidies and individual loans. Assessing the impact of subsidies and tax credits make sense because they are primary, but separate policy instruments (Qiu & Tao, 1998). Government stimulation of the innovation activity of private companies contributes to the growth of innovation activity to a certain level, after which the degree of influence and the positive effect of innovation decrease (Guan & Yam, 2015).

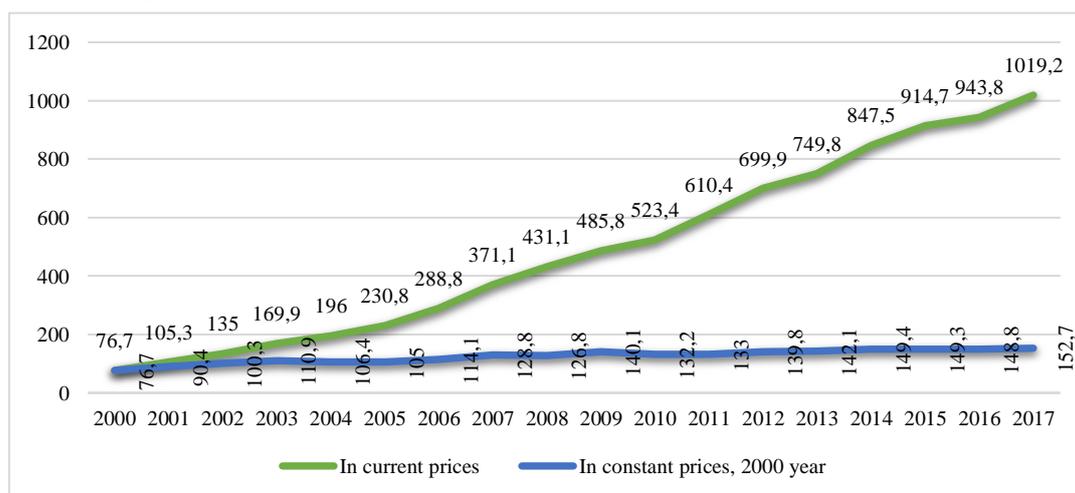
Methodology

The works of Russian economists in the field of innovative development of the economy, financial support for innovation, regulation of budgetary processes, as well as regulatory, methodological, and legal documents regarding the chosen research topic became the theoretical and methodological foundation of this study. Universal methods of cognition such as analysis, synthesis, induction, deduction, empirical description, graphical analysis, historical method based on statistical data have been chosen as the research methods.

Demonstrations

As part of the innovation state support measures justification, we shall consider the state of the innovation sector of the Russian economy. To begin with, we shall consider the volume of state-financing of innovation activities for 2000-2017 (Figure 1).

Figure 1. Dynamics of domestic research and development costs (billion rubles)

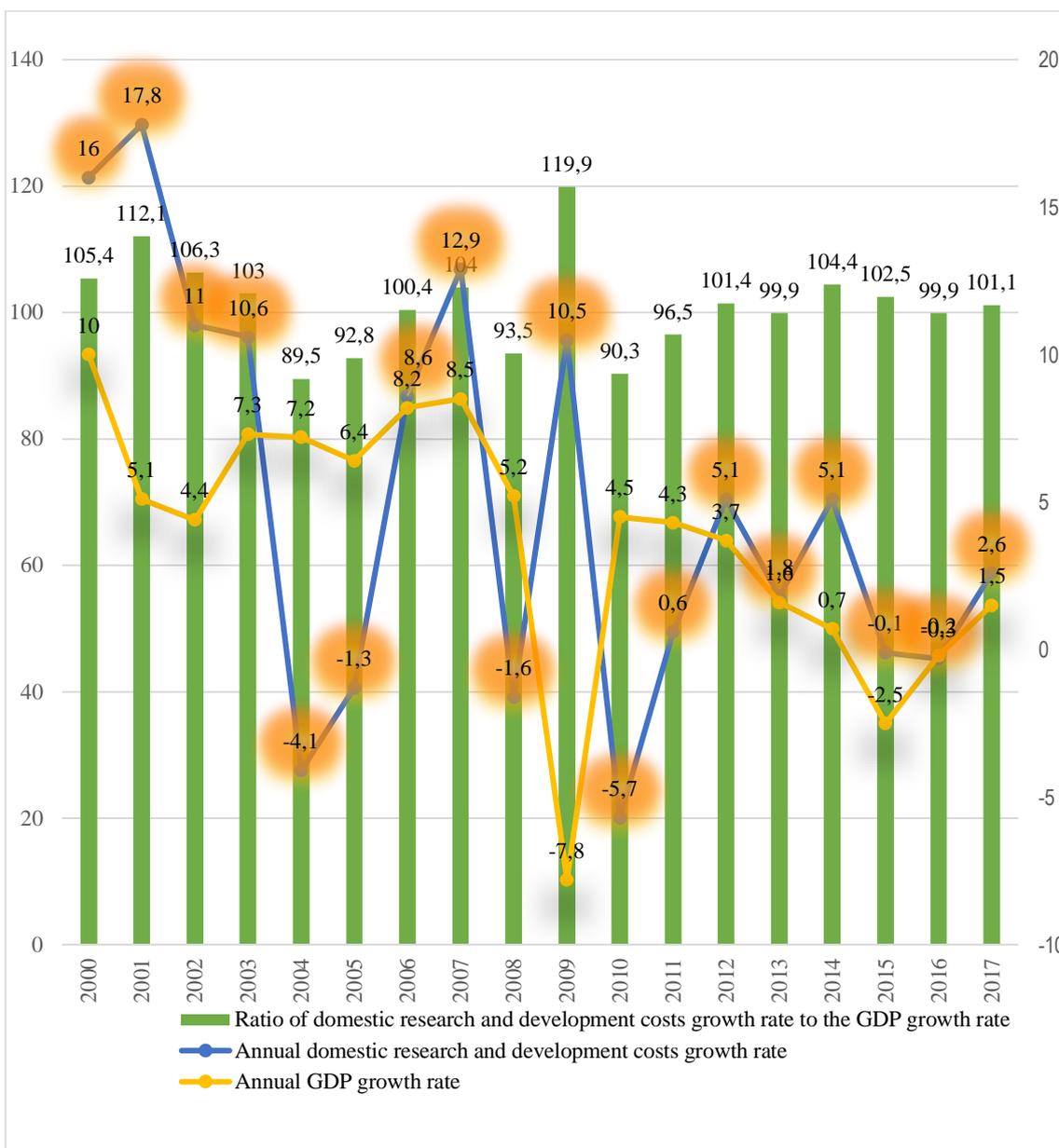


Source: Science and Education Statistics (2017, p. 24).

The volume of domestic research and development (R&D) costs in Russia in 2017 amounted to 1019.2 billion rubles, which is 2.6% (in constant prices) more compared to the previous year. The share of costs in the gross domestic product (GDP) has also slightly increased over the year – from 1.1 to 1.11%.

In general, in 2000-2017 the dynamics of internal costs for R&D, despite the uneven nature, looks positive: the value has doubled (in constant prices). In some periods, the annual growth rate of domestic R&D costs was higher than the growth rate of the country's GDP. Let us compare the values of domestic research and development cost indicators in Russia with the dynamics of Russia's GDP (Figure 2).

Figure 2. Annual growth rates of domestic research and development and gross domestic product costs (calculations were made in constant prices)



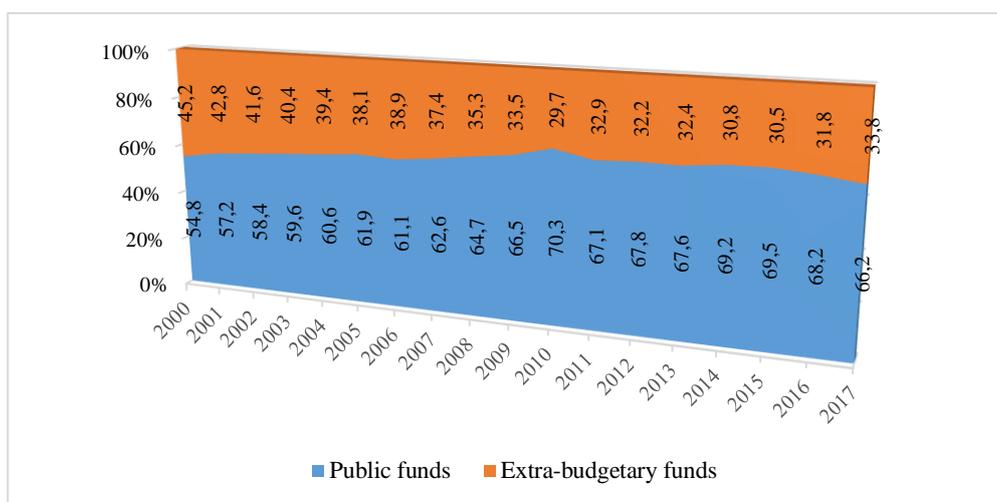
Source: Ratai (2018, p. 1).

The ratio of domestic research and development costs growth rate to the GDP growth rate for the period of 2000-2017 is uneven. However, over the last five years, this ratio demonstrates steady growth, which means, that domestic research and development costs grow faster than the Russian GDP.

In 2017, the ratio of the domestic R&D cost growth rate to GDP was 101.1%. The highest value of this indicator was noted in 2009 –

119.9%, when during the financial crisis the volume of GDP declined by 7.8% compared to the level of the previous year (at constant prices), while domestic research and development costs at the same time increased by 10,5% due to an increase in research and development costs from the federal budget by 18.5%. It is worth noticing that in Russia the state plays an increasingly important role in the development of innovations (Figure 3).

Figure 3. Distribution of domestic research and development costs by source of funds

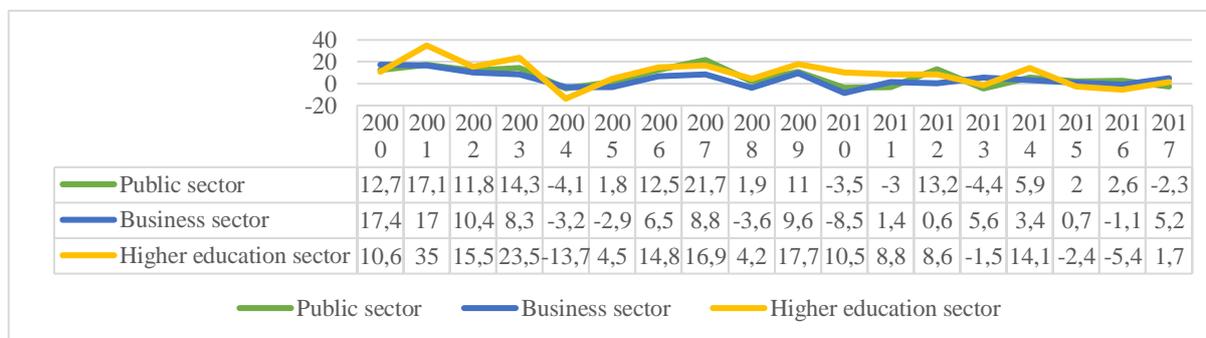


Source: Science and Education Statistics (2017, p. 122).

According to the data for 2017, two thirds (66.2%) of domestic research and development costs accounted for public funds. For example, in 2000, the state financed only 54.8% of all research and development costs in Russia.

Indicators of domestic research and development costs in the context of the science sectors also vary (Figure 4).

Figure 4. Annual growth rates of domestic research and development costs in scientific sectors (Calculations were made in constant prices) (%)

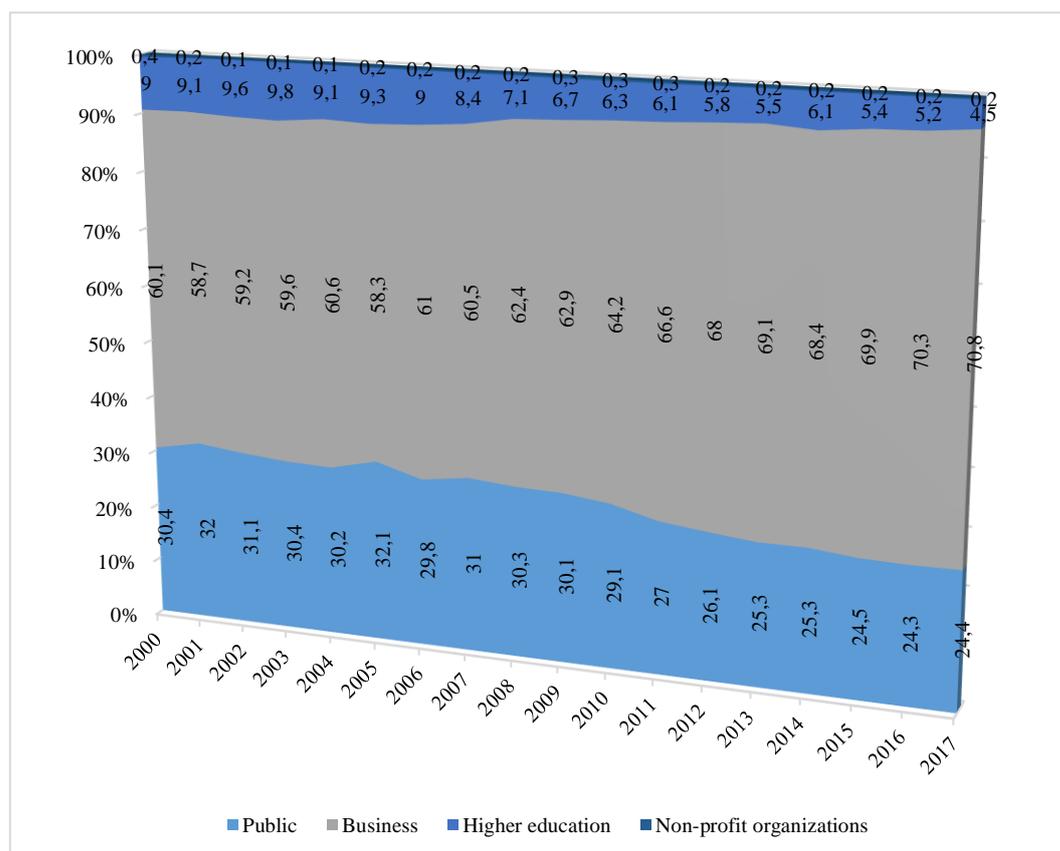


Source: Ratai (2018, p. 2).

As for the distribution of financial resources by sectors of science, this study reveals the unevenness in the dynamics of internal research and development costs. The higher education sector is the heavy developing segment of domestic science: it is characterized by relatively high annual growth rates. The average annual growth rate in this sector in 2000–2017 (8.4%) was higher than in other sectors: public – 5.5%,

entrepreneurial – 3.1%. The cost in absolute terms in 2017 compared with 2000 has increased in constant prices in the higher education sector by 3.9 times, in the public sector – by 2.5, in the business sector – by 1.7 times. At the same time, it is worth considering the scale of the higher education sector: its share in domestic research and development cost, according to the data for 2017, amounted to 9% (Figure 5).

Figure 5. Structure of domestic research and development costs by sector of science



Source: Science and Education Statistics, 2017, p. 124.

The business sector provides 60.1% of the total volume of internal costs for R&D determining the total dynamics. The public sector accounts for less than a third of the costs – 30.4% for 2017. In general, in 2000–2017 there is an increase in the total volume of domestic research and development costs of weights of the public sector (from 24.4 to 30.4%) and the sector of higher education (from 4.5 to 9%) in the structure of R&D costs by the sectors of science. The share of the business sector has decreased from 70.8 to 60.1%.

In general, in 2000-2017 the sectors of science demonstrate a decrease in the total amount of

domestic research and development costs of specific weights of the public sector (from 24.4% to 30.4%) and the higher education sector (from 4.5% to 9%). The share of business sector has decreased from 70.8 to 60.1%.

Thus, financing of innovations in Russia in 2000-2017 can be characterized as follows:

- 1) There is an increase in research and development funding;
- 2) The growth rate of research and development funding is declining;

- 3) The role of the state in financing research and development is growing, and if we consider the fact that the majority of Russian universities are state-funded, the indicator of the state's share in financing research and development is even higher.

Despite the positive dynamics of the development of the innovations sphere in Russia, there are several constraining factors:

- The low correlation between the size of public funding and the research results in higher education institutions of Russia;
- The lack of powers of the Ministry of Education of the Russian Federation as the primary operator of funding basic research in higher education institutions, which would allow establishing recommendations for other federal executive bodies in determining the amount and procedure for the distribution of subsidies between subordinate scientific institutions;
- The lack of common guideline and regulatory methodological support of state tasks in the field of science;
- Duplication of research topics at the stage of forming a state task in the field of science.

The lack of proper regulatory and methodological support for the formation of the state task in science leads to the following issues:

- 1) Each scientific institution, independently and without any price guidelines, determines its needs for budget financing from the state assignment, adds them into the draft state assignment and sends it to the founder, who, considering the financial possibilities of the next budget period, either approves or reduces them. Therefore, there are no objective indicators for calculating the size of the needs of the institution for financial resources for scientific research at the stage of their formation, and therefore the participant cannot verify the validity of the requested funds;
- 2) When allocating the appropriations available to one main manager of budgetary funds, there are no criteria among all subordinate institutions for allocating one institution a larger

amount of appropriation, while a smaller one to another;

- 3) There is no connection between the state task formation mechanism and the mechanism to monitor its implementation. Since there are no objective indicators of the quality of research executed at the expense of the state task funds, neither the founder nor the Federal Service for Financial and Budgetary Supervision or the Accounts Chamber of the Russian Federation have strict benchmarks for conducting an audit of the budgetary funds' application effectiveness. Moreover, the documentary acceptance of the work done according to the state task by an institution is considered equivalent to proper execution.

Discussion

Most of the instruments and methods mentioned above are limited by the "organizational culture", (Carrillo, 2015). The solution of these problems is available only if the system approach to the formation of an order in the field of science is changed – the transition from the state order system to the "public" order system.

This system should be based on the following principles:

- 1) Competition (when forming a public order, there should always be alternative solutions, while there should also be competition at all levels – competition of performers, competition among the main budget funds managers, as well as with funds and development institutions for budget appropriations);
- 2) Qualified customer;
- 3) Balance between the public order system and the proactive research;
- 4) Admissibility of reasonable risk in the implementation of scientific, technical and innovation activities;
- 5) Publicity of the public order formation.

All authorities, as public order operators, declare the main problems to be solved with the help of R&D as part of strategic planning. Public order

initiators – experts and the scientific community propose solutions to these problems by carrying out various research and development projects.

The Commission can form the expert opinion on the expediency of choosing one or another R&D, scientific field or project among the proposed by the initiators of the public order under the President of the Russian Federation, the activities of which are carried out by the Ministry of Education and Science of Russia. The Commission should ensure the entry of reputable experts in all types of scientific research (fundamental, applied, exploratory) and in innovation activities.

When planning budget allocations for a specific calendar period, the government can determine the size of budget appropriations based on the findings of the commission.

The operator of public order can form individual projects and collect these orders into programs. Evaluation of the operator's performance should not be carried out on individual orders, but on the program as a whole (the cumulative effect should be evaluated, not the effect of each project).

The transformations under consideration should be implemented with adaptation to the configuration of government bodies and, above all, the composition of the ministries. In this sense, the division or merging of the regulation of scientific and educational spheres can significantly change the face of the corresponding regulatory system.

It is worth noticing that the above considerations concern practically only domestic Russian innovation projects. For innovative projects with a non-Russian innovator or pioneer special, original regulatory schemes should be developed.

Overall, the authors suggest the following conceptual framework for the transformation of the Russian innovation sector in terms of its regulation on the part of government bodies:

- 1) Formation of an integrated organizational and economic innovation mechanism (mechanisms similar in design execution can be seen, such as, in particular, organizational and economic methods, levers, instruments of influence on a managed object) based on a full-fledged system engineering design of internal and external innovation environments;

- 2) Execution of innovations in the public administration of the economy are tested and their refinement based on the results of this testing;

- 3) Introduction of management innovations for widespread use.

Conclusion

The results obtained allow for the following conclusions and recommendations:

- 1) In general, in 2000–2017 in the structure of R&D costs by the sectors of science, there is an increase in the total volume of domestic R&D costs of weights of the public sector (from 24.4 to 30.4%) and the sector of higher education (from 4.5 to 9%). The share of business sector has decreased from 70.8 to 60.1%.
- 2) The current situation in the field of innovative development of the Russian economy is unacceptably bad and reveals pronounced tendencies for aggravation, especially in the areas of critical high-tech production. This generates strong social and national security threats;
- 3) One of the main crisis-forming reasons for the innovation crisis is the low quality of management, including government regulation, which is being formed distributedly and empirically;
- 4) The innovation environment is structured as a subject-oriented classical marketing environment, in which the pioneer and the innovator form the classical supplier-customer pair for the innovative commercial products;
- 5) The existing regulatory and legal framework is presented by a non-systemic conglomerate of federal laws, decrees of the President of the Russian Federation and bylaws of various levels. At least it does not contribute to the accelerated development of productive innovation activity;
- 6) It is necessary to introduce a public order institute and ensure monitoring of all proposals for the formation of public order for scientific research. The monitoring should involve the analysis

of all proposals for conducting fundamental and exploratory scientific research received from scientific organizations, research teams, scientists, including foreign ones, from industry, from public organizations must be executed. Such monitoring can be implemented by the Ministry of Education and Science of the Russian Federation or another functional ministry with simultaneous determination of the obligation of all public order operators to place information into the relevant state information system;

- 7) It is necessary to synthesize a scientifically substantiated mechanism for innovation and the legal regulations for its functioning;
- 8) The developments should be extended to the innovation processes with the import and export of innovative products.

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