

Artículo de investigación

State Regulation and Stimulation of High-Tech Industries

Государственное Регулирование и Стимулирование Высокотехнологичных Отраслей
Промышленности

Regulación Estatal y Estimulación de Industrias de Alta Tecnología
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Abstract

Research and development (R & D) work construct the main component and the driving force of economic growth of any state. The current investigation is devoted to studying strategic planning and regulation of high-tech developments and innovative technical solutions.

The material of this article can be used in the theory and practice of R & D analysis. It can be useful to managers of organizations involved in innovation, as well as to master degree students and postgraduates of financial and economic areas conducting research in this area.

According to the results of the study, proposals to improve the conditions for the development of research, development and innovation activities in general, the necessity to stimulate financing for innovation activities were crystalized.

Keywords: innovation, financing, forecasting, planning, research and development, science, technology.

Аннотация

Научно-исследовательские опытно-конструкторские работы (НИОКР) являются главной составляющей и движущей силой экономического роста любого государства. Исследование посвящено изучению стратегического планирования и регулирования высокотехнологичных разработок и инновационных технических решений.

Материал данной статьи может применяться в теории и практике анализа НИОКР. Она будет полезна руководителям организаций, занимающихся инновациями, а также магистрантам, аспирантам финансово-экономических направлений, проводящих исследования в данной области.

По результатам проведенного исследования сформулированы предложения по улучшению условий развития исследований, разработок и инновационной деятельности в целом, необходимости стимулирования финансирования инновационной деятельности.

Ключевые слова: инновация, наука, НИОКР, планирование, прогнозирование, техника, финансирование.

Resumo

Os trabalhos de investigação e desenvolvimento (I & D) constroem a principal componente e a força motriz do crescimento económico de qualquer estado. A presente investigação dedica-se ao estudo do planeamento estratégico e da regulação dos desenvolvimentos de alta tecnologia e das soluções técnicas inovadoras.

O material deste artigo pode ser usado na teoria e prática da análise de I & D. Pode ser útil para gestores de organizações envolvidas na inovação, bem como para formar estudantes e pós-graduados de áreas financeiras e econômicas que realizam pesquisas nesta área.

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De acordo com os resultados do estudo, propostas para melhorar as condições para o desenvolvimento de atividades de pesquisa, desenvolvimento e inovação em geral, a necessidade de estimular o financiamento de atividades de inovação foi cristalizada.

Palavras-chave: ciência, inovação, investigação e desenvolvimento, financiamento, planejamento, previsão, tecnologia.

Resumen

El trabajo de investigación y desarrollo (I & D) construye el componente principal y la fuerza gestora del crecimiento económico de cualquier Estado. La presente investigación está dedicada a estudiar la planificación estratégica y la regulación de desarrollos de alta tecnología y soluciones técnicas innovadoras.

El material de este artículo puede ser utilizado en la teoría y práctica del análisis de I & D. Puede ser útil para gerentes de organizaciones que participan en la innovación, así como para estudiantes de maestría y postgraduados de áreas financieras y económicas que realizan investigación en este campo.

Según los resultados del estudio, las propuestas para mejorar las condiciones para el desarrollo de las actividades de investigación, desarrollo e innovación en general, se cristalizaron en la necesidad de estimular la financiación de las actividades de innovación.

Palabras clave: ciencia, innovación, investigación y desarrollo, financiación, planificación, previsión, tecnología.

Introduction

All modern politics as at the global level as in the field of science, technology and innovation, is based on forecasting and strategic planning, monitoring and analyzing data, which is an international universal trend.

Within the framework of the United Nations (UN) sustainable development concept, it is planned to develop science, technology and innovation, which implies the growth of opportunities in the field of information and communication technologies, scientific, technical and innovative potential in the context of national development planning (Mindlin et al., 2016).

At the same time, the international community calls for using strategic planning and forecasting as a platform for discussing issues in the field of science and technology policy among all stakeholders, including representatives of government bodies, the scientific community, business and civil society.

Methodology

Currently, all issues of strategic planning in the field of R & D activities in the Russian Federation are governed exclusively by the Federal Law of June 28, 2014 No. 172-FL "On Strategic Planning in the Russian Federation" (Law No. 172-FL), which envisages the

development of two main strategic planning documents for a long-term period relating to this area: the forecast of scientific and technological development of the Russian Federation and the strategy of scientific and technological development of the Russian Federation (Veas Iniesta, 2018; Pinkovtskaia et al., 2019).

The forecast of the scientific and technological development of the Russian Federation for the period until 2030 was approved by the Government of the Russian Federation on January 3, 2014.

For the purpose of enhancing innovation in Russia, a system of program-target management was organized (Zolotukhina et al., 2017).

The main target programs for the development of science and technology in the Russian Federation are presented below.

1. "Research and development in priority areas of development of the scientific and technological complex of Russia for 2014-2020". The projected funding of the Program in 2014-2020 will be 179 839.8149 million rubles, of which the federal budget will amount to 146 953.2461 million rubles, extra-budgetary sources – 32 886.5688 million rubles (in prices of the corresponding years).

So, in 2014, the planned amount of funding in the amount of – 27 018.361 million rubles, in 2015 – 26 565.398 million rubles, in 2016 – 36 848.978 million rubles, in 2017 – 24 219.581 million rubles, in 2018 – 27 419.2179 million rubles, in 2019 – 23 846.8924 million rubles, in 2020 – 23 921.3866 million rubles.

2. The state program of the Russian Federation "The development of science and technology" for 2013-2020 ".

The amount of financial support of the State Program is:

for 2013 – 145 362 577.9 thousand rubles,
for 2014 – 150 952 739.6 thousand rubles,
for 2015 – 164 423 044.2 thousand rubles,
for 2016 – 157 674 339.7 thousand rubles,

for 2017 – 150 815 709.4 thousand rubles,
for 2018 – 174 442 915.7 thousand rubles,
for 2019 – 174 990 267.5 thousand rubles,
for 2020 – 176 123 464 thousand rubles.

Stimulation of state support for industry is necessary in the framework of supporting the innovation activity of entrepreneurship.

The amounts of financing of the program "Development of industry and improvement of its competitiveness" are expenses related to the implementation of the program's activities financed from the federal budget, as shown in Table 1.

The forecast of science financing in Russia until 2030 is presented in Figure 1.

Table 1. Volumes of program funding, thousand rubles. rub. (source: compiled by author)

Period	Volumes of funding
2013	55 311 588.4
2014	152 964 360.2
2015	134 727 709.9
2016	156 635 400.2
2017	146 432 670.1
2018	218 556 180.1
2019	220 314 492.2
2020	205 522 587.0

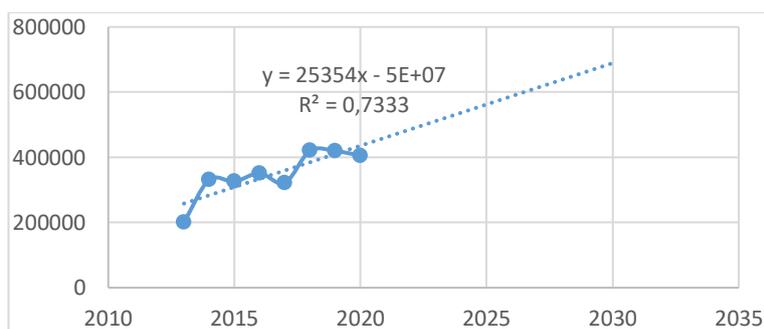


Figure 1. Forecast of financing of the R & D sphere in the Russian Federation until 2030 (compiled by the author)

Based on figure 1 we can judge the positive dynamics of financing the R & D sphere in the Russian Federation.

Article 18.1 of Law No. 172-FL stipulates that the strategy of scientific and technological development of the Russian Federation is elaborated for a long-term period in order to provide scientific support for the implementation of the strategy of socio-economic development of the Russian Federation, the strategy of national security of the Russian Federation

taking into account the strategic forecast of the country, the forecast socio-economic development of the Russia for a long-term period, the forecast of scientific and technological development of the Russian Federation and is approved by the president of the state (Sozinova et al., 2016; Pinkovtskaia et al., 2019).

The strategy of scientific and technological development of the Russian Federation is the basis for the adoption of sectoral strategic

planning documents in the field of scientific and technological development, developed in the framework of goal-setting, state programs of the Russian Federation, state programs of constituent entities of the Russian Federation, as well as planning and program-targeted documents of state corporations and joint stock companies with state participation (Novikov, 2018; Maltseva et al., 2019).

Currently, the Decree of the President of the Russian Federation of December 1, 2016 No. 642 approves the Strategy for the scientific and technological development of the Russian Federation.

Taking into account the consolidation at the level of Law No. 172-FL of the legal status of the two main strategic planning documents in the field of science and innovations, the new law on R & D activity, developed on the basis of the sustainable development concept, should reflect the features of strategic planning and forecasting in the scientific and technical sphere, including among the tasks of strategic planning in this area the definition of “big challenges” facing the Russian Federation and setting priority of scientific and technological development of the country.

The priorities of scientific and technological development of Russia are to be fixed in the strategy of scientific and technological development of the Russian Federation and should be the basis for the register of relevant technologies approved by the Government to be received when implementing the strategy of scientific and technological development.

It is in the law on science that the special role of the Russian Academy of Sciences (RAS) as a participant in the strategic planning of R & D activities should be fixed.

The introduction of the basic concepts and institutions of strategic planning and forecasting in the field of R & D activities in the law on R & D activities fully corresponds to the importance of the role of strategic planning and forecasting, which is internationally recognized.

It is also necessary to consolidate the legal status of the National Technology Initiative (NTI) at the regulatory level.

At a meeting of the Council for Science and Education on November 23, 2016, President of the Vladimir Putin stressed: “First of all, we need to create a powerful technological base to ensure rapid growth of the economy and global

competitiveness of domestic companies, bring medicine and agriculture to a new quality, and accelerate the development of our territories, including the Arctic and the Far East of Russia. Solving problems of this level is possible only with concentration of budgetary and private resources, with close interaction between science, government bodies and domestic business. Within the framework of the National Technology Initiative (NTI), the corresponding tools are already created”.

The Government Decree of April 18, 2016 No. 317 “On the implementation of the National Technology Initiative” approved the Rules for the development and implementation of action plans (“road maps”) of the NTI; Regulations on the development, selection, implementation and monitoring of projects for NTI; Rules for granting subsidies from the federal budget for the implementation of projects for the implementation of action plans (“road maps”) of NTI. However, this act does not contain a definition of NTI, and therefore it is rather difficult to integrate it into the existing strategic planning system.

Improving the effectiveness of scientific research through the use of the obtained results of R & D activities requires the inclusion in the legislation on R & D and innovative activities of a set of mechanisms (tools) aimed at:

- improving the monitoring of research and evaluation of their effectiveness;
- improving the system of access to reporting on the results of R & D activities derived from budgetary funds;
- stimulation of the use of the results of R & D activities obtained from budgetary funds.

The current legislation on scientific and technical activities does not contain a universal mechanism for monitoring and controlling the effectiveness of scientific activities, as the regulation is fragmentary (Novikov & Veas Iniesta, 2018).

The Decree of the Government of the Russian Federation No. 312 dated back to April 8, 2009 “On the Assessment and Monitoring of the Effectiveness of the Activities of Scientific Organizations Performing Civilian Research and Development and Technological Work” approved the relevant Rules of Assessment and Monitoring, which establish the procedure for assessment and annual monitoring of the performance of only scientific organizations

under the jurisdiction of federal executive bodies performing research, developmental and technological work for civil purposes.

The main goal of monitoring the performance of scientific organizations according to these rules is to “ensure the conduct of an objective departmental assessment of the performance of scientific organizations, as well as to unite them in comparable reference groups, including the ones based on belonging to a field and (or) branch of science, organizational and legal form, the ratio of basic research and applied research and experimental development belonging to strategic enterprises and strategic joint-stock companies” (Fedotova et al., 2018; Mitrofanova et al., 2017).

These rules contain a provision stating that a scientific organization, according to the results of its performance evaluation, can be assigned to one of the following categories (Zelentsova & Tikhonov, 2019):

1. scientific organizations leaders;
2. stable scientific organizations that demonstrate satisfactory performance;
3. scientific organizations that have ceased to carry out scientific activities as the main activity. These organizations also have lost their development prospects.

A serious drawback of existing regulation of monitoring and evaluation procedures in the field of science is not only the restrictions on the list of objects for monitoring and evaluation, but also the absence of systemic requirements for evaluating the effectiveness of R & D projects financed from the budget regardless of the jurisdiction of scientific organizations and their forms of ownership.

Without monitoring the results of scientific, technical and innovation activity, it is impossible to identify the weaknesses of the regulatory system and take effective measures at the political and regulatory level to strengthen its weaker elements and make necessary adjustments to the strategic planning documents.

The Federal Law of August 23, 1996 No. 127-FL “On Science and State Science and Technology Policy” does not even mention monitoring in the relevant areas of activity, which does not allow for systematic and high-quality assessment of the results of implementation of adopted strategic planning documents in science and innovation.

Accordingly, the new law on science should fill the existing gap and define the procedure for implementing state monitoring in the field of science and innovations.

In carrying out monitoring, data from state information systems in the field of science should be fully used, the special importance of which is emphasized by various international documents when describing such a relevant trend in the regulation of R & D activity as the creation of the “Open Science” system. Building a monitoring system without using state information systems solely by imposing additional information duties on the subjects of R & D activity will only be an additional burden for them.

With regard to improving reporting systems on the results of scientific and technical activities derived from budgetary funds, it is necessary to note a number of serious weaknesses in the regulation in this area.

Russian legislation does not contain virtually any requirements for the content and procedure for reporting on the results obtained by R & D.

Article 773 of the Civil Code provides that the contractor for a research, development, and technological work contract is required to perform work in accordance with the terms of reference agreed with the customer and transfer the results to the customer within the time provided by the contract, and the customer must accept transmitted results (article 774 of the Civil Code).

The Civil Code of the Russian Federation does not even use the terms “report” or “reporting” about R & D and does not provide for any requirements for the form of presentation of results or the procedure for transferring them to the customer.

Article 1 of the Model Law on Scientific and Scientific-Technical Activity establishes more specifically the connection between the scientific result and the R & D report: “A scientific result is a new knowledge obtained in the process of fundamental or applied scientific research and recorded on scientific information carriers in the form of a report, scientific article, a scientific paper, a scientific report on a the conducted research work, a scientific discovery, a published monograph”.

Despite the fact that model laws are designed to unify the legislation of the Commonwealth of Independent States (CIS) countries, the above-mentioned definition has not been applied in

Russian legislation. The requirements for the research report are described in sufficient detail in "GOST (technical standards) 7.32-2001. Interstate standard. System of standards on information, librarianship and publishing. Research Report. Structure and design rules" (introduced by the Resolution of the State Standard of Russia of September 4, 2001, No. 367st).

According to clause 3.1 of this standard, the research report is a scientific and technical document that contains systematized data on research work describes the state of a scientific and technical problem, the process and (or) the results of scientific research.

However, this definition is also not normative and is applied voluntarily (for example, the customer indicates in the tender documentation the application of GOST when preparing the R & D report), since, in accordance with the Decree No. 4 of the RF State Standard of January 30, 2004, standards adopted before July 1, 2003, are recognized by national standards, which applied on a voluntary basis (clause 2 of Article 15 of the Federal Law of December 27, 2002 No. 184-FL "On Technical Regulation").

The legal status of the R & D report is contained in Federal Law No. 77-FL dated December 29, 1994 "On Mandatory Copy of Documents" (Law No. 77-FL): in accordance with Art. 5, among the unpublished documents which contain the results of research, developmental and technological work (thesis, reports on research, developmental and technological works, deposited scientific works, algorithms and programs).

Paragraph 2 of Art. 10 of Law No. 77-FL establishes that document producers submit to the scientific and technical information body of the federal executive body in the field of scientific, technical and innovation activities, determined by the Government of the Russian Federation of March 31, 2009 No. 279, a mandatory copy of research and development reports within 30 days from the date of their approval.

Paragraph 3 of Art. 10 of Law No. 77-FL of the Order of the Government of the Russian Federation of April 12, 2013 No. 327 "On the Unified State Information System for Accounting for Civil Engineering Research and Development and Technological Work" (USISA) provides that the number of objects of accounting in the information system includes information on the results of work according to

the Federal Law "On Mandatory Copy of Documents" in the form of mandatory copies of unpublished documents (reports on scientific research and developmental works, defended dissertations for academic degrees, algorithms and programs), their abstract bibliographic descriptions and information about the presence of a statement about the granting free use of such results to any person under certain conditions or about the conditions of an open license to use such results.

It should be noted that neither the Law No. 77-FL nor the RF Government Decree No. 327 contain any requirements for the content of the R & D report, since they pursue a different goal: to establish a procedure for accessing R & D reports.

Clauses 10 and 11 of the Statute of USISA establish that access to the information contained there is carried out through the official website of the Ministry of Education and Science of the Russian Federation on the Internet. The information is publicly available, with the exception of information, access to which is limited in accordance with the legislation of the Russian Federation, it is free of charge.

Similar conditions are provided by the Resolution of the Government of the Russian Federation of November 14, 2014 No. 1195 "On the submission by scientific and educational organizations of higher education, which carry out basic research and exploratory research to the Russian Academy of Sciences of basic research and exploratory research, on the obtained R & D results" (reports are submitted to the Ministry of Education and Science for present accommodation USISA, Ministry of Education of Russian Academy of Sciences provides access to the records placed in USISA).

Thus, all requirements for R & D reports, including their content, composition, order of delivery and delivery, the level and categories of access to reports are set either at the level of orders of state customers (when conducting R & D as part of a government order) or the level of the grantors' documents (when performing R & D at the expense of grants from funds supporting R & D activities).

As examples of regulating the requirements for R & D reports at the level of departmental acts we can cite: Order of the Federal Fisheries Agency dated February 8, 2010 No. 71 "On approval of the forms of reports and information provided by the decree of the Government of the Russian

Federation No. 921 dated November 13, 2009 approval of the regulation on the implementation of fisheries for research and control purposes"; Resolution of the State Standard of the Russian Federation of April 1, 1997 No. 119 "Planning of research and development work carried out by research organizations of the State Standard of Russia at the expense of the federal budget, and reporting on their implementation. PR 50.1.010-97"; Order of the State Committee for Construction of the Russian Federation of April 5, 2000 No. 74 "On the procedure for holding tenders and concluding contracts (contracts) for research and development work carried out on the orders of the State Committee for Construction of Russia" and others.

However, the basic rule is the inclusion of R & D reporting provisions in a contract or tender documentation, which means one-time (calculated for a specific R & D) application of the relevant provisions.

For these reasons, it is necessary to solve the systemic problem of regulating the status of R & D reports at the level of the new science law, as well as the problem of the inability to automatically open access to these reports (or part of it) to everyone, since any of them is subject to copyright. Access to it is possible only with the permission of the right holders and on terms agreed with them.

Findings

The results of scientific research in the civilian sphere, that is, carried out at the expense of budget funds and at the same time not related to ensuring the defense and security of the state, should be available to an unlimited circle of people, because otherwise the effectiveness of the use of budget funds for scientific research is reduced.

Accordingly, it is necessary at the regulatory level to regulate the procedure for accessing R & D reports and to indicate the extent of rights of third-party access to reporting:

- full access without the consent of the copyright holder;
- partial access without the consent of the copyright holder;
- access with the consent of the copyright holder and on conditions agreed with the copyright holder.

The level of access should differ, firstly, depending on the type of research (fundamental,

applied, search), and secondly, on the degree of use of R & D reports by the rights holder (in civilian R & D, such a right holder is, as a rule, the R & D worker).

Stimulation of the use of the obtained results of scientific and scientific-technical activities should be carried out in two directions:

1. the consolidation in the legislation of requirements for the use of R & D results and the consequences of non-compliance with the specified requirement;
2. changing the approach to the use of R & D results assigned to the contractor.

The first direction was discussed in sufficient detail when making amendments to the Civil Code of the Russian Federation in 2012–2013. However, it was never developed.

Conclusions

Currently, there is a mechanism for regulating the distribution of rights to the results of R & D activities created by the state and municipal contracts (we can consider it on the example of works of science, among which, as a rule, is a R & D report - Article 1298 of the Civil Code).

The exclusive right to a work of science created under a state or municipal contract for state or municipal needs belongs to the performer, who is the author or other person who fulfills the state or municipal contract. If the state or municipal contract does not stipulate that this right belongs to the State, the subject of the Russian Federation, municipality, jointly with the performer and the Russian Federation, the Executive and the subject of the Russian Federation or the Executive and municipalities.

If the exclusive right to a work of science, literature or art created under a state or municipal contract for state or municipal needs belongs neither to the Russian Federation, nor to a subject of the Russian Federation or to a municipal entity, the right holder at the request of the state or municipal customer must provide the person specified by him free of charge a simple (non-exclusive) license to use the corresponding work of science, literature or art for state or municipal needs.

Similar provisions are contained in Art. 1373, 1432, 1464, 1471 of the Civil Code of the Russian Federation.

Chapter 38 of the Civil Code, which regulates the rights and obligations of the customer and the contractor for an R & D contract, does not establish the obligation of the contractor under a state or municipal contract to use the results of R & D.

Considering that in the articles of the Civil Code we can read only about the results of R & D activities created under a state or municipal contract (an agreement to perform R & D), that means that the obligations of the copyright holder of R & D results created under the agreement on the provision of a grant at the expense of state funds supporting R & D activities or at the expense of state assignments, it is impossible to regulate even amendments to the relevant articles of the Civil Code.

It appears that the law on science can and should establish the duty of stakeholders in the field of science to use the results of R & D activities created at the expense of budget funds, public funds, determine the content of the term “use of the results of R & D activities” and establish consequences of failure to perform this duty.

As for the second direction, it is necessary, using international experience, to propose the following models of stimulating the use of R & D results:

- providing free access to the results of R & D created by educational and scientific organizations (such an obligation must be fixed in all contracts, state tasks, provided that the results of R & D are not used during the year);
- granting the right to authors to receive the rights to the results of R & D.

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