CREATION OF THE INSTITUTIONAL INNOVATION INFRASTRUCTURE OF CLUSTERS AS A MECHANISM OF THE PROVIDING INNOVATION DEVELOPMENT OF RUSSIA

Michail Romanovskii[1], Daria Shkuta[2]

Saint Petersburg State University of Economics (Russian Federation)

ABSTRACT
The purpose of this article is to investigate the mechanisms contributing to increasing of the efficiency of the institutions and instruments ensuring the innovative development of Russia, increasing of its competitiveness in terms of accession to the WTO and the OECD. The article considers factors, negatively influencing on the innovative development of Russia. In the article was conducted comparative analysis of expenditure on R&D in the different countries, analysis of modern methods and tools of state support of innovative development. A complex of additional measures aimed at enhancing the innovative activity of the business sector and the measures of state support of innovative development in Russia are proposed.
KEYWORDS: *innovational development, R&D, cluster, institutions, financial instruments.*

JEL CODE: O430

Introduction

Problem. The strategy of innovative development of Russia, approved at the highest state level, requires significant transformations as in the institutional system of the Russian economy as a whole, and in its regional unit. Existing conditions in these critical areas will not allow in short terms to ensure success in achieving the purpose of innovative breakthrough. These circumstances require the creation proposals for the improvement of the institutional and regional structure of the Russian economy.

Purpose. The purpose of this work is the development and justification of proposals for the formation of a regional cluster of institutional innovation infrastructure.

Object. The object of research is the innovation system of the region as a cluster formation, formed on the basis of elements of institutional innovation infrastructure.

Tasks:

- Disclosing the essence and peculiarities of the formation of institutional innovation infrastructure in the framework of the regional cluster innovation systems, as well as describe its contemporary state.
- Conducting a scientific substantiation of the advantages of the cluster approach in enhancing the effectiveness of the process of innovation management to ensure the innovative development of the economy of Russia.

[1] Michail Romanovskii – Saint Petersburg State University of Economics, Department of finance
[2] Daria Shkuta − Saint Petersburg State University of Economics, Department of finance
E-mail: shkutadd@inbox.ru
Tel.: +7911 996 59 07

Methods. The work is structured into three main parts of which the first two deal with statistical and theoretical aspects, and the third with practical suggestions on mechanisms to overcome the technological backwardness of Russia. The article was made as a constructive research, qualitative as well as quantitative material was used. This view places constructive research in a central position surrounded by fundamental research and scientific problem solving. When reporting constructive research answers must be presented about the intention of the constructive research, about where in the methodological field of business science the research is located, and about under which conditions the research can produce scientific knowledge. Within the four-field of concept-analytic, decision-methodological, action-analytic, and nomothetic research grips constructive research is placed connected to the decision-methodological and action-analytical research grips, in the combined normative and empirical field.

1. The modern condition of the Russian economy in the sphere of innovations

Russia inherited from the USSR significant scientific and technological potential and scientific-technical achievements in the field of fundamental developments, which has practically exhausted itself in the end of the first decade of the XXI century. This led to the adoption of the real action by the state to increase the financing of research and development. The necessity and inevitability of transition to the innovative way of development of the Russian Federation is recognized by the general public. This fact has been realized by the Russian government, first of all, by substantial increase of spending on R&D. In 2011 they amounted to 1.3 % of GDP and it was maximum for the last 11 years. Dynamics of gross domestic expenditure on R&D (in % to GDP) is shown in figure 1. In 2012 they planned to bring to 1.67 % of GDP, in 2013 − up to 2.3 %, and by 2020 − up to 3 % of GDP. However, to date, the share of Russia in the world's expenditure on R&D accounts for only 2 %. While the similar indicator of the USSR to the beginning of the 90th years was about 15 %. Thus, on the share of expenditures on science in the GDP Russia closes the top thirty countries of the world; on an absolute scale of the costs, it lags behind the U.S. in 17 times, China − 5, Germany − in 4, France and Korea − approximately in 2 times. The share of the Russian Federation in comparison with the leading countries in the world's expenditure on R&D characterizes by figure 2.

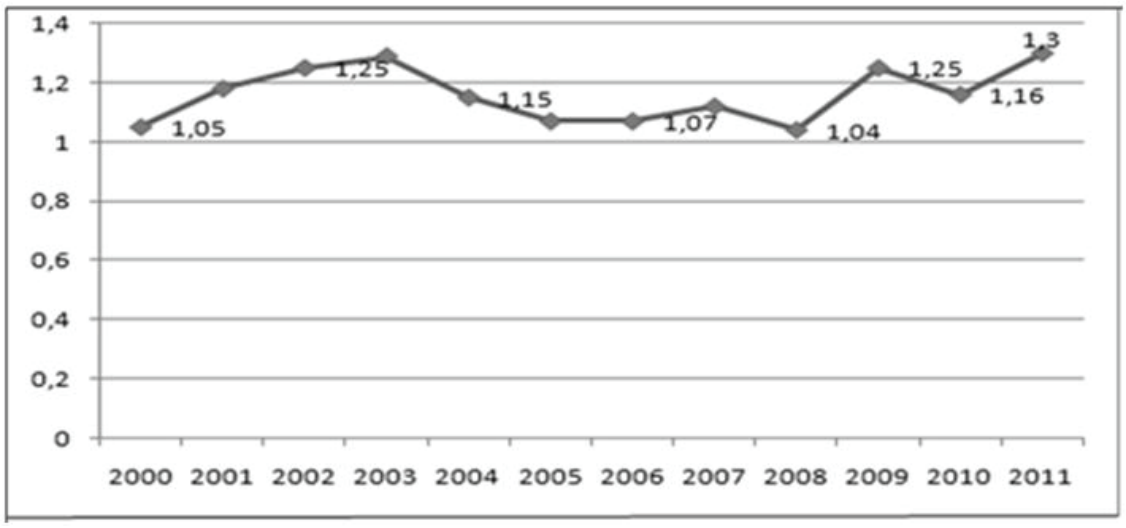

Figure 1. Dynamics of gross domestic expenditure on R&D in Russia, % of GDP

Source: Federal Service of State Statistics of the Russian Federation

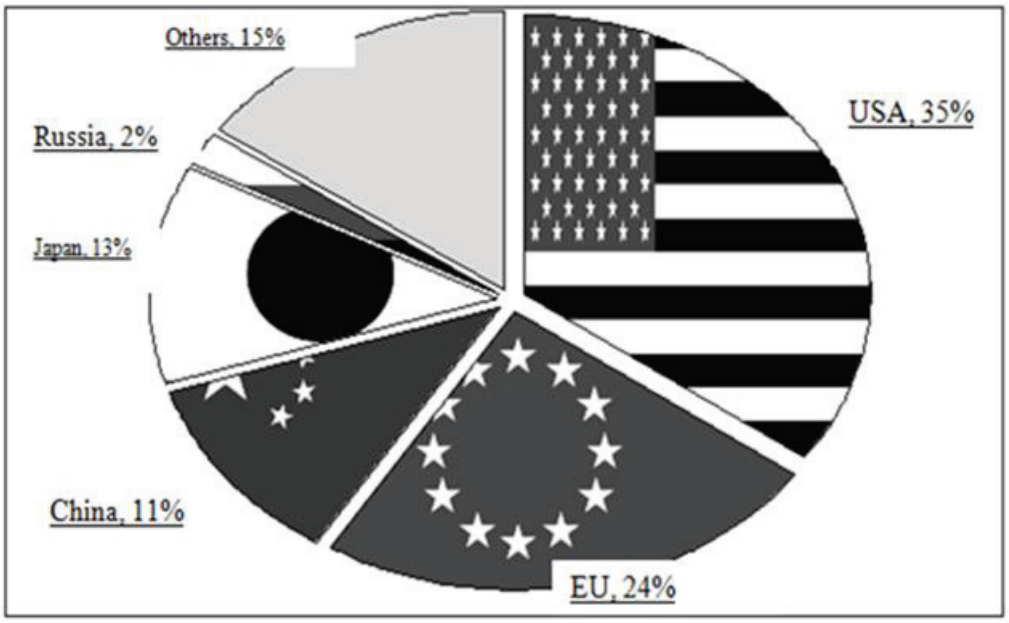

Figure 2. The world centers of scientific progress
(share in the world's expenditure on R&D)

Source: Global R&D Report 2008 Magazine, p. 3

Along with the increase of direct budget financing of the national innovation system in Russia are developed relatively new for this country institutes − public venture funds, mainly state. They are aimed on ensuring the access of the scientific organizations to the government financing. In the period 2006−2011 in Russia was established nine state funds for the support of innovative activity[3], the total amount of assets at the end of 2011 amounted to about 600 billion rubles. However, the effectiveness of the work of this institutions cannot be estimated highly enough. There are problems of the low accessibility and lack of investment of the funds and also the absence of highly effective innovative projects. Consider, for example, the Russian venture company (OJSC RVC), for the 2011 its total investments amounted to 2.3 billion rubles. (in 2010 − 2.9 billion rubles, in 2009 − 2.1 billion rubles). If we take into account that the fund's assets in 2011 amounted to 34.5 billion rubles it turns out that assets of the RVC in amount of 32.2 billion rubles not find effective application and generate revenue through their placement on deposits in commercial banks and other instruments.

It is possible to identify a number of common problems in the work of the funds. And the first one is the disproportion in the volumes of funds aimed at support of fundamental research and funds financing applied research, as well as at the various stages of the innovation process. Calculations show that the total volume of funds attributable to the three state scientific funds (RFBR, RGNF, FSRMSP NTS) amounted to 15.1 billion rubles in 2011, while the 6 funds aimed at financing non-fundamental researches have to 580 billion rubles. Thus, the gap in the amount of two groups of funds is 38.5 times. And this in conditions of constant "erosion" of scientific-technical backlog, a previously created at the expense of priority funding of science in the USSR. Another proof of the under-funding of the Russian fundamental science, is that the National Science Foundation of the USA receives annual financing in the amount of $9 billion. That is almost 50 times more than that of the RFBR.

[3] Including: the State Corporation Bank for Development and Foreign Economic Affairs (Vnesheconombank) and two his subsidiaries: the Russian Direct Investment Fund (RFPI) and OJSC „Russian Bank for support of small and medium entrepreneurship (SME Bank, the former name − the Russian Bank for Development); OJSC "Russian venture company" (RVC), Russian Fund for technological development (RFTR); OJSC RUSNANO; Russian Association of Venture Investment (RAVI); the Russian Fund for basic research (RFBR), The Russian humanitarian scientific Fund (RGNF), Fund of assistance to development of small forms of the enterprises in scientific and technical sphere (FSRMFP NTS − Fund of Bortnik.

A similar disproportion in the financing is to be observed in respect of the stages of innovation process. On the first, in our opinion, key stages of the innovation process – on the stages of R&D, accounts for an extremely small amount of financial resources of state-owned companies, most of them aimed at the stage of rapid growth of innovative project, that is explained by the policy of avoiding the risks.

2. The main problems in the development of an innovative economy in Russia

Despite the intensification of the state in financing of fundamental and applied researches through the various institutions, the activity of the private sector in the financing of innovations does not increase. Analysis of the structure of investment sources in innovation activity in Russia, reveals that during the last 10 years in the structure of expenditures on R&D − in sources of financing the share of budgetary funds amounted to an average of 60 %, about 2.5 % were due to state non-budgetary funds, as a result, public funding is only about 37 % from all sources. Meanwhile, the world practice shows, that the business-structures play a key role in the development and implementation of innovations. Thus, the share of costs of corporations on innovations in the world expenses exceeds 65 %, and the average for OECD countries is about 70 %.

This situation is explained by several factors. Firstly, this is the constant lack of financial resources, which is typical for the vast majority of Russian enterprises, that implement innovative projects. Their partial replacement by the credit sources in the conditions of work of the Russian banking system is not expedient. There are no opportunities for increase of profitability of own capital. That is, often the degree of financial leverage, for companies attracting credit resources, appears to be negative. In recent years, the value of interest rates on credits exceeds the level in 13 %, whereas the return on assets on the average in sectors ranges from negative ratio in the automotive industry, the level of 3 % in construction and manufacture of machinery and equipment up to 15 % in the extraction of minerals. In Russia at the present time, only large companies with a turnover in billions can afford to invest in R&D, and they are held at the main profile of company's activity: oil production, metallurgy and etc. Attraction of external financing through equity sources, that is, by the IPO, bond issue, due to low stock market in Russia and as a consequence, the high cost of underwriting and high minimum amount of issue make such sources of external financing also non-suitable for small and medium companies.

Thus, credits of commercial banks in the Russian Federation are the most important resource for providing innovative development of companies. However, this resource is extremely expensive − often its price is higher than the profitability of the assets, which bring to rise of the weighted average cost of capital and reduction of profitability of own capital, and, accordingly, the value of the company. It should be noted here also that when Russia finally joins the WTO, relative high cost of credit sources for business in Russia compared with the cost of loans for companies in foreign countries, further aggravates the problem of the lack of competitiveness of domestic industries, especially of fund-capacious ones.

Furthermore, the problem of financing of innovations is expressed also in the existence of a narrow market of private venture capital and business angel investing in Russia (according to estimates of experts, in 2011 the volume of capital of the 112 operating funds on the Russian market of direct and venture investment reached 130−135 billion rubles, or $4.5 billion. Whereas the capital volume of the 450 American venture capital companies is more than $500 billion). Moreover, there are only 1 special Bank for development, and it's state − MSP Bank, the extremely low activity of commercial banks in the provision of funds to innovative enterprises. It is appropriate here to quote the statement of the CEO of the Sberbank H. Gref, which he made in the conference "The Banking Sector and Modernization of Economy" (may 2011): "Virtually no Bank in the country is ready to finance innovative projects − we do not have such competence, and in order to create it, it will take several years."

The low share of the business sector in financing R&D is largely due to the weak development of a system of state-private partnership in Russia: the share of innovative companies, which received the budget financing

is only 0.8 %. For comparison: in Germany − 8.8 %, in Belgium − 12.7 % (Rating Agency "EXPERT RA", 2011).

The direct state support for the development of small forms of the enterprises in scientific-technical sphere is extremely insignificant in the RF. So, for instance, the volume of programs of Small Business Innovation Research (SBIR) Program and the Small Business Technology Transfer (STTR) Program in the U.S. is $2 billion, while in Russia, the innovative component of the Federal Program of Support of Small Innovation Business is the equivalent of approximately $67 million, the volume of the Fund of Assistance to Development of Small Forms of the Enterprises in Scientific and Technical Sphere (FADSFE STS) is about $220 million.

Big business in Russia spends much lower on R&D than similar foreign corporations. So, Russia is represented only by three companies in a rating of 1.400 largest companies of the world in absolute expenses on innovations (prepared annually by the Joint Research Practical Centre of the EU). They are JSC "Gazprom" (83rd position), AVTOVAZ (620th) and "LUKOIL" (632nd position). For comparison: in the Fortune Global 500 among the 500 companies of the world on the volume of revenue there are in 2 times more Russian companies and in the list of 1.400 of the world's leading companies for revenue there are a few dozen representatives of Russia.

Another important problem, which is hampering the innovative development in Russia, is the low demand for innovation in the Russian economy, as well as its inefficient structure − the excessive distortions in favor of the procurement of finished equipment abroad to the detriment of the development and introduction of the own innovations. In 2011, the development and introduction of technological innovations implemented 9.5 % of the total number of Russian industrial companies. For comparison: in Germany they accounted for 69.7 %, in Ireland − 56.7 %, in Belgium − 59.6 %, and in Estonia − 55.1 %, in the Czech Republic − 36.6 % (Rating Agency "EXPERT RA", 2011). However, the Russian business's orientation on the borrowing technologies is not caused by the unwillingness to create and develop own breakthrough technologies, but by the objective necessity: the condition of modern Russian scientific-and-production base does not allow to deploy a full-scale innovation process. Therefore, the main task at the present stage is to conduct a full-scale modernization on the basis of the import of advanced technologies and ensuring their effective transfer in the economy, that could really be achieved on the basis of the rapid creation of new joint ventures, in particular, through mergers and acquisitions with the participation and without the participation of the state and the expansion of attraction of foreign capital and technology.

Unfortunately, Russia still is an outsider in the world race of innovations. This fact is confirmed by the positions of Russia according to the estimates of the country in the index of global competitiveness. So, in 2010 in terms of the Global innovation index (GII, developed by the Boston consulting group), Russia ranked only 49th place, and occurred next to Saudi Arabia and Trinidad and Tobago.

The most important indicator characterizing the level of innovative development of the country is the structure of exports and, accordingly, the share of the innovative products in the total export volume. Analysis of data from the commodity structure of export of the Russian Federation showed that in the last decade the raw share in the structure of exports steadily has been increasing, except years of world financial crisis. While the share of innovative products in exports has been decreasing. In 2010 the share of innovative industry-specific products in the exports fell for five years by 35 % and amounted to only 5.4 % (figure 3), while this indicator in commodity export USA − 10.2 %, France − 19.4 %, China − 16.7 %, Germany − 15.3 % (Rating Agency "EXPERT RA", 2011).

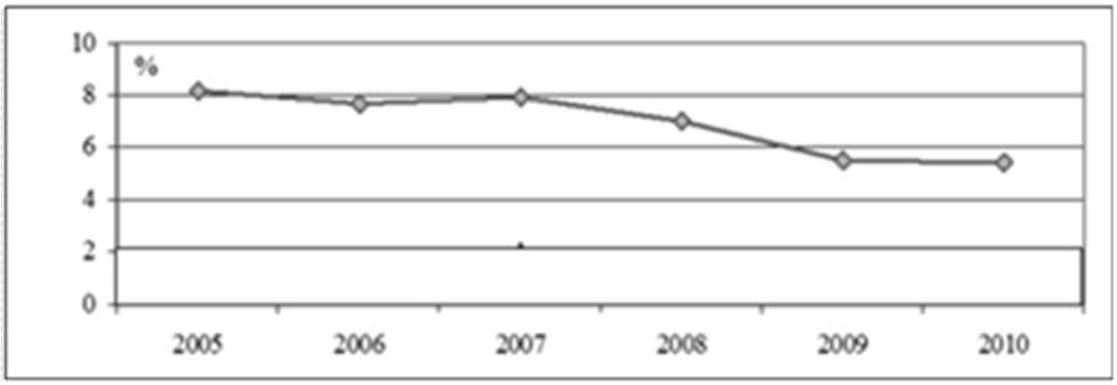

Figure 3. Dynamics of share of innovative products in the structure of exports of the RF, in % to the total

Source: Federal Service of State Statistics of the Russian Federation

3. The mechanisms to overcome the technological backwardness of Russia

Above were presented the arguments that the modern industrial and post-industrial development of Russia was faced with two interrelated problems: poor infrastructure and technological backwardness. If the solution of the problem of technological backwardness seems obvious − it is the import of the most advanced technologies of developed countries, the problem of the effective transfer of imported technologies, their successful diffusion in the national economy, and, first of all, the mobilization of financial resources and their effective spending for these purposes, i.e. the creation of the national innovation system, remains unresolved. Analysis of the best practice of developed and developing countries in creation of national innovation systems allowed us to justify a conclusion, that real innovation breakthrough in Russia can be achieved only on the basis of two conceptual principles: the principle of regional clustering of the Russian economy and the principle of creation and development of institutional innovation infrastructure.

Considering the territory of the Russian Federation, a significant regional differentiation in terms of the financial resources available and development of the institutions of the national innovation system, according to the authors, the key to solving the problem of accelerated innovation development should become the stimulation of the regional innovative clusters's creation. This approach involves selection by the state the regional growth points, and ensuring regional institutional innovation environment for their development. That is consistent creation of the system of institutions, including: financial, human resources, sales, production-technological and informational-consulting ones.

Clusterization of the economy is actively used in developed countries. Today in the USA there are 160 clusters, in France − 144, in Germany − 100, in Spain − 142, in Austria − 76. At a very fast pace is the development of the cluster strategy in Japan and China and at the moment in China, there are already 120 clusters.

At present in Russia there are about 60 technology parks, research associations, which are involved in the R&D, but not linked, as in clusters with the production. And taking into account the necessity of intensification of the processes of creation and development of cluster formations (first of all, innovation), which are based on the network interaction between the participants of the cluster, it is advisable to consider the possibility of the development of innovation cluster on the basis of objects of innovation infrastructure − technoparks (figure 4).

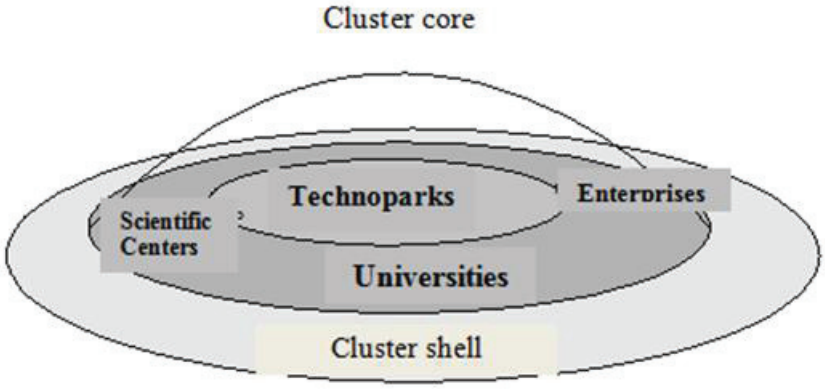

Figure 4. Conceptual scheme of the innovation cluster

Source: was created by authors

From these positions, consider the prospects of St. Petersburg as an innovation center. In recent years, St. Petersburg occupies the leading position among the regions of the country on the level of innovation activity of business (in 2011, it amounted to 14 %, while the national average of 9.5 %). St. Petersburg has many advantages in comparison with other regions. First of all, it is the remaining since Soviet times, a powerful research-and-production base. Today in St. Petersburg concentrated: 11 % of the scientific potential of Russia; 14 % of Russian researchers; 8 % of Russian students. The sphere of science and innovation activity of the city is represented by: 453 scientific organizations, including 48 scientific organizations of the RAS; 327 research organizations; more than 130 higher education institutions; 14 innovative-technological centres and scientific-technological parks.

The analysis of the innovation activity of the economy of St. Petersburg showed the existence of the prerequisites for the formation of the following clusters: the food industry, ship-building, power engineering cluster, automobile, energy-cluster and the cluster of radio electronics (Fishermen, 2008).

Today in St. Petersburg there are about ten emerging cluster formations and they are the ones in the above-mentioned industries, in particular, in mechanical engineering and metal working, information technology, shipbuilding and others. And, in addition, they are constructed, mainly, on the basis of the conceptual scheme of the innovation cluster, which also gives the basis to predict their successful development.

Support of cluster associations registered in the priority direction of the program of innovation policy of St. Petersburg. It is planned that implementation of the programs will help to transform Petersburg to 2025 in the world innovation center.

Conclusions

In the recent years in Russia has been broadened the application of measures of direct and indirect state support of the innovative development, are undertaken by the state measures for the development of the institutions of the national innovation system. However, in spite of the introduced tax benefits, the innovation activity of the business remains very low.

The analysis of the best practice of developed and developing countries in creation of national innovation systems allowed us to justify a conclusion, that real innovation breakthrough in Russia can be achieved only on the basis of two conceptual principles: the principle of regional clustering of the Russian economy and the principle of creation and development of institutional innovation infrastructure.

Modernization and the transition to the innovation-based economy suggest multilateral efforts. The task of the state is to initiate institutional changes in the economy, but the demand for modernization must go "from below", from the business, science, the non-profit sector, regions. All aforementioned proves the actuality of the task of creation an institutional environment of the modernization and regional development institutions, namely the creation and development of the national innovation system and regional innovation clusters.

References

Ballard, G. M. (2007). *Industrial Risk: Safety by Design*. Chapter 6.
Blake, S. B. (2007). *Managing for Responsive Research and Development*. San Fransisco, CA: Freeman and Co.
Christensen, C. (2009). *The Innovator's Dilemma*. Boston, Mass: Harvard Business School Press.
Cohen, D. (2006). Innovation at Du Pont – a Real-Time Perspective. *Research Management*, Vol. 3.
Drucker, P. (2009). *Innovation and entrepreneurship, Practice and Principles*. London: Heinemann.
Duncan, W. (2005). *Project Management Institute. A Guide to the Project Management Body of Knowledge*. Automated Graphic Systems, Charlotte, NC, USA.
Freeman, H. (2004). *The Economics of Industrial Innovation.* Penguin.
Harrison, F. L. (2008). *Advanced Project Management: A Structured Approach.* Third Edition. Halistead Press, John Wiley & Sons Inc, NY, USA.
Lichtenberg, S. (2005). New project management principles for the conception stage: outline for a new 'generation'. *International Journal of Project Management*, Feb. 1989, Vol. 7 (1).
Marshall, A. (2008). *Principles of Economics.* London: Macmillan.
Nonaka, I., Takeuchi, H. (2010). *The Knowledge-Creating Company, How Japanese Companies Create the Dynamics of Innovation*.
Penrose, E. T. (2009). *The Theory of the Growth of the Firm*. Oxford: Basil Blackwell.
Pettigrew, A. M. (2008). The Character and Significance of Strategy Process Research. *Strategic Management Journal*, Vol. 13.
Porter, M. E. (2008). *Competitive Strategy.* New York: The Free Press.
Prahalad, C. K., Hamel, G. (2010). The Core Competence of the Corporation. *Harvard Business Review*, p. 79–91.

KLASTERIŲ, KAIP INSTITUCINĖS INOVACIJŲ INFRASTRUKTŪROS, KŪRIMAS, SIEKIANT UŽTIKRINTI INOVACIJŲ PLĖTRĄ RUSIJOJE

Michail Romanovskii, Daria Shkuta
Valstybinis Sankt Peterburgo ekonomikos universitetas (Rusija)

Santrauka

Šio straipsnio tikslas – ištirti mechanizmus, kurie padėtų skatinti diegti naujoves Rusijoje, taip didinant jos konkurencingumą PPO ir EBPO. Straipsnyje aptariami veiksniai, neigiamai veikiantys inovacijų plėtrą Rusijoje, atlikta lyginamoji R&D išlaidų skirtingose valstybėse analizė, modernių valstybės paramos inovacijų plėtrai metodų analizė. Pasiūlytas papildomas kompleksas priemonių, skirtų skatinti privataus sektoriaus inovacinę veiklą ir gerinti valstybės paramos inovacijų plėtrai Rusijoje teikimą.

PAGRINDINIAI ŽODŽIAI: *inovacijos ir plėtra, R&D, klasteriai, institucijos, finansiniai instrumentai.*

JEL KLASIFIKACIJA: O430