



## THE ROLE OF TERRITORIAL CLUSTERS IN THE MANAGEMENT OF INNOVATIVE DEVELOPMENT

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### ABSTRACT

*The article deals with the essence and role of territorial clusters in the management of innovative development. The current state of emerging and developed territorial innovation clusters, financial instruments of support, and methods of risk management of cluster financing are revealed. The basics of cluster policy implementation are outlined. Addressed to researchers, teachers, and students of economic universities, as well as managers and specialists of innovative enterprises. The article was prepared in the framework of research work on the project supported by the grant of the President of the Russian Federation for young scientists - candidates of science MK-3834.2019.6.*

**Keywords:** Innovative Development, Territorial Innovation Cluster, Financial Risk, Cluster Policy, Subsidies, Financial Mechanism.

### INTRODUCTION

At the present stage of economic development, the concept of economic growth based on innovative development is recognized. A territorial cluster is an association of enterprises, suppliers of equipment, components, specialized production and services, research and educational organizations related to the relations of territorial proximity and functional dependence in the production and sale of goods and services. The development of clusters makes it possible to optimize the position of domestic enterprises in the production value chains, as well as to increase the level of competitiveness of Russian goods and services.

The experience of recent decades has shown that one of the most effective tools to stimulate innovation activity and improve its quality is innovation clusters. The development and implementation of an active cluster policy allow to strengthen the market position of the cluster members, promote a positive trend in the development of administrative-territorial

units, the growth of their export opportunities, overcoming structural imbalances, and orientation to production using modern technologies, methods, and forms of management. At the same time, a relatively small number of clusters have reached the stage of practical implementation. The real development of clusters will be facilitated not by the cluster policy itself, but by entrepreneurial activity, innovative initiative, and a high level of competition.

### ***Problem Statement***

A knowledge-based neo-economy cannot develop sustainably without a distinct innovation component. The innovative activity of various economic entities is a determining factor in the efficiency and competitiveness of both themselves and the national economy as a whole. Global competition, which is becoming tougher over time, and therefore requires the search and application of new organizational forms of creation and development of innovations, has its impact.

The problems of innovative development of the national economy are analyzed in the economic literature quite deeply. Thus, one of the founders of the theory of innovative development was Y. Schumpeter, who distinguished the categories of "economic growth" and "economic development". The theories of postindustrial and new industrial societies, which laid the basis for the formation of modern innovative economy, were developed by J. V. Stalin. Galbrata, P. Drucker, and M. Ketelsen. From domestic authors who have contributed to the theory of world innovative development, it can be pointed to academician N. I. Ivanov.

Innovative development is a trend in the development of the economy, as a result of which it acquires a new qualitative state and structure that ensures the priority of innovation. Economic development based on innovation provides intensive economic growth based on the latest, most advanced and promising knowledge and technologies. The described process is fully consistent with current trends when the basis of productive forces is scientific and technological progress.

Each country and region has its own characteristics of innovative development and capacity building in this area, which are the characteristics of the national innovation system.

One of the most important approaches to the formation and strengthening of innovative potential in a globalizing world is territorial cluster development, which has become widespread in the Russian Federation. In modern conditions, it is used as one of the most effective tools for the development of the world, national, and regional economy.

The relevance, theoretical and practical significance, as well as the insufficient degree of elaboration of the studied question, determined the choice of the topic of our study.

### ***Purpose of the Study***

The purpose of the study was determined by the need to develop areas of sustainable regional development on the basis of industrial import substitution, aimed at mobilizing the spatial and territorial potential of industrial production using the format of industrial parks as local nodes of production infrastructure with the possibility of emission of competitive advantages.

## **METHODS AND MATERIALS**

In the course of the research, methods of system analysis, design analysis, extrapolation, and comparative analysis were used.



The study used such general scientific methods of cognition as analysis and synthesis, system analysis, structural analysis, comparison of the studied indicators, methods of grouping, and generalization. The empirical analysis of the data was supposed to be based on the materials of the Russian statistical service, enterprises of the industrial complex of the North Caucasus Federal District, and other regions of the Russian Federation. Among the main tools of quantitative analysis, the statistical and economic-mathematical methods of analysis were used. The validity of theoretical developments was determined by the proper use of economic analysis methods, systematic analysis of economic phenomena and processes, strategic and investment management methods, methods of economic organization and management of industry, regional economy methods, and management of regional socioeconomic systems.

### ***Main part***

Competitive advantages are accumulated not at the supranational or even national level, but primarily at the regional level.

In the formation of competitive advantages, the key role is played by: historical trends in the development of regions, the diversity of cultures of entrepreneurship, and the existing models in the organization of production and education.

These factors have determined the feasibility of the formation and dissemination of territorial innovation cluster (TIC).

According to M. Enright, the regional cluster includes:

1. Industrial area of small and medium enterprises;
2. The focus of high-tech firms linked together through the development and use of common production methods, techniques, and technologies;
3. Production system between the enterprises, which were formerly a part of the corporation.
4. It is regional clusters that need support from government agencies and research organizations, as they are an important factor in improving national and regional competitiveness. Russia is not among the leaders in innovation and global competitiveness, which confirms the instability of its innovation system.

Systematizing the reasons for the insufficient level of innovative development of Russia, it is possible to allocate the following:

1. Insufficient development of mandatory elements of the national innovation system (insurance of innovative investments, venture financing system, leasing of high-tech products);
2. The specific structure of the Russian economy, which determines the greater profitability of investments in the raw materials industry;
3. Insufficient level of government regulation and support for innovation;
4. The narrow scope of dissemination of innovative ideas;
5. The unattractiveness of innovations for many enterprises, which determines their weak susceptibility to new developments.

The study of the experience of developed countries shows that the successful development of national innovation systems largely depends on the qualitative level of development of institutions that ensure the development and promotion of innovations (Porter, 1979).



Thus, in the leading countries, there are effective mechanisms of innovative development based on the use of public-private partnerships, business angels, venture funds aimed at the modernization of national economies in the innovative direction. The Institute of clusters, especially innovation-type clusters, is also actively used.

The cluster is the optimal environment for creation, implementation, and dissemination of innovations, which is determined by its features (Andreeva et al., 2018):

- a workforce of the highest qualification;
- geographical proximity, which creates favorable opportunities for the dissemination of knowledge;
- functioning in clusters of a large number of small and medium-sized businesses, which are characterized by a high degree of flexibility that contributes to innovative growth.

Therefore, the more clusters (industrial and innovative) there are in a country, the more opportunities it has to create and promote innovations. This trend is confirmed by the relationship of the number of clusters with the country's innovative development index.

The largest number of clusters operates in the USA, Finland, Great Britain, France, Canada, and Germany. The highest value of the global innovation index is characteristic of these countries. The only exception to this pattern is in Italy but in this country the common clusters of small size, not focused solely on the development of innovative activities (Eickelpasch and Fritsch, 2005).

Usually, with the spread of clusters, their innovative orientation increases, which is the basis of the competitiveness of these structures. In Europe, for example, clustering is currently concentrated in industries such as machinery and electronics, biotechnology, pharmaceuticals and cosmetics, transport and infrastructure, and light industry. In General, there are three main world centers of innovative cluster development: North America, Western Europe, and Asia.

Innovation clusters are also of great interest to the Russian economy. They have been the object of state economic policy for more than 10 years.

The development of conscious systemic innovation policy at the macro and meso levels began after the 2008 crisis, when the Russian Government in 2012 approved a list of 25 areas, selected on the basis of competition, which, will develop innovative territorial clusters with government support.

Innovative territorial cluster (ITC) is a territorial cluster with a significant share of innovative products of the cluster (in comparison to industry and country indicators), as well as with the formed innovative infrastructure, including interaction between stakeholders of the regional innovation system (educational institutions, research and development centers, technology transfer centers, business incubators, technology parks, centers for collective use of scientific equipment, public organizations, financial institutions, centers of cluster development).

Currently, clustering to varying degrees has covered almost all Federal districts of Russia.

There are 39 innovative territorial clusters in Russia, of which 27 (69.2%) are included in the list of pilot innovative territorial clusters.

According to the level of organizational development, Russian innovation clusters are divided as follows: 22 clusters have an initial level of organizational development (56%), 9 – medium



(23%), 8 – high (21%). Domestic innovation clusters are located in all Federal districts, except for the North Caucasus and Crimea. The largest representation – in the Volga and Central Federal Districts, the smallest-in the Ural and Far East (one).

The largest number of innovation clusters in Russia is in the field of pharmaceuticals. In addition, the common specializations are nuclear and radiation technologies, microelectronics and instrumentation, production of machinery and equipment, information and communication technologies, aircraft, new materials.

According to the Ministry of Economic Development of the Russian Federation, for the period 2013-2016 innovative territorial clusters achieved the following indicators: 7,39 trillion. RUB-volume of products, works and services; 137.4 thousand-number of new/upgraded high-performance jobs; 55,9 thousand people-passed professional retraining and advanced training as employees of the organizations-participants of clusters; 2848,5 rubles – average annual output per 1 employee of a member organization of the cluster; 551,64 billion rubles – volume of investments from extra-budgetary sources.

The main performance indicators of innovative territorial clusters (ITC) of the Russian Federation in 2013-2016 are presented in Table 1. Table 1 shows that production volumes in innovation clusters tended to grow by more than 10% annually. The number of jobs created and labor productivity increased (also by more than 10% per year). The volume of investments in the development of clusters is growing, but the rate of their growth is decreasing, especially noticeable in 2015.

In General, we can note a positive trend of indicators characterizing the development of innovative clusters in Russia. Eleven clusters are recognized by the Ministry of Economic Development of Russia as leaders of investment attractiveness of the world level. Most of them are located in the Volga region and specialize in pharmaceuticals and engineering.

Table 1-Key performance indicators of innovative territorial clusters of the Russian Federation in 2013-2016.

**Table 1 - Key performance indicators of innovative territorial clusters of the Russian Federation in 2013-2016**

Indicator	2013	2014	2015	2016	Growth rate (%)		
					2014 to 2013	2015 to 2014	2016 to 2015
The volume of products, works, services, trillion. RUB.	1,54	1.71	1.97	2.17	11.0	15.2	10.2
Number of new/upgraded high-performance seats, ths.	27.21	32.68	36.09	41.42	20.1	10.4	14.8
Number of TIC employees who have undergone professional retraining and advanced training, thousand people.	8.29	15.23	16.22	16.13	83.7	6.5	-0.6
Output per 1 employee of the participating organization	2630	2630	2899	3235	0,0	10,2	11.6
The volume of investment costs of participating organizations, billion. RUB.	82.6	93.2	93.3	98.1	12.8	1.1	5.1

Total investment in the cluster development from extra-budgetary sources, billion rubles.	91.2	132.2 9	139.4	181.7 5	45.1	5.4	30.4
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According to the results of the formation and development of innovative territorial clusters presented by the Ministry of Economic Development in 2016, it turned out that in three years the output per employee of participating organizations increased from 2630 thousand (in 2013) to 3235 thousand rubles (in 2016). The number of new (or upgraded) high-performance jobs increased from 27.2 thousand (in 2013) to 41.4 thousand (in 2016), and the volume of products, works, and services (for the same period) – from 1.54 trillion. RUB every year to 2.17 trillion. RUB. In the projections presented by the Ministry of Economic Development in April last year, it was stated that by 2020, the cluster development will achieve the output of growth per employee by 20% compared to the level of 2016, the number of jobs in the organizations participating in the clusters will grow to not less than 100 thousand units, attracting investments from extrabudgetary sources by 2020 will increase by at least 300 billion rubles; the volume of works and projects in the field of scientific research and development, performed by "cluster" companies will be more than 100 billion rubles.; the volume of total revenue from the sales of non-resource clusters by companies for export will double, and the growth in the number of patents for inventions will triple.

The clusters are concentrated a significant part of a viable innovative business, which should support development institutions. Now they have the opportunity to support not only projects of individual companies, but also projects of cooperation.

One of the mechanisms that accelerates innovative activity is an effective innovation cluster policy that involves the use of the following tools (Pogodina, et al., 2016):

- regional, interdepartmental, and interregional strategies and programs of innovative development;
- state support for the commercialization of research and applied development results;
- creating a favorable business environment that makes conditions for the work of innovative active industrial enterprises (reducing the tax burden on R&D expenditures, as well as activities not directly related to research and development, but contributing to their implementation; financial support for ongoing cluster projects; reducing the degree of public administration);
- stimulating demand for cluster products;
- cooperation of scientific and educational institutions as well as organizations of innovative infrastructure and industrial structures;
- development of the state-business-science partnership;
- regular monitoring of innovation development and cluster-oriented activities;
- development of infrastructure and communications;
- promotion of competent human potential.

The basic legal act defining the parameters of the cluster policy of Russia is the "Concept of long-term socio-economic development of the Russian Federation for the period up to 2020"





(Karkhanova, 2017). The strategy of innovative development of the Russian Federation for the period up to 2020 is also focused on the need to support initiatives for the formation and development of clusters. In addition, an important document describing mechanisms to support cluster strategy is a priority project of the Ministry of Economic Development "Development of innovation clusters - leaders of investment attractiveness of world level». In this document, a key condition for economic modernization and the realization of competitive potential of the regions is the creation of a network of territorial production clusters in two types: innovative (in urban areas) and regional production, aimed at restructuring the industry, its orientation to the use of high technology.

However, the active cluster policy began to be implemented in June 2012, when the "List of pilot programs for the development of innovative territorial clusters" was formed. According to the results of the competitive selection, this list includes 25 cluster projects with high scientific and technical potential.

Most of them are implemented in innovation enclaves that already have special preferences – in the territory of science cities, closed administrative-territorial entities, and technical-implementation zones (Lenchuk and Vlaskin, 2017).

Financial mechanisms to support clusters in Russia provide for the use of most measures taken abroad: special tax regime, preferential lending and debt financing, loan guarantees, investments in the framework of state programs and investment programs of state-owned companies, direct investments, development of the venture ecosystem of the regions, subsidies to companies, educational institutions of the Russian Federation and co-financing of regional programs, support of foreign economic activity of cluster participants, educational programs for cluster management bodies, information support for cluster members.

The availability of financial resources for the implementation of innovative projects and commercialization of the created innovations is a necessary condition for the implementation of innovative activities in territorial clusters (Bondarenko, 2016).

In the context of increased competition for limited financial resources that can be directed to innovation, the question arises from determining the optimal ratio of their sources.

Currently, the regulatory and methodological framework does not establish a single procedure for assessing the effectiveness of the use of budgetary and extra-budgetary sources of financing for innovation and innovation infrastructure, one of the elements of which are territorial clusters (Mokhov et al., 2018).

Public spending on the formation of innovative infrastructure is not accompanied by the planned volumes of extra-budgetary financing, the growth of costs does not lead to an increase in revenues from the activities of innovative infrastructure and increase their contribution to economic growth.

In order to increase the efficiency of the use of resources allocated for the development of innovation, it is necessary to ensure not only sufficient funding for real investments but also to obtain competitive advantages in the long term through the formation of a financial mechanism for the development of innovative territorial clusters.

Under the financial mechanism refers to a set of basic elements, principles, sources, and forms of financing, coordinated methods, and tools that specifically affect innovation processes in territorial clusters (Bogovik et al., 2016).



Most of the public funds allocated to support clusters go towards the development of innovation and educational infrastructure (about 70%).

Stakeholders of cluster initiatives (or stakeholders) can be federal, regional, and municipal authorities; professional communities of entrepreneurs; and other institutional entities interested in the development of integrated innovation-oriented structures including innovative territorial clusters.

The most commonly used financial instruments to support ITC are as follows (Morzhakova, 2017):

1. Budget financing. A kind of budget financing is an investment tax credit, the most promising for financing innovative processes in territorial clusters.
2. Equity financing is when commercial banks and institutional investors provide their financial resources to organizations for finance research and innovation. At the same time, these investments do not have a target orientation and are characterized by a high level of risk, which complicates their use in Russian conditions.
3. In project financing of innovation activities, investors are governments, international financial institutions, commercial banks, Russian organizations, foreign investors, and institutional investors who provide funds to finance certain investment and innovation projects on a targeted basis. At the same time, the risks arising in the implementation of projects are distributed, the process of project implementation is monitored, and guarantees are provided to the participating states of financial institutions. The difficulties of using this form in Russian conditions are its significant dependence on the investment climate, high level of credit risks, instability of legislation, and tax regime.
4. An indirect form of financing innovative processes in territorial clusters is franchising, which allows reducing costs for the development of production technology, market conquest, marketing, advertising, etc. (Seredin and Gutman, 2017).



Companies-innovators within innovative territorial clusters can receive not only support from other participants but also access to production and information technologies. At the same time, innovative developments will appear as a result of many adjustments at different stages of the innovation process, in which various companies of the territorial innovation cluster participate. Financing of innovations is provided at the expense of their own funds, and attraction of external sources of financing is not difficult because of reliability and solvency of the potential borrower.

Currently, the cluster policy in the country is implemented by the efforts of two national departments: the Ministry of Economic Development of the Russian Federation and the Ministry of Industry and Trade of the Russian Federation. The Ministry of Economic Development of Russia since 2010 provides subsidies to the regions for the creation and support of cluster development centers (Table 2)

**Table 2- Current and planned expenditures for the development of the innovation infrastructure of the Russian Federation.**

Directions of financing with action	2010	2012	2020
Expenses for development of innovative infrastructure of the Russian Federation, billion rubles.			



Innovation center "SKOLKOVO" (except co-financing of projects of companies)	3.98	10,1	20,5
Infrastructure of technical and innovation zones	11,9	7,8	10,0
Program of construction of technoparks in the sphere of high technologies	3,1		
Subtotal	18,98	17,9	30,5
Additional expenses to support innovative development of regions, billion rubles.			
Providing additional financial assistance to the subjects of the Russian Federation, actively contributing to the development of the innovative sector of the economy	-	5,1	15,2
Funding for science cities	0.55	1,1	3,2
Development of innovation clusters (including within the framework of the program of support of small and medium-sized businesses)	0.15	1,1	10,1
<b>Total</b>	<b>0,7</b>	<b>7.3</b>	<b>28.5</b>

The budget of the program in 2010-2016 amounted to 1.01 billion rubles.

As a result, 34 centers of cluster development were created in 33 regions of Russia by 2016. Their activities aimed at supporting cluster initiatives by providing consulting and organizational services to their participants -small and medium-sized enterprises-, including marketing research; organization of educational, communication, and exhibition events; information campaigns; development of business plans; strategic documents; etc. In 2012, the Ministry of Economic Development initiated the first and most ambitious to date program to support pilot innovative territorial clusters (TIC pilot) with a total budget of over 5 billion rubles (Gokhberg and Shadrin, 2013)

An important factor in the development of clusters is the provision of targeted subsidies from the federal budget to the budgets of the constituent entities of the Russian Federation, on the territory of which the ITC pilot is localized.

For 2013-2015, the total volume of subsidies has exceeded 5 billion rubles. In particular, for the development of innovation and educational infrastructure in the clusters were allocated 3.6 billion rubles for training, retraining, methodical, organizational, expert-analytical, and informational support – 951,1 million RUB; for development cooperation, the promotion of products including foreign markets (business missions, exhibition, fair, communicative events, etc.), – EUR 432.1 million.

The program of support of 25 pilot ITC became the first and the largest among such national initiatives. Its implementation contributed to the revitalization of the organizations participating in the clusters.

Thus, in 2013–2018, according to the Ministry of Economic Development of Russia, the volume of production within the clusters increased to almost 3 trillion RUB.

Against the background of negative general economic trends, the enterprises demonstrated positive dynamics in a number of indicators: output per employee in real terms increased by 10%, the number of new high–performance jobs-by more than a third, 40 thousand employees were trained in professional training and advanced training programs.

The development of pilot innovative territorial clusters has become a significant driver of growth in investment activity: on each ruble of budgetary investments to support the cluster



members and infrastructural facilities, attracted more than 3.5 rubles extrabudgetary sources (Popov *et al.*, 2017). In just three years, investments from budgetary and extra-budgetary sources exceeded 98 and 360 billion rubles, respectively.

The main indicators of the development of TIC pilot significantly exceed the average values for the regions of their home: the total revenue of their participants from sales of products in the foreign market is higher by an average of 20%, the volume of shipped innovative products of own production, innovative works and services performed by own forces – by 61-90%.

The key performance indicator of the ITC pilot is the total volume of joint research projects. During the implementation of the program (2013-2015), it exceeded 75 billion rubles.

The implementation of the priority project began with the development of roadmaps until 2020, allowing early identification of deviations from the goals of the development strategies of the leading clusters, and to take additional measures to eliminate them.

Domestic and foreign experience shows that ITC can achieve the following competitive advantages:

- increased economic growth;
- intensification of economic development of the region;
- growth of innovation and investment activity of organizations and industries;
- increase in exports of technological and high-tech products;
- improving the efficiency of economic resources (labor productivity, capital productivity, turnover ratio of current assets);
- development of small and medium-sized businesses;
- increase of employment and decrease of unemployment in the region (Today *et al.*, 2018).



It should also be noted that innovation territorial clusters provide more effective channels of access to specialized factors of production including new equipment and technologies, highly qualified personnel, and developed infrastructure, and provided that the region has competitive suppliers in the domestic and/or foreign markets and competitive technologically interconnected industries.

It is advisable to identify the following sources of financing for innovative enterprises, which have a state character and are able to reduce risks in innovation clusters:

1. Federal: venture partners of the Seed Investment Fund of Open Joint-Stock Company «RVC»;
2. Regional: regional venture capital funds, venture and seed funds under the control of the state and competent authorities, programs of grant and equity funding of innovative projects, targeted subsidies for compensation of expenses of small innovative enterprises, etc. (Kutsenko *et al.*, 2017)

In order to mobilize resources and reduce costs, it is advisable to develop joint (cluster) projects. In this process, it is important to actively involve small and medium-sized businesses. Especially attention should be paid to fast-growing companies with significant growth potential and clear development prospects (Gazelle companies), attractive to suppliers, contractors, service organizations, etc.

In the absence of such companies – "gazelles" in the innovative territorial cluster, the risk of stagnation in the development of innovative breakthrough business increases, and the possibility of creating a regional economic growth point on the basis of the cluster can be assessed as low.

Determining the composition of the cluster participants, we believe that in modern conditions the potential of their interaction should provide not only superiority on the national scale but also on the scale of the world economy as a whole. In this regard, it is important to carefully select applications for participation in the cluster.

Given the experience of European cluster programs, it is expedient to make a choice in several stages, as this lets you adapt the detailed applications under the existing rules of financing, bureaucratic procedures meet the need for investment issues, the existing support mechanisms, in fact, to test the cluster format of the interaction (in the process of aligning the vision, objectives, strategies, cluster members, and development of joint projects).

## CONCLUSION

Territorial clusters play an important role in the development of the Russian national innovation system. They contribute to its balance and stability, being growth points of industry and science.

In turn, for the successful functioning of clusters, it is necessary to take into account the experience gained and focus on the following areas:

- development of clusters based on a network of business incubators, medium and small companies cooperating with public authorities, which will contribute to the creation of innovation infrastructure and attract foreign investors;
- mandatory consideration of regional specifics, including the foreign economic potential of the regions;
- development of legislation in the field of public-private partnership, commercialization of innovations, import of promising foreign technologies;
- regular monitoring of the production capabilities of organizations' actual and potential cluster members, conducted by a single methodology, and is the basis for the management of decisions;
- formation of clusters together with foreign partners (for example, Chinese) in those sectors that are strategically important for Russia, focusing on cooperation in the field of research and development, as well as on the implementation of major projects in priority areas;
- formation of a business climate conducive to the development of small and medium-sized businesses innovation orientation;
- promotion and popularization of innovative business by the state with simultaneous financial support;
- development of regional, industrial, transport, financial, and social infrastructure.

One of the main tasks solved by territorial clusters through the development of entrepreneurial activity and increasing the competitiveness of their home region is the socio-economic



development of the territory. In this regard, the task of the state is not to grow clusters "from scratch", but to stimulate clustering processes at the national and regional levels through the formation of cluster policy, which can be formalized in the application of programs of support for territorial clusters by the authorities.

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## SUMMARY

In our opinion, one of the main tasks solved by territorial clusters by means of development of business activity and increase of competitiveness of the region of their basing consists of the social and economic development of the territory.

The priority direction of attracting financial resources to the TIC is foreign investment. The problems of financial support of TIC should be solved at the state level. The key directions of cluster policy improvement in Russia should be: expansion of financial instruments to support as well as assistance in improving the quality of pilot cluster strategies and the formation of a monitoring and evaluation system within the framework of cluster policy.

The authors' recommendations can be used in the development of territorial programs of industrial development in the framework of import substitution, in the development of regional projects of innovative development, as well as in the preparation of strategic agreements between regional economic systems and large external investors.



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