

# Improvement of the Innovative Capacity of a Socioeconomic System Based on the Development of the Cluster Approach

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## Abstract

This article deals with the ways of improving the innovative capacity of socioeconomic systems based on formation and development of innovative clusters; justifies the need for implementation of the cluster approach, analyzes the models and mechanisms for developing an innovative socioeconomic system, tools, and trends in scientific and technological development of the country; provides with the guidelines to improve the incentive mechanisms for the innovative activity and with innovation policy tools.

**Keywords:** socioeconomic system, innovative processes, innovative capacity, innovation clusters

## 1. Introduction

The dynamics of the development of national and regional socioeconomic systems becomes more informative and predictable if it is based not only on the study of traditional states, interconnections, and interdependencies, but also on the study of their innovative capacity, regularities and peculiarities of its accumulation, implementation, and development.

Knowledge of prerequisites, trends, and patterns of the dynamics of the innovative capacity of socioeconomic systems of the national and regional level provides many opportunities for efficient impact on the financial and economic reality of territories. Moreover, such an approach in the economics can be regarded as a theoretical and methodological basis for the modernization of the national economy, taking into account current trends and prospects of development of regions. One of the most urgent and important research tasks in this connection is the qualitative assessment and forecasting of innovation of regional socioeconomic processes, based on which the specificity of the dynamic development and interaction of the coherent national innovative socioeconomic system manifests itself.

The modern scientific theories in the field of storage, implementation, and development of the innovative capacity of socioeconomic systems allow studying the dynamics of economic processes from the standpoint of determinacy of chaotic innovative phenomena, the wave principle of the innovative capacity development, its fractal nature, and the bifurcation theory.

The interrelation of the research oriented to construction of a single forecast of development of the innovative capacity of socioeconomic systems will allow harmonizing the existing methods for evaluating and forecasting the development dynamics of economic processes innovation, which processes describe best the state of and prospects for the development of innovative capacity of regional socioeconomic systems.

The need to form an optimal integrated assessment and prediction system, best combining the variety of methods and approaches in order to identify regularities of accumulation, implementation, and development of the innovative capacity of regional socioeconomic systems, confirms the relevance of this study, its theoretical and practical value.

Study of the problems of accumulation, evaluation, implementation, and development of the innovative capacity of national and regional socioeconomic systems in the works by many domestic and foreign authors showed that they explore few elements of these problems, the solution of which does not suggest any comprehensive, systematic analysis; nor discloses the peculiar features of the strategies of development of these processes in terms of opposing trends of globalization and regionalization of socioeconomic processes in the regions of Russia.

In addition, a systematic approach to the study of the above problems allows concluding that they should be studied further, because they are dynamic and require constant in-depth understanding of these changes at the national and regional levels and development of their effective management. Currently, there is urgent need to develop and adapt the recommendations on the forms and methods of organizing and managing the accumulation, evaluation, implementation, and development of the innovative capacity of socioeconomic systems of specific regions of Russia with account of the experience and processes of their innovation, globalization, and clustering. The issues of the strengthening differentiation of regions of Russia in terms of their innovative activity are worth approaching. This determined the necessity to revise the importance of developing the innovative capacity of the socioeconomic system of the country and the introduction of the cluster approach in addressing the pressing issues of its accumulation, development, and implementation.

## 2. Methodology

The methodological basis of the study were the fundamental provisions of the economic theory; scientific works by Russian and foreign scientists in the field of economics, prognostics, the system theory, the results of various applied studies on the performance of innovative socioeconomic systems, the dynamics of the innovation process development, and their forecasting opportunities.

To date, certain methods and approaches to the assessment of regularities and trends of accumulation, implementation, and development of the innovative capacity of socioeconomic processes in the national and regional socioeconomic systems have formed in the economics. However, none of them can be considered universal for the study of these processes.

As a methodological framework, we used in the course of our study the dialectic, systemic-functional, regional, economic-statistical, and formally logical methods, as well as the methods of cluster analysis.

## 3. Results

### 3.1 *The Key Lines of Improvement of the Innovative Capacity of the National Socioeconomic System*

From the modern standpoint of the need to shift to the innovative way of development, a socioeconomic system should be treated as an organized unity of diverse and interacting traditionally innovative socioeconomic relations, which are localized in the economic time and space and which cause the alternatives of its development management (Dudin et al., 2014). Such a system belongs to the groups of systems that are complex, probabilistic, dynamic, multi-level, and that include the processes of production, distribution, exchange, and consumption of tangible and intangible benefits. A key characteristic of a socioeconomic system is its innovative capacity that characterizes the ability of the system to form, accumulate, distribute, and consume innovative products, works, and services.

The most common differences between traditional and innovative forms of organization and mechanisms of reproduction of tangible and intangible benefits are administrative-command and market methods and techniques that are typical of, respectively, administrative-command and market socioeconomic systems based on the use of traditional and creative management. Transition from the traditional to innovative form of organization of the socioeconomic system is very complex; multiple obstacles and problems arise on its way (Kirov, 2014).

The most important areas to improve the innovative capacity of a socioeconomic system are the following:

- 1) Providing for technological balance of the economy sectors and conversion of a number of manufactures on a differentiated basis.

The progress in science and technology develops in waves, with the duration of the technological cycles up to 50 years. During the last centuries in the history of technological evolution, there have been five such waves and five varieties of technological orders have formed. At present, the sixth technological cycle is forming in the developed countries (Dzhamaldinova & Sidorov, 2012).

At the same time, Russia's economy is characterized by the dominance of the third and fourth orders, as evidenced by the specific organization of manufacture in Russia. The peculiar features of the Russian manufacturers is the dominance of large separate enterprises; dominance of the monopoly or oligopoly principle

in the market (Menshikova and Levitsky, 2013). However, the processes of development of the fifth and sixth technological orders are at the same time carried out fairly actively (Lyasnikov et al., 2014).

For universal advancement of the fifth and sixth technological ways by the major condition maintenance of equilibrium processes in economy and an intensification of economic growth acts. Thanks to development of equilibrium processes in economy there is a softening of cyclic character of development of economy, duration of phases of revival and lifting increases, duration and depth of phases of crisis and depression decreases. As a result, are stabilised and dynamically develop all elements forming innovative potential of social and economic system. This trend is especially actual for Russia, which social and economic development is unstable and it is often accompanied by the crisis phenomena.

The basis of the fifth technological order is manufacturing industries. We have analyzed the indexes of the innovative activity of basic industry sectors, including the share of organizations implementing technological innovations in the total number of organizations, the share of innovative products, works, and services in the total volume of shipped goods, performed works, and rendered services.

Analysis of statistical data in 2007-2012 revealed significant differentiation of industries in the manufacture of innovative products (refer to Table 1).

Table 1. Dynamics of innovative products, works, and services in the total volume of products, works, and services of organizations, % (According to the Federal State Statistics Service)

Basic branches of the industry	2007	2008	2009	2010	2011	2012
1. Extraction of fuel and energy resources	3.2	2.8	2.8	3.0	7.5	7.3
2. Food production	5.3	4.6	4.8	4.9	4.1	9.6
3. Chemical production	12.0	11.9	11.4	11.5	10.2	10.0
4. Metallurgical production and production of fabricated metal products	5.0	4.6	5.5	4.8	6.2	5.9
5. Production of machinery and equipment	6.1	7.5	8.3	6.5	7.8	6.0
6. Production of coke and refined petroleum	3.4	4.4	1.6	3.9	2.3	10.4
7. Production of electrical, electronic, and optical equipment	10.2	8.8	9.9	10.0	9.1	9.7
8. Production of vehicles and equipment	18.4	17.9	16.2	17.1	18.9	26.2
9. Production and distribution of electricity, gas, and water	0.4	0.6	1.5	0.7	0.6	0.4

The production of vehicles and equipment, chemical production, and manufacture of coke and petroleum products had the highest share of innovative products and services (10%), and production and distribution of electricity, gas, and water had the smallest share. In many manufacturing industries in 2007-2012, there has been a steady increase in the share of innovative products in the total volume of shipped goods, performed works, and rendered services, primarily in the manufacture of coke and petroleum products, vehicles and equipment, except for the production of food products, machinery and equipment, and foodstuffs. At the same time, the production and distribution of electricity, gas, and water, the production of machinery and equipment, and the chemical production demonstrated negative dynamics.

In many industries and industrial manufactures in Russia in 2007- 2012, the decrease in the share of organizations engaged in technological innovation was noticed, which is a negative trend (The official website of the Federal State Statistics Service). First of all, it refers to the metallurgical production, manufacture of machinery and equipment, which form the productive capacity of the socioeconomic system and ensure its progressive transition to innovative development.

Thus, the structural and technological restructuring of the economy should be started with the basic industries, without which it becomes problematic to approach enhancement of the innovative capacity of the socioeconomic system, at the level of both the whole country and its individual regions.

## 2) Formation and implementation of the strategy of unbalanced growth

In view of the limited economic resources available for distribution in the economy, the most efficient policy to encourage economic development is the strategy of unbalanced growth. This strategy is focused on the support of really and potentially competitive industries and companies that supply on the market fundamentally new and upgraded products with improved consumer properties and operating specifications, which will allow expanding the existing positions in the commodity markets and win new ones. However, within the framework of the

strategy of unbalanced growth, the revival of the whole industry of Russia to the state as before the 1990s is an unrealistic task. Therefore, the strategy of unbalanced growth should result in a policy of identifying the "growth poles", the selective support of those industries and companies, which have the best chance to win, continuously retain, and expand the markets in the country and abroad, and are the most promising for the further development of the socioeconomic system and for the strengthening of its innovation capacity.

For successful implementation of the innovative industrial policy, coordination of federal, regional, and local interests of the government, business, and society as a whole is necessary as well as transfer of the relationship between them to a really innovative economic basis (Davydov, electronic resource).

The main tools for implementing the innovative industrial policy is the adequate to the market legislative regulation, the financial and credit mechanism, the price and tax policy, and the mechanism of regulation of domestic commodity markets. It is necessary to provide opportunities for the development of industrial consortia, which, as international experience shows, demonstrate high efficiency of the innovation activity, provide the socioeconomic system with necessary stability, innovation, and dynamism.

To intensify the development further, state support of the innovation activity is required, which can be implemented in direct and indirect methods. The government, first of all, needs to create environment for the financial support of innovations, create favorable investment climate of innovative activity and innovative infrastructure. Formation and protection of the domestic market of scientific and technical products should become the strategic line of the state innovation policy (Drucker, 1981).

It is necessary to pay more attention to the development of interregional cooperation and collaboration. For more effective innovation activity, companies need technology exchange both within the region and between countries. For the implementation of the innovation strategy of prospective development in the regions, it is advisable to create a database of innovative projects, which would accumulate experience in innovative activity, and form permanent regional inter-sectoral committees for implementation of the innovative strategy and monitoring of the status of the innovation process at the level of republics and regions.

### *3.2 The Priority Areas for the Formation of Innovation Clusters in Russia*

A cluster is a form of business organization that allows achieving a number of advantages, including:

- provision of privileged access to specialized factors of production (new equipment, advanced technology, qualified personnel, infrastructure), provided that in the region there are distributors, which are competitive in both domestic and(or) foreign markets, paying customers, and competitive related industries (Porter, 2006). This accessibility, as shown by the analysis made by M. Porter, results in reduction in transaction costs, minimization of inventory, exemption from import, preventing prices from being increased by suppliers and their failure to meet their obligations, reduction in the costs for enterprises' adaptation to changes in the markets;
- accumulation of specialized information (knowledge), access to which is better organized and requires lower costs, thus facilitating information flows. In a cluster, one can directly observe the activities of other companies and more quickly and adequately respond to the needs of customers;
- the complementary nature of the activities' types (by the extent of meeting the consumer demand, by the marketing, and by the procurement), thus increasing the quality and efficiency of work;
- the improvement of the competitiveness of the region's socioeconomic system. It is primarily linked to the support of science, innovation, export activities, creation of the necessary infrastructure, and education.

Thus, the creation and development of clusters provides for new business opportunities, leads to improvement of the sustainability of small businesses, stimulates innovation, and leads to increase in the competitiveness of the regions and the whole country (Kenzhebayeva & Turchekenova, 2014).

The cluster approach to the development of the Russian economy started in 2008 (The Concept of Long-Term Socioeconomic Development of the Russian Federation until 2020). To ensure sustainable development of clusters, it is necessary to implement the cluster policy in the regions of Russia. Regional cluster policy is the activity of public authorities related to addressing the objectives of improving the competitiveness and the innovative capacity of the region through the implementation of measures to promote the development of innovation clusters. Based on this definition, we can note that the most important goal of the cluster policy in the Russian regions is to increase its competitiveness through the formation of innovation clusters (Sandu and Troshin, 2010). We believe that achievement of this goal requires the following tasks to be solved:

- creation of legal framework, which would establish the legal basis for interaction between participants of the innovation cluster;

- development of regional support programs for innovation clusters;
- establishment of a coordination center responsible for implementation of cluster initiatives based on innovations;
- stimulation of the innovative activity of small and medium-sized businesses that are the key participants in the cluster and that ensure its sustainable operation;
  - assistance in development of the innovation infrastructure;
- assistance in attracting investments for the implementation of innovative projects in the cluster structures;
- development of cooperation between the members of the emerging innovation cluster (cluster meetings, round tables, scientific and technical exhibitions and fairs).

One of the ways of cluster formation is to create them based on the specialization of regions where there is geographic concentration of interconnected industries. Another way is to give economic regions, cities, or agglomerates the status of special zones where investors will be provided with tax exemptions if they develop innovation clusters. Therefore, it seems reasonable that many Russian regions follow the first path of formation of innovation clusters, as in this case, their natural (related to climatic conditions) and acquired (associated with the current specialization) benefits are implemented the most fully (Mingaleva & Mirskikh, 2014).

Not by chance that in the Volga Federal District, which is a leader in the number of innovation clusters created and supported at the federal level, the most promising and developed ones are the chemical and automotive clusters. This is due to the specialization of the Volga Federal District in these industries.

In addition, the chemical complex has been developed in most regions of the Volga Federal District, which is associated with the presence of sources of raw materials, electricity, and water supply. An important role was played by the consumer factor, since the district is the largest center for the automotive industry. Analysis of the localization of individual branches of the chemical complex made it possible to group the regions as follows:

- regions with prevailing development of oil refining and chemical production (the Republic of Bashkortostan, the Perm region);
- regions with prevailing development of chemical production and the production of rubber and plastic products (the Republic of Tatarstan, the Kirov, Samara, and Saratov regions);
- regions with prevailing development of the refining industry and the production of rubber and plastic products (the Nizhny Novgorod region);
- regions with primary development of individual branches of the chemical complex – the Republic of Mari El (the refining industry), the Republic of Mordovia (the manufacture of rubber and plastic products), the Chuvash Republic and the Orenburg region (the chemical industry).

In the export structure, products of inorganic chemistry prevail (fertilizers, sulfuric acid, soda and caustic soda, etc.). This situation results in the fact that the exported chemicals are processed abroad into products with higher added value, which has a negative impact on domestic producers. This problem can be solved by creating at the facilities of large chemical manufacturers a network of small enterprises involved in producing final products of the chemical products.

In our opinion, improvement of the competitiveness of the chemical industry can be achieved by creating a network of small enterprises around the base manufacturers based on development of a system of manufacturing and cooperative collaboration. This cluster structure will provide for successful operation of not only companies of the chemical industry, but also of the related industries, including manufacturers of rubber and plastic products and transport engineering companies.

The machine-building complex in the Volga Federal District has been developed thanks to the available physical infrastructure, available qualified personnel, advantageous transport position with respect to the raw material sources and consumers. The machine-building complex is represented by various industries, the concentration of which in some regions is heterogeneous. The regions, in which the production of machinery and equipment and the instrumentation have been developed on a priority basis, include the Republic of Mari El and the Penza region. The regions such as the Samara and Ulyanovsk regions have focused on instrumentation and vehicles production. In some regions, the structure of the machine-building industry includes several developed industries at the same time. These regions include the Udmurt and Chuvash Republics (manufacture of machinery and equipment, instrumentation, and vehicles production). Other regions, such as the Nizhny Novgorod region, are focused on only one industry (vehicles production).

In the Volga Federal District, a number of prerequisites has formed, which facilitate the formation of the automotive cluster. These include, above all, the presence of major car manufacturers. In particular, "AvtoGAZ" in Nizhny Novgorod, the Volga Automobile Plant in Togliatti, and "KAMAZ" in Naberezhnye Chelny. All this, of course, favors the selection of the cluster model of development of the engineering industry.

In the Central District, the innovation clusters in the field of pharmaceuticals and biomedicine (the Kaluga region), biotechnology (the Kaluga region, the Moscow region, Pushkin), nuclear physics and nanotechnology (the Moscow region, Dubna), new materials, laser and radiation technologies (the Moscow region, Troitsk) are of the highest priority (Sandu et al., 2014).

In the North-West Federal District, the priority is given to the development of clusters in the sphere of development of information technology, electronics, instrumentation, communications, and information and telecommunications (the Leningrad region, St. Petersburg), shipbuilding (the Arkhangelsk region), the medical, pharmaceuticals, and radiation technologies (the Leningrad Region, St. Petersburg).

### 3.3 Formation of the Mechanism of Stimulation of the Innovation Clusters Establishment

Table 2. Formation of the mechanism of governmental stimulation of the regional innovation clusters formation

Elements	Contents
<b>Goal</b>	Providing decent living conditions for citizens based on the integrated development of the innovative potential of areas
<b>Objectives</b>	<ul style="list-style-type: none"> <li>- Development of a long-term strategy for socioeconomic transformation of territories according to the priorities of the spatial development of innovative and resource constraints;</li> <li>- formation of favorable innovation and investment climate in regions;</li> <li>- <b>settlement of economic and financial relations between the federal, regional, and municipal authorities about the accumulation of economic resources in the innovation sphere;</b></li> <li>- improvement of the innovative industrial policy based on clustering, diversification of socioeconomic systems;</li> <li>- formation of financial and economic mechanisms to encourage the development of regional innovation clusters.</li> </ul>
<b>Subjects</b>	<b>Public authorities, corporate management, and control bodies of the society</b>
<b>Objects</b>	<b>Innovative companies, objects of the innovation infrastructure, economic resources, the human potential and the environment, which form the region's economic potential, regional innovation clusters</b>
<b>Principles</b>	<ul style="list-style-type: none"> <li>- <b>of combining the strategic, tactical, and operational planning;</b></li> <li>- <b>of participatory management;</b></li> <li>- <b>of evidence-based approach;</b></li> <li>- <b>of comprehensive problem solving;</b></li> <li>- <b>of systematic approach;</b></li> <li>- <b>of the Balanced Scorecard use.</b></li> </ul>
<b>Strategies</b>	<ul style="list-style-type: none"> <li>- <b>of unbalanced growth;</b></li> <li>- <b>of prospective development;</b></li> <li>- <b>of overtaking modernization;</b></li> <li>- <b>of clustering and diversification of production.</b></li> </ul>
<b>Methods</b>	<ul style="list-style-type: none"> <li>- the legal and administrative methods;</li> <li>- the target program methods;</li> <li>- the finance and economics methods;</li> <li>- the information and communication methods;</li> <li>- the institutional methods;</li> <li>- the psychological methods;</li> <li>- the regulatory methods;</li> <li>- the institutional methods.</li> </ul>
<b>Tools</b>	<ul style="list-style-type: none"> <li>- formation of a mixed cluster policy;</li> <li>- provision of public investment;</li> <li>- tax credit and tax exemptions on the VAT, income tax, property tax, exemptions on payment of the insurance premiums to social funds;</li> <li>- financial incentives;</li> <li>- risk management tools;</li> <li>- diversification of cluster development;</li> <li>- organization of economic competition of regional innovation clusters;</li> <li>- formation of markets of innovative products.</li> </ul>

In order to advance the process of creating innovative regional clusters, we have developed a relevant mechanism, which includes the main tools of state incentives for cluster development of areas (see Table 2) (Pogodina & Medvedev, 2013).

Among the models of cluster policy, the most promising is the mixed one, which is now beginning to form in Russia. It suggests a key role of regional authorities in the development of regional innovation clusters, with the federal center providing for creation of the infrastructure required for their successful operation (Pogodina & Zadorova, 2014).

Diversification of cluster development provides for the allocation of clusters in all federal districts of the Russian Federation, especially in such as the Far East, Southern, and North Caucasus Federal Districts, the financial, investment, employment, production, information, and innovative potential of which is not used in full (Afonasova, 2008).

Considerable opportunities exist in the Southern Federal District related to the development of competitive clusters in the agricultural sector, light industry, tourism, production of building materials, logistics hub, as well as in the new directions in the field of information and communication technologies, biotechnology, and pharmaceutical industry (Afonasova, 2010).

In the North Caucasus Federal District, the most promising are the following innovation clusters:

- production of building materials (the Republic of Dagestan, the Republic of North Ossetia, the Chechen Republic, the Republic of Ingushetia);
- the food industry (the Republic of Ingushetia, the Republic of Dagestan),
- the fuel industry (the Republic of Ingushetia, the Karachayevo-Cherkessian Republic);
- the light industry (the Republic of Ingushetia, the Chechen Republic);

The key element of improving efficiency of the economy of the Far Eastern Federal District should become the cluster of oil and gas processing in Primorye, which is planned to establish based on the following projects:

- construction of petrochemical facilities in Nakhodka;
- construction of a plant in the Khasan district of Primorye;
- construction of gas-chemical facilities in Nakhodka.

The advantages of this mechanism include the inherent possibility of self-regulation, self-stabilization of the socioeconomic system, which is one of the most important criterial tasks when selecting a strategy to improve the innovative capacity of the region and the whole country (Igonina, 2014).

The financial and economic instruments, which are represented in Figure 1, turned out to be especially effective at stimulation of the creation of regional innovation clusters.

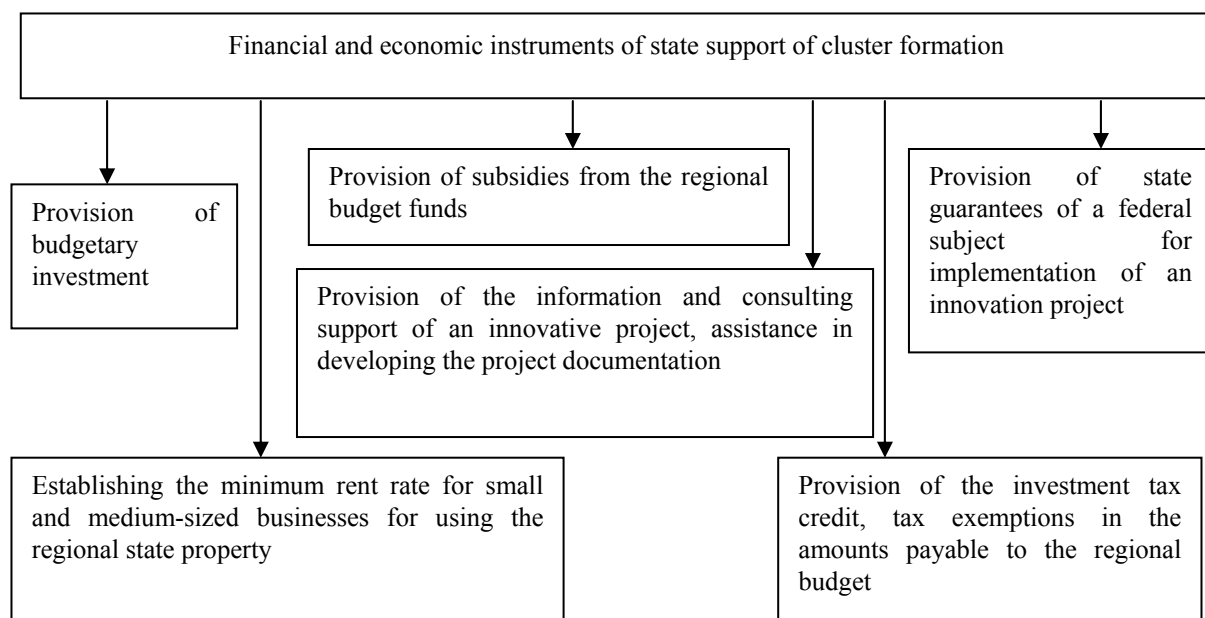


Figure 1. Financial and economic tools to stimulate cluster development in the regions of Russia

The above tools are classified as methods of direct and indirect stimulation of the development of innovation clusters; they facilitate the mobilization of the internal capacity of the regions and their adaptation to the environment conditions, characterized by the increasing effect of the risk and uncertainty factors (Kopylov, 2011).

### 3. Discussion

This study to identify the peculiar features of cluster development in the circumstances of the transition of the socioeconomic system of the region to the innovative path of development is based on the dialectical method of cognition. As a result of collection, generalization, and analysis of the information on the impact of innovations on the development of socioeconomic systems, it has become possible to confirm the hypothesis about the need for the introduction of the cluster approach in order to stimulate these processes. The high reliability of the results is based on the publications of the scientists Sandu I.S., P. Drucker, M. Porter, and others. A distinctive feature of this research is the consideration of the specificity of Russian regions and their industrial specialization and accumulated innovation capacity. During performance of the theoretical analysis, separate elements, attributes, and features of the formation and development of innovation clusters were identified and considered. The article highlights the key areas of clustering of the regions of Russia; provides the mechanism of governmental incentives to form innovation clusters and the financial and economic tooling. The validity of the obtained results is confirmed by the data of official statistical agencies of the country, published on the website of the State Committee of Statistics.

### 4. Conclusion

The proposed measures to stimulate the development of innovation clusters should lead to positive results in terms of improving the innovative capacity of the socioeconomic system of the region. The updated indicators of advancement of the activity of innovation clusters, government agencies related to promotion of the processes of formation of innovative clusters will allow evaluating the efficiency of storage and implementation of the innovative capacity of the national and regional socioeconomic systems.

1. A key feature of the modern socioeconomic system is its innovative potential, the formation, accumulation, and development of which have a direct impact on the competitiveness of regions.
2. The most rational policy option to promote economic development is the unbalanced growth strategy focused on the support of really and potentially competitive industries and companies that supply on the market fundamentally new and upgraded products with improved consumer properties and operating specifications.
3. The cluster approach in Russia should be implemented based on a mixed model of cluster policy. It suggests the key role of regional authorities in the development of regional innovation clusters, with the federal center providing for creation of the infrastructure required for their successful operation.
4. To stimulate cluster development, it is necessary to focus on the use of financial and economic instruments including provision of budget investments, subsidies from the regional budget, information and consultancy support at implementation of innovative projects in the cluster structures.

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