Development of Industrial-Innovative Clusters in Russia

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ABSTRACT

An important feature of the cluster is a factor of innovation orientation. Clusters usually form where there is ongoing or anticipated "breakthrough" progress in the field of engineering and technology, production and subsequent entering new market niches. In this regard, many countries in the economically developed and just starting to form a market economy – are increasingly using the cluster approach to support the most promising directions and forms of entrepreneurial activity in the formation and regulation of their innovation systems. In most cases, the industries included in the clusters are grouped based on the extent of intersectoral flows of products and knowledge, and include: technology flows due to the purchase of products and intermediate goods in other industries, as well as the interaction between their producers and users; technical cooperation, as expressed in patenting, development of patents, the use of scientific results in several related industries, as well as in joint research projects; staff mobility between the segments of the cluster to disseminate the best achievements control.

JEL Classification: P25, P28, R1, R12.

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1. INTRODUCTION

Indeed, the most important tool for improving the competitiveness of regions in the modern world was clustered form of spatial organization of the economy.

Foreign experience of functioning of the clusters shows that the cluster model of economic development of regions is the most efficient from the point of view of strengthening of competitiveness and increasing of cooperation and innovation activity of economic entities on the territory of the region. That is why currently, the cluster approach is part of the economic policy of many States, leading to a proliferation of clusters in the global economy.

In Russia and its regions clustered form of spatial organization of the economy in recent years has become one of the priorities of industrial policy instruments. This is evidenced by the significant attention to the functioning of the clusters by the Ministry of economic development of Russia, Ministry of regional development of the Russian Federation, and many regional governments. However, the documents of the state strategic planning issues of increasing the efficiency of cluster functioning and regulation of their development are considered mainly in fragments. The problem of detecting clusters in relationships of all cluster members in the process of "cultivation" and development of clusters is still not well understood and appreciated by domestic practice.

Theoretical and methodological basis of the study was the classics of Economics, world-renowned experts in the field of formation and development of clusters, both foreign and domestic economists who study the issues of analyzing market situations and competition in the field of cluster management.

In the research process, as methodological tools were used: comparative, logical, and situational analysis and expert evaluation.

2. DISCUSSION

Some aspects of the studies are reflected in scientific works of domestic and foreign authors.

Studies the problem of clustering of the economy and cluster policies presented in the works of the following authors: M. Porter (Porter, 1991), M. Enright (Enright, 2009), T. Andersson (Andersson, 1991), C. Ketels (Ketels, 2006), etc.

Practical questions on aspects of cluster policy, reflected in the reports of the European cluster Observatory INNOVA. Aspects of the development and management of cluster initiatives displayed in the guidelines CLOE. Practical issues associated with the implementation of the comparative analysis of clusters of Germany, reflected in the report of the Institute of innovation and technology.

In General, in modern scientific literature there is a large number of controversial definitions of a cluster are different from each other. The author's interpretation of the category "cluster" consists in the fact that the cluster is treated as a group of independent companies that are in geographical proximity and related partnerships across the value chain, resulting in the growth of competitiveness of the participating companies and the cluster as a whole.

3. COMPARISON OF THE CLUSTER FORM OF SPATIAL ORGANIZATION OF THE ECONOMY WITH INDUSTRY AND CORPORATE FORMS

As noted by A. Berezov, with indicative planning of the economic clusters of small enterprises at the regional level should take into account the following essential requirements: the contribution of the cluster in the combined result of socio-economic development of the region; the most rational and efficient allocation

of production in some areas of the region (municipalities, counties); promote comprehensive development of the economy of the region; rational distribution of labor between the individual districts of the region; alignment of levels of economic and social development of the region (Bolnokin et al., 2016; Lomova, Shiryaev, Kobersy, Borisova, & Shkurkin, 2016; Ananishnev, Godunova, & Kryukova, 2016).

The analysis of scientific works by domestic and foreign scientists, allowed the author to systematize and identify the unique characteristics of the cluster. Data typical properties of the cluster allowed us to compare the cluster shape the spatial organization of the economy with industry and corporate forms (Table 1).

So, the clustered form of the spatial organization of the economy, in contrast to the industry, includes in its membership universities and research institutes generating new knowledge, which in turn contributes to the obligatory presence of innovative activity in a cluster form (Almatova, 2011). Also, significantly difference of the cluster shapes of the branch forms the composition of the participants. So, in a cluster forms include providers, consulting, Finance businesses and other enterprises conducive to the creation and realization of competitive advantages of the cluster.

At the same time, the difference of the cluster shapes the spatial organization of the economy from corporate is the presence of internal competitive environment, which leads to strengthening the competitiveness of the cluster as a whole. It should also be noted that some unique characteristic features of the cluster are optional properties, industry and corporate forms, which from our point of view makes the form of clustered spatial organization of the economy more efficient relative to the other two.

Cluster policy is a new and little studied question of modern Russian science. In order to fill the methodological gap, we have carried out the analysis of the cluster policies of European States. This was done using records of 31 European countries, written as part of the European cluster project, INNOVA by definition of clusters.

The analysis revealed that cluster policy is implemented through the concept of cluster development, including national and regional programs. Also, it was determined that an important policy element is to identify sources of financing and responsible institutions for the implementation of these programs.

4. THE STRUCTURE OF THE REGIONAL INDUSTRIAL-INNOVATIVE CLUSTERS (RIIC)

Under the regional industrial-innovative cluster we mean the set of institutions and organizations of various forms of ownership located in the territory of the region and involved in the creation and dissemination of new knowledge, products and technologies, as well as the legal terms and conditions of business certain combined influence of government science and innovation policies, regional policies at the Federal level and socio-economic policy of the region.

Structural elements of industrial-innovative clusters are the following types of organizations:

- scientific organizations carrying out research activities primarily in accordance with national priorities of scientific and technological development;

- scientific organizations of regional subordination, whose activities are primarily aimed at solving problems of scientific and technological development of the region;

Table 1: Comparison of the cluster forms of the spatial organization of the economy with industry and corporate forms

Unique cluster characteristics	Comparison with industry form	Comparison with the corporate form
The location of the companies-participants of the cluster on a relatively compact region, i.e., the presence of geographical proximity.	The non-requirement of geographical proximity.	Possible location of the company as on a relatively compact territory, and no.
Intra-cluster interaction, which leads to lower costs and enhance the competitiveness of companies-cluster members at all levels and the cluster as a whole.	The presence of interaction between the participants inside the form, but it does not ensure lower costs and strengthen competitiveness.	The presence of interaction between the participants inside the form.
High performance, which is achieved through access to specialized inputs and labor force, as well as specialized information inside the cluster and public goods.	It is possible to have high performance, but it is not a required property.	It is possible to have high performance, but it is not a required property.
The presence of innovative activity, which is accompanied by innovative development of key companies across the value chain of the cluster.	It is possible the presence of innovative activity, but it is not a required property of the form.	It is possible the presence of innovative activity, but it is not a required property of the form.
The presence of a cluster of universities and/or research institutes generating new knowledge and creating possibilities for improvement of products; as well as companies-suppliers, consulting, financial and other organizations.	The absence of universities and/or research institutes, as well as suppliers, consulting, financial and other organizations.	It is possible the presence of universities and/or research institutes, but it is not a required property of the form. The lack of supplier, consulting, financial and other organizations.
Encourage the creation of new business formations due to the lower barriers to entry, as well as a better awareness of the existing opportunities.	It is possible to create new business entities. However, there is no lower entry barriers and better awareness.	The lack of incentives for the creation of new business entities.
The existence of an internal competitive environment, which increases the competitiveness of the cluster as a whole.	The existence of a competitive environment.	The lack of a competitive environment.
The presence of foreign economic activities, i.e. the implementation of the export of manufactured goods and services outside the region.	It is possible the presence of foreign economic activity, but it is not a required property.	It is possible the presence of foreign economic activity, but it is not a required property.
Self-generated form of interaction between the companies, which can not only be created artificially with the help of implementation of various governmental programs as required prerequisites.	Self-generated form.	Self-generated form.

– institutions of higher education training highly qualified personnel for the economy of the region;

– enterprises engaged in innovation (innovation-active businesses);

– small innovative enterprises;

– organization of innovative infrastructure;

– bodies of the regional scientific and technical complex.

Scientific organizations are the basis of scientific-technological complexes, and research teams from different science sectors are the environment, generating knowledge. Infrastructure support the innovation process at the present stage of development becomes almost the dominant component in the creation of regional scientific-technical complexes, since the activity in the use of infrastructure elements will allow you to obtain a synergistic effect resulting from the interaction of all elements of industrial-innovative cluster.

The structure of the regional scientific and technological clusters includes elements-the subjects of scientific and technological activities directly involved in the research, development, and implementation of results into economic turnover, as well as controls directional effects on the elements of scientific-technological complex for their progressive development. (Figure 1).

For interaction between managed and managing subsystems requires a system of indicators reflecting the current state of Affairs in the region and the results of the implementation instruments of the influence of management on system-managed.

The system used measuring instruments should on the one hand, to give the control system the necessary information to develop the implementation of management decisions, on the other hand, the adopted system of measurements should be based on existing reporting practices, to prevent ambiguity of interpretation, should be fairly easy to calculate and interpret indicators.

Evaluation of potential results of managerial influence on its development can be made on the basis of a system of indicators. For example, the system of indicators may have the following structure: resources, the scale of scientific and technological activities, scientific and technological results.

However, it should be noted that the measurement of scientific and technological activities traditionally seemed ambiguous task. Respectively the scientific and technical sphere as a control object has a number of features.

First, the activities carried out within the framework of scientific and innovation complex is a component of the innovation cycle of the economy. Thus, the development of scientific and technical sphere in General, and private research and innovation systems at the regional level, is crucial for the development of the economy as a whole.

Secondly, the result of scientific and technological activities are, as a rule, intangible assets that do not generate revenue. In this regard, escalated issues evaluate the impact of scientific and technological activities, as a mechanism for the valuation of intangible assets is ambiguous.

Thirdly, there is an objective problem of the disintegration of the scientific-technical and production processes. Of course, this aspect of scientific and technological activities indirectly affects the performance, did not reflect its real importance, and given, rather, the problems of management.

Fourthly, it is the scientific-technical field concentrates the most skilled and creative scientific and technical workers (Mattsson, 2009).

Fifth, the results of scientific and technical activity in the Russian Federation, despite their substantive importance, may not always be demanded and implemented. The motive for the introduction of any innovation is the economic benefit. In the Russian context, owing to the inefficiency of its economy, sometimes it is not appropriate the introduction of technological innovations, while they provide a technological base product innovation. This is due to the low level of wages in the country – the development, production, implementation and operation of new equipment become disadvantageous compared with the use of human labor.

Accordingly, the main objective of the evaluation and comparative analysis of activities of regional scientific-technological complexes is the choice of an adequate measurement system conforming to the features of each control and task management subjects.

5. CLUSTER POLICIES AND TOOLS FOR THE DEVELOPMENT OF INNOVATIVE CLUSTERS

Under the cluster policy in this paper refers to activities undertaken by municipal and state authorities for creating and supporting the development of clusters. Activities include organizational and regulatory support, investment, fiscal tools, information and staff support.

The goal of cluster policy is to increase the competitiveness and innovative potential of regions and individual enterprises, development of small and medium-sized businesses, promoting the diversification of regional economies based on the stimulation and development of regional industry clusters.
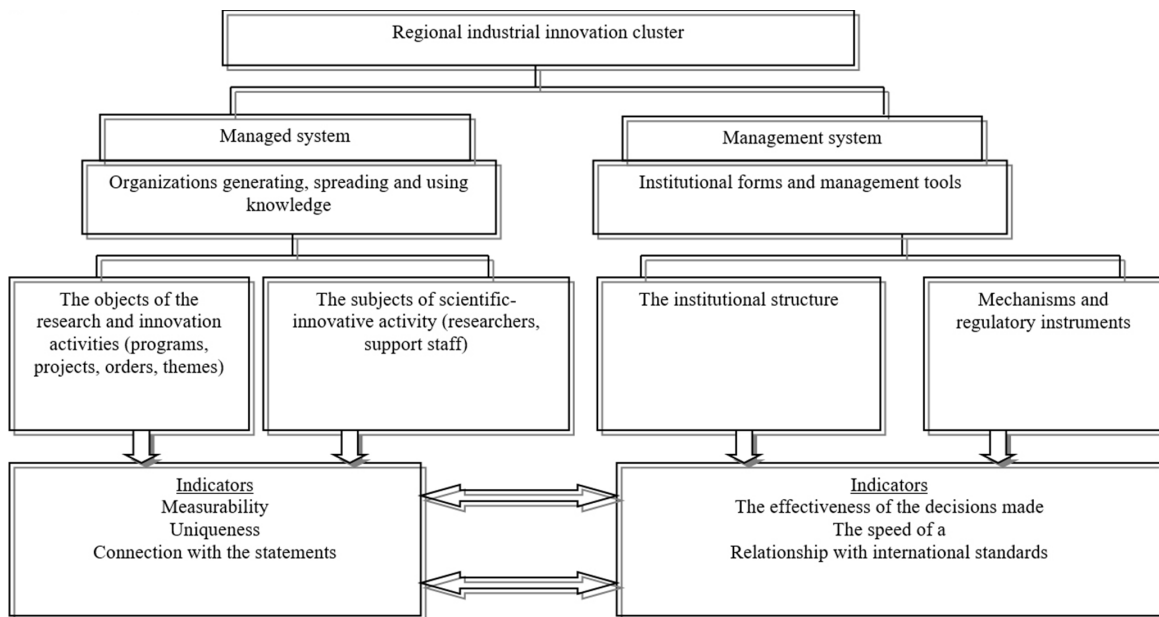

Figure 1: The structure of the interaction elements of the regional innovation cluster

It is possible to distinguish two types of cluster policy: the administrative and democratic.

Administrative policies conform to the following rules:

– form the government priorities (selected sectoral and regional priorities and those clusters that intend to develop);

- purposefully creates an environment for the priority clusters (control structures, branches of universities, research institutes, airports, roads, etc.);
- government chooses the regions to create clusters and funding.

Democratic policies are good for other rules:

- the government grows the clusters that were originally formed by the market;
- governments rarely participate in the creation of infrastructure for cluster;
- the government creates incentives for the regional authorities, which bear the entire responsibility for the creation of clusters (finances projects, provides special grants to individual regions in the development of clusters, in particular in depressed regions). Development strategies of regions based on development of clusters.

Cluster arrangements consist of a set of tools and the sequence of steps: initiation, development of a strategy and action plan (Kobersy, Barmuta, Muradova, Dubrova, & Shkurkin, 2015), the formation of a specialized management structure, program development and evaluation.

In the world, most famous instruments to support the development of clusters are the following:

- direct funding (subsidies, loans), which reach 50% of the costs for the creation of new products and technologies (France, USA, Russia and other countries);
- tax relief for businesses, including the exclusion of tax-deductible R & d costs and write-off of investment in R & d tax incentives universities and research institutes (Japan);
- legislative protection of intellectual property and copyright;
- loans, without interest payment (Sweden);
- targeted subsidies for research and development (almost in all developed countries);
- establish the foundations of innovation, taking into account possible commercial risk (England, Germany, France, Switzerland, Netherlands, Russia);
- grants up to 50% of the cost of innovation (Germany);
- reduced state fees for individual inventors and submission of tax benefits (Austria, Germany, USA, Japan, etc.), as well as the creation of special infrastructure for their support and economic security (Japan);
- deferred payment of duties or exemption from them if the invention relates to energy savings (Austria);
- free processing of applications of individual inventors, free patent attorney services, exemption from payment of fees (the Netherlands, Germany);
- state program to reduce risk and reimbursement risk losses (Japan);
- search programs and attract foreign talent including expedited processing of visas to them, the idea of scholarships for study and improvement of living conditions (Japan, USA, Australia).

The analysis allows to improve the tools of management of innovative development of regions in Russia. These include regulatory, organizational, financial-economic instruments.

The proposed functional structure of the instruments of influence on the development of regional scientific-technological complexes suggests some cross-influence of individual elements on a control object, and accordingly, the possibility of attributing one particular leverage to multiple groups. However, the analysis of certain types of tools of influence does not reduce, but rather increases the possibility of synthesis, i.e., the simultaneous use of several tools in a systematic manner.

The proposed concept and the results of the study allow not only to assess the level of innovative development of individual territories, but to conduct the factor analysis of the causes that determined the value of the innovation index in a particular region or group of regions, to formulate proposals for improving the management of RPIC, including regulatory, financial, economic and organizational management tools.

6. CONCEPT OF COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF RIIC AND THE RESULTS OF EMPIRICAL RESEARCH

Strengthening the regional component in the formation and implementation of innovation policy of EU countries is the need to measure and compare the level of innovation development of the regions, countries or groups of countries. Many researchers worldwide are trying to answer the question – how does the innovation economy, what factors determine its nature, how to predict its development. Despite the fact that any model is a simplification, the focus is primarily on identifying the key parameters that define its essence.

The obvious requirements are the features of the innovation economy, which, along with the traditional structure of indicators (financial, logistical) needs to be structured and intellectual indicators (human, relational, institutional).

The majority of scholars is on the path indicator simulation, which allows you to select multiple parameters simple and/or compound (IC), which conducted both domestic and cross-country analysis (Diallo, 2015). The logic of such modelling relies on the understanding of the innovation economy as a process of continuous development of the many items that are in relationship with each other, creating, spreading and using knowledge to ensure growth and competitiveness. In this sense, the logic of such modeling is closely linked with the logic of measurement.

Practice of the comparative analysis is based on international standards of accounting for research and development and innovative activities. Uniform standards implemented in European countries under the auspices of Eurostat, are based on two main documents, regulating accounting practices in the research and innovation sector: the Frascati Manual, the Oslo Manual. The current third edition of the Oslo Manual provides guidelines for the measurement of not only technological, but also non-technological marketing and organizational innovation (Gupta, Hanges, & Dorfman, 2002).

Installed Eurostat standards in accounting practices opens opportunities for comparison of EU countries on a variety of criteria. For example, the well-known technique developed by experts of the world Economic forum (WEF), according to which a comparison of the effectiveness of the economies of different countries is carried out by 10 complex parameters. Eurostat on a regular basis by the project

"Research innovation community" (Community Innovation Surveys – CIS). The methodology provides a system of indicators that allow for comparative assessment of level of innovative development of different countries of the EU. Used system of indicators allows to use the technique of cluster analysis to estimate the concentration of knowledge in specific sectors, regions, groups of countries (Wooldridge, 2003). International organizations, accumulate and use their reports information about the level of development of individual countries, widely used composite indices, which is a weighted aggregate indicator constructed on the basis of a wide range of different indicators. The system of indicators is constructed in accordance with the objectives of each study and varies considerably.

Among the composite indices, relevant to innovation and scientific-technical sphere, it should be noted: the Index of technological development, program of the UN in the framework of the project "Report on human development", world Bank Index, the Index of the new economy (developed in USA), the Indicator of investment in the knowledge economy (European Commission). Since 2001, used mainly 3 methods, called innovation benchmarking: European innovation barometer "European Innovation Scoreboard", the Research approach to the scale of innovation ("Exploratory Approach to Innovation Scoreboards"), a Database of measures of the European innovation policy (Data-base of Innovation Policy Measures). Recently a system of indicators "European Innovation Scoreboard" (EIS) system developed by EXIS "Exploratory Approach to Innovation Scoreboards" ("Research approach to the scale of innovation"), Knowledge Assessment Methodology (KAM) ("Methodology of assessment").

The European experience in innovation benchmarking shows that national development in this area need serious coordination to achieve the goal of building a single European research area (Elenkov, Judge, & Wright, 2005). The inclusion of Russia in this process implies that the domestic practice of intercountry and interregional comparisons should be consistent with the international community standards and practical guidelines for use. You cannot copy the existing experience; however, it is important to rely on it, forming your own strategy of innovative development, in order to avoid already known mistakes.

7. CONCLUSION

The concept of a sustainable cluster of innovative development is applied in the strategies of most regions of the country. However, the factors contributing to their use, are summarized only in some subjects of the Russian Federation. Now the most effective choice for many progressive regions and areas is strategy development and formation of industrial innovation clusters. For the effective development of industrial innovation cluster there should be a joint effort of many agencies at different levels, namely, government agencies, educational and research institutions, private organizations, business enterprises and other public institutions.

The Russian government aimed at a strategy of the innovative development of the region using the new structure in the provision of real output, sound competition, enterprise development and balanced territorial market.

The formation of the innovation sphere contributes to increased industrial innovative potential of Russia, the development of the legislative base regulating the innovation activity, scientific work, proving that government investment in innovation is only part of the challenges of growth through innovation.

Innovative activity of enterprises must be formulated and used economic motives of innovative development. To foster the development of cluster formations, have to be applied to the potential in

funding the development of infrastructure, manufacture of budgets, as well as preferential tax burden and provide a major competitive attraction of residents, acting as the core of the developing cluster.

For the functioning of cluster structures requires the creation of a special infrastructure – industrial parks, technology parks, transport networks, etc. Industrial-innovation clusters created in Russia, are the most advantageous form of development in the competition, are associations of various organizations (industrial centers, scientific and research institutes, service companies, government agencies, etc.) that allows you to effectively redirect new knowledge and skills, research and inventions transforming them into an entirely new form of innovation that are demanded by market and society.

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