



Clusters in modern innovations of the economy of the Russian Federation

Los clústeres en las innovaciones modernas de la economía de la Federación Rusa

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ABSTRACT:

The purpose of this article is to study the essence and classification of clusters in the modern economy. In nowadays economy clusters have become one of the most effective forms of integration of financial and intellectual capital, providing necessary competitive advantages and solving problems in the field of modernization and innovative development of industry all over the world. They are aimed at the development of innovative component of industries, their investment attractiveness, creation of new high-tech industries and training of highly skilled labor.

Keywords: competitiveness, innovation development, industrial cluster, state innovation policy, industrial policy of the Russian Federation, classification of clusters

RESUMEN:

El presente artículo tiene por meta estudiar la esencia y clasificación de los clústeres en la economía moderna. Hoy en día los clústeres se han convertido en una de las formas más efectivas de integración de capital financiero e intelectual, proporcionando ventajas competitivas y resolviendo problemas en el campo de la modernización e innovación en la industria a nivel mundial. Sus objetivos están enfocados en el desarrollo de los componentes industriales, en la atracción de inversiones, la creación de nuevas industrias de alta tecnología y el entrenamiento de trabajadores muy cualificados.

Palabras clave: competitividad, desarrollo innovador, clúster industrial, política estatal de innovación, política industrial de la Federación Rusa, clasificación de los clústeres.

1. Introduction

To solve problems in the field of modernization and innovative development of industry all over the world clusters are widely used. Their goals consist on achieving the development of the innovative component of industries, their investment attractiveness, the creation of new high-tech industries and the training of highly qualified labor force. The use of clusters in solving such problems is a worldwide and quite well-known practice.

The high level of competitiveness of the country in the world markets is now considered the main source of sustainable economic growth. Since the country's success is increasingly

conditioned by the renewal of technologies, the development of new market niches and the organizational innovations, the basis for increasing the competitiveness of the state is the high innovative activity of business.

An important feature of the cluster is its innovative orientation. The most successful clusters are formed where a "breakthrough" in the field of production technology and technology is being implemented or is expected to be achieved, with the subsequent access to new "market niches". In this regard, many countries - both economically developed and just beginning to form a market economy - are increasingly using the cluster approach in the formation and regulation of their national innovation programs.

Today, the issues of innovative development are more relevant than ever for Russia. This topic is a constant focus of attention of the political leadership of the country. The implementation of the state innovation policy will have a significant impact on how and at what rate Russia will transition from "catching-up" to a one of the global innovation leaders, a country capable of generating substantial and sustainable revenues from high-tech exports. Russia faces the challenge of strengthening the role of innovation in socio-economic development.

The share of organizations in the industry that implement technological innovations has not changed much over the last five years. It is 9.2-9.7%, which indicates the low innovation potential of the economy and the insufficient rate of its development, according to the Institute of Statistical Research and Knowledge Economy of the National Research University Higher School of Economics.

In 2017, 9.6% of industrial enterprises used technological innovations in Russia. In the rating of European countries, where similar surveys are conducted, Russia remains on the 28th place, ahead of only Romania (6.4%). In Germany, the index is 58.9%, in Finland - 52, France - 46.5, Great Britain - 45.7, Denmark - 39.4. In other sectors in Russia, innovations are also not widely used: 8% of telecommunication and IT companies and 3.1% of agricultural enterprises.

According to some experts, the lag in the development and testing of innovations is due to the low level of commercialization of scientific developments. Universities are engaged in research at their own discretion, and companies introduce new technologies based on their own needs. The links between science and business remain extremely weak. However, they can be strengthened by the authorities' plans to form multi-sectoral clusters.

2. Methodology

The development and application of cluster approach to the formation of the innovation economy in the Russian Federation has been applied for a long time. However, it was not systematized and did not have a sufficient methodological basis. At the state level, this problem was addressed in 2008 with the adoption of the Concept of Long-term Socio-Economic Development of the Russian Federation for the period up to 2020. One of the key conditions for the modernization of the economy and implementation of the competitive potential of Russian regions is the formation of clusters focused on high-tech businesses in priority sectors, as well as on the processing of raw materials and energy production using modern technologies.

Further development and support of clusters at the state level continued with the adoption in 2011 of the Strategies of Innovative Development of the Russian Federation for the period up to 2020. In this document, it is assumed that the formation of areas of innovative development and innovation clusters will contribute to the activation of innovation activities.

In 2014, the Federal Law "On Industrial Policy in the Russian Federation" established the definition of the industrial cluster and fixed the possibility of applying measures to stimulate its activities. The condition for the provision of support is the creation of a specialized organization that provides support for the development of the cluster, as well as confirmation of its compliance with the requirements established by the Government of the Russian Federation.

In furtherance of the Federal Law No. 488-FZ "On Industrial Policy in the Russian Federation"

dated December 31, 2014, the Resolution of the Government of the Russian Federation No. 779 dated July 31, 2015 (as amended by the Resolution of the Government of the Russian Federation No. 963 dated September 26, 2016) "On Industrial Clusters and Specialized Organizations of Industrial Clusters" approved the requirements for industrial clusters and specialized organizations of industrial clusters in order to apply to them measures to stimulate their activities in the field of industry and the Rules of Confirmation.

In 2016, the companies' industrial clusters and specialized organizations were approved by the Ministry of Industry and Trade of the Russian Federation. The Ministry of Economic Development passed on to the support of cluster initiatives based on the principles of project management, launching the priority project "Development of innovation clusters - leaders of world-class investment attractiveness". Its main objectives are to create points of economic growth, innovative development, export of high-tech products and commercialization of technologies, increase labor productivity and creation of high-performance jobs, and increase the competitiveness of the country. The new initiative takes into account the experience of the program to support pilot innovation clusters, with an emphasis on a number of priority areas. These include:

- formation of a cluster management system based on modern experience and high quality of human resources, in particular, training of regional leadership development management teams;
- assistance in access to existing forms of support for the development of territories, including budgetary instruments and development institutions, the use of the status of a special economic zone and the territory of advanced socio-economic development;
- assistance in the integration of territories into the development programs of suppliers of large companies with state participation;
- support for access to foreign markets, including export promotion, investment attraction, promotion of cooperation with foreign partners.

The priority project of the Ministry of Economic Development and Trade of the Russian Federation suggests focusing the efforts of innovation clusters on achieving global leadership in terms of investment attractiveness. Based on this, the efficiency of their functioning is determined, first of all, by the volume of attracted investments from extra-budgetary sources. According to the data presented in the agreements on support for the development of innovation clusters concluded by the Ministry of Economic Development and Trade of the Russian Federation and the supreme executive bodies of the state authorities of the constituent entities of the Russian Federation, in 2016 this indicator amounted to 163.9 billion rubles. It is expected that by 2020 it will grow by 69%.

In accordance with the system approach, the following features of cluster classification are proposed:

1. The degree of homogeneity (concentration on the core business). The boundaries of the classification on this basis are as follows: an industrial cluster in which all enterprises have a similar main business - an intersectoral cluster in which enterprises of various industries are united.
2. The degree of connectivity. Boundaries: a group of interacting enterprises forming a single technological chain with a single management body - a group of competing companies.
3. The degree of participation of innovation generation centers. Boundaries: the cluster is formed on the basis of scientific centers and universities - innovation generation centers belong to separate enterprises - there are no innovation generation centers.
4. The degree of maturity. Emerging clusters; formed (mature) clusters; clusters at the stage of disintegration (crisis).
5. The degree of significance (scale of the cluster). Regional, national, transnational cluster.

There are three main types of clusters by area of linkage:

- clusters with a regionally limited form of economic activity within related sectors, usually linked to certain scientific institutions (research institutes, universities, etc.);
- clusters with vertical production linkages in narrow fields of activity, formed around parent firms or networks of major enterprises covering production, supply and marketing

processes;

- Sectoral clusters in different types of production with high levels of aggregation (e.g. "chemical cluster") or at an even higher level of aggregation (e.g. "aerospace cluster").

3. Results

On the basis of research of works of the western economists it is possible to make a classification of clusters, revealing the basic types of innovative regions on the basis of a number of technical and economic parameters. The main characteristic of these regions is that certain types of companies are located in relative proximity to each other, i.e. they make up integration economic clusters or territorial agglomerations, the most common is the model of regional production network, within which three types of clusters are distinguished (Table 1).

Table 1
Types of clusters according to the regional production network model

Cluster type	Name	Characteristic
Type A	Linked clusters	The oldest type of cluster, which is a group of companies that were originally located in close proximity to each other in order to reduce costs.
Type B	New industrial zones (usually high-tech)	This type of cluster is characterized by high-tech companies such as computer manufacturing, information technology and trace elements.
Type C	Innovation environment	Research groups form the basis. In the innovation environment, social ties are established both between individual participants working in the same company and between employees of different companies.

In addition, there is an approach according to which clusters are divided into industrial (based on functional connections) and regional (based on spatial connections).

The Organization for Economic Cooperation and Development (OECD) uses an approach based on the level of industrial coverage of the cluster. According to it, there are three levels:

1. national (or regional) economy as a whole, where the interrelationships between sectors or enlarged industries are studied;
2. The level of industries and sub-sectors where inter and intra-industry linkages are investigated;
3. the firms are considered together with the supplier networks, i.e. the inter-firm relations are studied.

Researchers define the essence of cluster associations in different ways. Some point to the geographical concentration as the main characteristic of the cluster, others to the industry affiliation, and others to the innovation orientation. In our opinion, it is the innovation orientation that becomes the main characteristic of modern clusters, as it determines their competitiveness.

In the work of A.T. Berezova, the main attention is paid to the principles of formation of the mechanism of management of the cluster of small enterprises. The author highlights the principles shown in Table 2.

Table 2
Principles of formation of the mechanism of management of the cluster of small enterprises

Number	Principle	Characteristic

1	Principle of independence and cooperation	Within the framework of the cluster, its participants maintain freedom and independence in their activities. At the same time, they can transfer to the general level of regulation the solution of a number of issues on coordination of activities.
2	Principle of competition	The enterprises included in the cluster compete both with the subjects of external environment and with each other within the cluster.
3	Principle of free entry and exit	Any enterprise of the cluster, subject to certain rules established in the cluster, may, on its own initiative, withdraw from its composition or enter.
4	Principle of responsibility	Enterprises undertake obligations to interact with other cluster members, maintaining legal, commercial and industrial-technological independence. In addition, cluster members should support the development of the industry by attracting new ideas for the implementation of internal projects, by attracting new partners offering more effective solutions to internal problems.
5	The principle of complementarity	The pooling of resources of the cluster members should ensure the implementation of the synergy effect.
6	Principle of awareness	Technologies available within the cluster, innovative developments may be available to all cluster members.

A number of principles of cluster formation are also presented in the work of E.V. Marchenko:

- territorial and sectoral isolation;
- voluntary partnership of enterprises with preservation of competitive struggle within the cluster;
- organization of high-tech production within the cluster;
- orientation to the organization of compact placement of the entire production cycle.

Drozdova N.V. also gives the basic principles of cluster construction, which are presented in Table 3.

Table 3
Fundamental principles of cluster construction

Principle	Content
Self-organization	<ol style="list-style-type: none"> 1. Historical preconditions for cluster development 2. Structural and functional community of the cluster enterprises 3. Strengthening the interconnection of enterprises in the cluster 4. Creating conditions for the development and formation of the cluster
Intracluster cooperation and competition	<ol style="list-style-type: none"> 1. Competition between enterprises 2. Cooperation when entering the foreign market 3. efficiency and development of own economic activity 4. Stimulating innovation processes
Relationship based on	<ol style="list-style-type: none"> 1. Participants' dependence on each other's success

common economic interests	<ol style="list-style-type: none"> 2. Increasing the level of business innovation 3. Preservation of autonomy and cohesion of cluster members 4. Coordination in dispute resolution and decision making, building external relations
Corporativeness	<ol style="list-style-type: none"> 1. Culture of communication between participants, presence of climate of trust 2. Reciprocity and good-neighbourliness, a unified system of values, behavioral patterns, methods of evaluation of results, mutual control in conflict resolution 3. Possibility of information exchange, experience exchange, joint training 4. Simplification of the interaction structure, cost reduction 5. Fulfillment of obligations to partners, reputation of enterprises and the whole cluster as a whole
Long-term cooperation	<ol style="list-style-type: none"> 1. Maintaining relationships 2. Regular, long-term guaranteed deliveries and quality of services 3. Access to information, resources, awareness of participants 4. Interaction to achieve and maintain competitive advantage
Partial leadership	<ol style="list-style-type: none"> 1. Presence of the "center" of gravity (leading structural enterprises) 2. The dominating factor is the concentration around large leading production enterprises and scientific centers 3. The activity of the "center" and the attraction of "peripheral" enterprises
Dynamic (flexibility)	<ol style="list-style-type: none"> 1. Constant "movement" of the cluster - continuous processes of formation, development and decay 2. adapting to the ever-changing requirements of the market environment 3. Introduction of new production facilities, expansion of the product range 4. Increasing the level of innovation in production
Complexity of resource use	<ol style="list-style-type: none"> 1. Unification of participants in the framework of a single indissoluble technological chain, integration and technological interrelation, unified technological approach, standards 2. Consistency of production, participants - suppliers and consumers of each other's services 3. end-user orientation, expansion of assortment 4. Improvement of business processes and management skills
Outsourcing specialization	<ol style="list-style-type: none"> 1. Delegation of responsibility, fragmentation of business functions 2. Contractual outsourcing of ancillary facilities, cost savings and resource savings 3. Formation of new unique abilities, access to the best world production technologies

Rulinskaya A.G. considers the creation and development prospects of clusters in the regions from the angle of the following principles: general, which are inherent in all types and types of clusters, regardless of their sectoral orientation; and special, which take into account the sectoral orientation of the real or emerging cluster.

The author considers accounting to be the general principles of cluster formation the following criteria:

1. geographic location of the region;
2. administrative-territorial structure of the region;
3. peculiarities of the region's nature and natural resource base, their impact on the living conditions of the population;
4. Composition of the population, demographic and ethno-cultural peculiarities;
5. peculiarities of the economy of the region (i.e. the main factors of the development of industries, the problems of the region and ways to solve them).

Klimova T.B. believes that territorial clustering is based on the following principles: the presence of geographical proximity, the inclusion of private and public enterprises connected by business and non-business relations.

O.M. Trofimova singles out the following principles of formation of clusters in Russia:

1. vertical integration of the enterprises included in the cluster;
 2. the presence of close relations of cooperation, replacing the competitive relations and increasing the synergetic level of the cluster;
 3. unified production and social infrastructure of the cluster;
 4. availability of a clear specialization on the national scale and at the level of the economic region, a pronounced industry specialization;
 5. territorial concentration on a limited area with the necessary set and size of resources;
 6. high innovation activity due to cooperation with the leading universities of the region, availability of scientific institutions within the cluster.
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4. Conclusions

The development and application of cluster approaches to the formation of the innovation economy in the Russian Federation has been applied for a long time. However, it was not systematized and did not have a sufficient methodological basis. Researchers define the essence of cluster associations in different ways. Some of them point out the geographic concentration as the main characteristic of the cluster, while others point to the industrial affiliation and the third innovative orientation. In our opinion, it is the innovation orientation that becomes the main characteristic of modern clusters, as it determines their competitiveness.

Thus, an important element of the formation of cluster structures is to determine the principles of their construction. The main ones are: vertical integration of enterprises, close cooperation relations, unified production and social infrastructure, clear specialization, territorial concentration and high innovation activity.

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