

Innovative clusters of modern Russia: management features

Clústeres innovadores de Rusia moderna: gestión características

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ABSTRACT:

Being in a cluster is beneficial for small and medium-sized companies, as this increases their competitiveness due to the expansion of opportunities for cooperation, the use of a unified infrastructure, interaction with local research organizations. As a result of cluster formation, regions increase their attractiveness to business, investors, etc. The identification and support of clusters is an important tool for stimulating economic development in countries with economies in transition. Cluster policy has relatively recently been provoking heated discussions in Russia.

Keywords: cluster, regional economy, management system, construction algorithm.

RESUMEN:

Estar en un clúster es beneficioso para las pequeñas y medianas empresas, ya que esto aumenta su competitividad debido a la expansión de las oportunidades de cooperación, el uso de una infraestructura unificada, la interacción con las organizaciones locales de investigación. Como resultado de la formación de clúster, las regiones aumentan su atractivo para las empresas, los inversores, etc. La identificación y el apoyo de los clústeres es una herramienta importante para estimular el desarrollo económico en los países con economías en transición. La política de clúster ha provocado recientemente discusiones acaloradas en Rusia.

Palabras clave: clúster industrial, económico regional, sistema de gestión, algoritmo de construcción

1. Introduction

The need to develop an innovative strategy for the socio-economic development of different regions raises the question of the possibility and effectiveness of the cluster approach in this direction. Criteria for the effectiveness of the innovation strategy stem from the accepted understanding of the innovation process.

By definition, innovation is the result of innovation activity, expressed in the form of new or improved products marketed, the use of new forms and methods of purposeful activity of any subjects of the social and economic system, including management processes at all levels, which is especially important for our country, the introduction of new or improved technologies used in the production and non-production spheres, etc. The ultimate goal of innovations is to increase the efficiency, economy, quality of meeting various social needs in their entire spectrum.

At the same time, innovations are viewed differently regarding various functional subsystems: from production and technological, information and management, social environment organizations, market infrastructure, transport infrastructure, organizations carrying out political and legal functions, etc. Thus, innovative activity is the process of creating, absorbing and spreading of innovation. The concept of innovation refers to both radical and gradual changes in various elements of the socio-economic system.

In the context of an innovative development strategy, it is natural to consider clusters the mission of which is connected with the "production" of innovations. The results of the activities of such innovative clusters can have a variety of material or informational implications: from new scientific theories and geopolitical concepts, to new energy sources and educational methods. The structure of the innovation cluster is thus determined by the technological scheme of creating innovative products and services: from the fundamental idea to its expansion into the sphere of practical application.

If we project the notion of KPS to the notion of innovation activity, then the structure of an innovation cluster can be different depending on the subject area, but two subsystems must necessarily be present: first, a creative, technology-oriented production. Its structure includes research organizations, educational institutions, organizations of innovative market infrastructure, experimental production. The result of the functioning is the provision of opportunities for certain subsystems of the socio-economic system of the region to introduce innovations that fall under the notion of innovation. The second subsystem can be defined as an implementation.

The result of its functioning is the spread of innovations in the relevant fields. The main element of this subsystem is a certain type of activity for which the use of this innovation provides a competitive advantage.

2. Literature review

It is generally accepted that the term "cluster" was borrowed by economists, by M. Porter in particular, from mathematics. The scientist describes in detail the relationship between cluster partnerships, the competitiveness of firms and industries in his works on industrial (1990) and, later, regional clusters (1998). These works served as the basis for the development of the cluster economic concept. Let us note that R. Tryon is mentioned as the author of the name to this method (Batorov, 1974; Boush, 2011).

However, back in 1974, relying on the theory of analogies, K.B. Baboroyev generalized the properties of cluster formations, revealed by such natural science disciplines as physics and chemistry, and attempted to transfer them to the field of economics (Boush, 2011), where clustering processes manifest themselves in such basic form as enterprise clusters.

Cluster members are in close proximity to each other, which is determined by the ability of the subjects to use resources that are localized in a given territory and possess "limited mobility" of resources. According to A.E. Shastitko: "If it were possible to represent production using only resources that possess the property of perfect mobility in space (such as information transmitted via the Internet - with some exceptions related to the specifics of regulating information exchange), then there would hardly be any reason to state the existence of clusters as a special form of economic organization" (Shastitko, 2008).

By mobility in this case we mean the material and technical possibilities of moving in space, which determine the level of costs for obtaining this resource.

Technology and information have greater mobility in comparison with the workforce. Therefore, for example, for an information technology cluster, the workforce (highly skilled

programmers) will become a key resource. L.S. Markov, M.A. Yagolnitzer emphasize the importance of the "nature of the key resource" of the mesoeconomic system (Markov & Yagolnitzer, 2008).

D.A. Yalov defines the cluster as a network of suppliers, producers, consumers, elements of industrial infrastructure, research institutes interconnected in the process of creating added value. A.V. Egorova notes that at the mesolevel the integration interaction of economic entities is carried out by forming in the national economy special network organizations - clusters, including firms and organizations associated with the output of final products and geographical location (Egorova, 2007; Mohnachev & Mokhnacheva, 2009).

B.A. Erznkian and V.A. Agafonov view clusters as "a network structure based on horizontal links between the members of the cluster system and interacting enterprises and organizations that are endowed - spontaneously or intentionally - with elements of self-organization, self-regulation and inter-firm coordination" (Erznkian & Agafonov, 2011).

According to G.D. Boush, under certain conditions, clusters can, like catalysts, launch integration processes in the economic environment, and like enzymes, contribute to the synthesis of rather complex organizational structures of a network nature (Raevsky & Vinokurov, 2007).

J. Humphrey and H. Schmitz, singling out the types of interaction of subjects in value added chains, came to the conclusion that network relationships help firms develop closer connections based on information flows. They are mutually beneficial, and the inclusion of economic entities in network structures is the most optimal solution, allowing to gradually improve the entire production process (Russell et al., 2008; MacGregor & Carleton, 2012).

3. Materials and methods

The theoretical and methodological basis for the study was: a systematic approach to the object and the object under study; conceptual provisions of classical and modern economic theory; dialectical approach to the study of the features of the functioning of the innovation sphere.

Methodologically, this study is based on the works of E. Dahmen, A. Cornett, A. Marshall, L. Matson, F. Peru, M. Porter, D. Solier, I. Tolanado, P. Fischer, J. Hansen and other researchers, which laid the foundations of the theory of clusters, as well as the competitiveness of "clusters of economic units" from the point of view of their spatial organization.

When processing the actual material, traditional scientific methods were used, such as dialectical, chronological, logical, scientific generalizations.

As the research tools methods of comparison, ranging, structuring goals, as well as modeling and expert assessments were used.

The research is based on a systematic approach to the study of the problem of the formation and functioning of innovative clusters as a key factor in enhancing the competitiveness of high-tech industries and the Russian economy as a whole.

The information basis for the study was the legislative and regulatory acts of the Russian Federation, analytical materials of government bodies, official documents of the Government and the State Duma and other federal bodies.

The statistical materials of the Federal State Statistics Service of the Russian Federation, analytical materials on the problems of reforming and developing the defense industry complex, materials of scientific conferences, seminars, mass media reflecting the problems of the innovation sphere were used as information sources.

4. Discussion

4.1. The concept of innovative cluster and cluster approach in the development of the region

The main differences of the cluster approach to ensuring innovative activity in the region in

comparison with the traditional industry approach is that it is oriented to regrouping the productive forces and factors of production and the growth of the total capitalization of the territory. Clusters, dictating to the environment the need for obtaining factors for their development, stimulate the creation on the territory of the region of a kind of framework that reflects the direction of development of all sectors of the economy and are a modern tool for managing the territory.

The systemic effect of the creation of regional clusters is aimed at increasing the economic activity of depressed regions, supporting intra-regional exchange of products and services, building the capacity of highly qualified specialists, and manifested in pursuing a unified policy in the markets for factors of production, research and development, the exchange of people, ideas and capital, in a single policy in the markets for the products and services produced on the market, etc. (Mercan & Goktas, 2011).

One of the most important issues that arises in relation to real and potential innovation clusters is to what extent and on what basis federal and regional executive authorities can participate in supporting their formation and functioning.

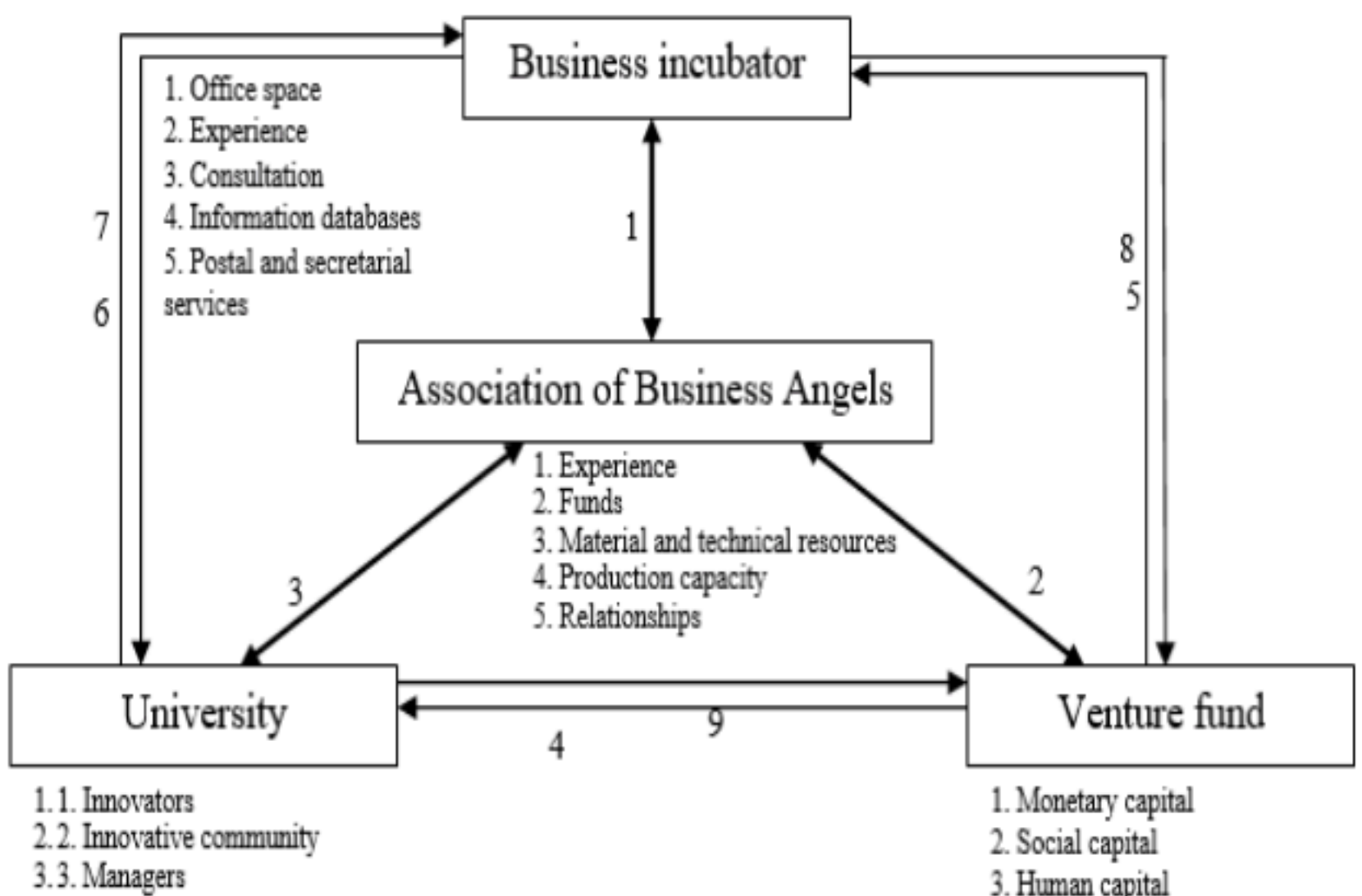
In our opinion, one of the priority tasks in implementing cluster approach in managing socio-economic development at the regional level is to achieve a real systemic result. The desire of the regional administration to create a cluster on its own territory does not guarantee obtaining any additional effect. A purely volitional decision is not enough to create an arbitrary cluster in a particular region. Not every region has prerequisites for the formation of an economic cluster.

Active innovative cluster policy on the part of the state authorities presupposes the provision of various public services:

- identification of the most promising areas of development in which innovation-oriented clusters can be created and developed in order to ensure the maximum synergetic socio-economic effect, taking into account the absolute and relative competitive advantages of the region;
- organization of interaction between participants, provision with necessary documents of strategic and territorial development;
- formation of innovative infrastructure, consulting and methodological services in the field of marketing, management, advertising, financing of fundamental research potentially contributing to cluster development;
- provision of educational services, organization of training, exchange of experience and advanced training;
- promoting innovation dissemination processes;
- organization of effective work of all state bodies, organizations and institutions that ensure the activities of organizations within the cluster;
- creation of engineering, transport and other infrastructure necessary for cluster development;
- providing the maximum possible amount of preferences, benefits and other measures of state support in order to stimulate the development of the respective cluster.

As a result of the implementation of innovative cluster policy, it is planned to achieve the following goals: the creation of a new economy based on knowledge (Kobersy et al., 2016); increasing the competitiveness of the real sector of the economy; increasing the share of small and medium-sized enterprises; outstripping growth in the level of employment and incomes of the population; expansion of inter-industry and interregional cooperation; creation of conditions for the formation of human potential of a new quality. The features of the innovation cluster implementation model will be shown in Figure 1.

Figure 1
Innovative cluster implementation model



Source: Prepared by the authors

An innovation cluster can survive if, firstly, it produces competitive products or services. It follows that the most important elements of the implementation subsystem are the presence in one or several leading companies with stable market positions (in the world or regional markets); Secondly, there are required many small and medium-sized enterprises that serve the main enterprises (companies) within the framework of the current marketing policy; thirdly, the efficiency of industries that produce basic production by factors of production should be adequate to the basic one in order to avoid a "backlog" situation and ensure the stability of the functioning of cluster enterprises and organizations organized in technological chains. As for the creative subsystem, the most important factor for it is the availability of a scientific and educational core and an infrastructure that provides transfer of ideas, technologies and know-how, prototypes and other results of scientific developments.

4.2. The use of an innovative cluster in the process of managing the external environment

It is advisable to structure the external environment of the innovation cluster and the enterprises forming it into social, state-political, technological and macroeconomic components.

The social environment is formed by the population whose vital activity is somehow connected with the activity of the enterprise. For example, for a city-forming enterprise, the social environment is characterized by the sex-age structure of the urban population, its general level of education, lifestyle, dominant motivations in production and consumer behavior, the general mentality, and the level of social tension. The production and consumer behavior of the population and the existing trends in this area are also important. If, for example, the supply of labor is expected to decrease in the near future, it can stimulate enterprises to implement measures aimed at increasing labor productivity, increasing the efficiency of work of mature and elderly people, investing additional funds in training with a shortage of labor. The growth of the population of the retirement age can guide enterprises to produce cheap goods of low quality.

The state and political environment for each enterprise included in the cluster is manifested, as a rule, in the following. The state establishes the rules of the game, that is, it generates a legal environment.

In addition, the state plays a regulatory role for the private sector, formulating a specific policy aimed at developing certain sectors of the economy and, in accordance with this policy, can support various enterprises. It can take the form of subsidies, tax benefits, legal control over events in the unregulated market, regulation of excess production, interest rates.

The role of the state in macroeconomic regulation is also evident, that is, the state to a large extent also shapes the macroeconomic environment. Finally, the state can be a customer and a consumer of products and services produced by the enterprise. Many private firms are tightly linked to the state sector: they are manufacturers of military and special equipment, other supplies for state needs, in particular for education and medicine, in general to ensure the activities of the entire budgetary sphere.

The most important for innovative clusters is an organization with state support for research and development of general purpose, carried out in key, breakthrough technological areas. And this requires the adoption of appropriate managerial decisions in the state-political and legal sphere. To a large extent, this is close to the institute of technological platforms which has received serious development abroad and is being formed here. At least, in our country exists a list of platforms based on the use of Forsyte technologies.

In the legal environment for each enterprise, the main blocks are legislation blocks regulating property relations, contractual relations, consumer rights, antimonopoly legislation and regulation of natural monopolies, tax legislation.

Technological environment. We understand it as the multitude of technological processes that affect the production and consumption opportunities of products and services produced by the enterprise. In the technological environment, the following main subsets can be distinguished: possible technologies with the help of which the production of raw materials and materials necessary for the activities of cluster enterprises can be carried out; a set of technologies for the actual production activity of the cluster; possible technologies for the production of substitute products; a variety of technologies for consumption of manufactured products and services.

The technological environment tends to change, creating both additional opportunities and limitations for the enterprise. In particular, the impact of technological changes on growth opportunities is manifested in changes in the demand for products and services, as well as in the possibilities for changing the technological processes used. For example, the development of CD production has opened new opportunities for firms producing software, audio equipment and audio products, and the development of the Internet creates certain difficulties for manufacturers of CD-ROMs of information and reference nature.

Technological changes affect the size and quality of the workforce. For example, the process of computerization of management and new information technologies have reduced the number of proper management personnel, but they have increased the need for an increase in the number of highly skilled service personnel, created the need for a specially prepared user environment and enhanced same time, the automation of production processes and the use of new technologies reduce the need for highly skilled workers, but increase the need for specialists in setup and software.

4.3. Innovation cluster macroeconomic environment

The macroeconomic environment determines the economic background on which the activities of the enterprise that implement innovations are deployed and are characterized by the level of inflation, the level of employment, the overall standard of living, the economic growth rates of the economy as a whole and in certain sectors, the taxation system, the national currency rate.

The level of employment on the one hand affects the availability of labor in the labor market

and the level of prices of its supply, on the other hand, on the aggregate level of effective demand of the population. The activities of an enterprise can be influenced by measures that can be taken at the macroeconomic level to reduce the rate of unemployment or its nominal level, since these measures can directly affect the enterprise (for example, it can be benefits, removal of restrictions, easing of the tax burden, measures, etc.).

The inflation influence on a specific innovative enterprise should be considered in the context of a possible decrease in the purchasing power of its consumers, as well as investment opportunities. In addition, it is necessary to take into account the impact of the inflation tax on the commercial effectiveness of these organizations. Estimates of the effectiveness of innovation in terms of inflation become more uncertain, the risk premium for investors and creditors increases. This, in turn, influences the strategic decisions taken. The activities of cluster enterprises can also be influenced by the methods of combating inflation, undertaken by the state. In particular, methods of containing money, increasing the tax burden and increasing the discount rate lead to a reduction in revenues, difficulty in attracting borrowed funds, a drop in sales, a decrease in investment activity, etc.

The system of taxation should be considered, first of all, as an object of possible control actions on the part of federal and regional authorities aimed at maintaining the activity of this problematic system. Trends in economic growth are taken into account in the analysis of factors in the construction of scenarios of the development of the resource market consumed by the problematic system and the market of its products and services. Since economic growth is accompanied by rising costs due to wage growth, and an increase in the cost of resources due to the involvement of less efficient sources (producers) in operation, this effect can also be considered.

In accordance with the structure of the external environment and the composition of the resources used, we can subdivide the factors of the innovation process into resource, production-technological, macroeconomic, general economic, socio-demographic, foreign policy, foreign economic, environmental, etc.

4.4. The main factors behind the innovative cluster development

The internal environment of the innovation cluster is formed by its functional divisions focused on providing basic production with all necessary resources and their effective use. Traditionally, in the course of the economic analysis of enterprises, there are divisions that ensure the implementation of its following main functions: management system, information support; supply and logistics; production and technological support, research and development; marketing and sales; financial management, personnel management.

In the socio-economic development of each region there is a number of stable trends associated with the socio-psychological appearance of the population, the history of the formation of industrial potential, cultural and social traditions, production traditions, lifestyle, self-identification of the population, etc. All these trends are very stable, they cannot change at the same time. They also form the internal environment of the innovation cluster, where the enterprises and organizations that form it are "immersed". The factors of the internal environment determine the predominantly evolutionary nature of the possible changes in the cluster and in the region as a whole (Gadzhiev, 2008). For example, it seems very difficult to turn Ivanovo region into a center for electronic engineering, and Bryansk region to the center of the textile industry. It is necessary to consider the following factors in the formation of an innovative cluster.

Historical factors are considered as socio-containing ones; they determine such an important factor of production efficiency as the production culture and labor mentality of the population.

4.5. The economic-geographical factor manifests itself in several aspects

Firstly, the geographical concentration of enterprises that are linked within the full production cycle: from the formation of the potential of production factors (material and production base, human potential, infrastructure, etc.) to the production of the final innovative products (Bogoviz, Vukovich & Stroiteleva, 2013).

Secondly, geographical proximity to the most important markets for consumption of research and development results, as well as innovative products. In particular, the regions of the Central Federal District have such a competitive advantage as territorial proximity to European markets (Shkurkin et al., 2017), as well as to the largest domestic markets in Moscow and Moscow region, St. Petersburg and other "flagman regions". That is, those regions that are most prepared for the perception of potential products of innovative clusters.

There are two factors that should combine optimally. Firstly, it is the end product transporting cost factor, secondly, due to the territorial factor, the ability to respond quickly to changes in the market in terms of consumer preferences.

The marketing factors of cluster formation are expressed:

- first, in the presence and preservation of the innovative brand of the localization region in our country and abroad, as well as in the arrangement of the respective industries in the interregional and international cooperation ties;
- second, in the presence of a stable external demand for innovative products and services produced by cluster enterprises.

The technological environment is determined by the developed scientific and production potential of the region, which is, in its turn, determined by the availability of the technological chain: "fundamental research - developmental design - training of necessary personnel - creation of industrial technologies".

Of particular importance is the potential of the market infrastructure, which is understood as the integration of those institutions that traditionally belong to the "market infrastructure" and government bodies that perform regulatory functions for the market economy that promote the activity of market mechanisms or even replace them if private business de-facto excludes this sphere from market interactions.

5. Conclusions

Over the past few decades, most countries have not only used clusters as a foundation for the development of their economic performance, but have also been successful with the so-called "cluster method".

It turns out that the cluster unites various enterprises and organizations that take part in the production chain, and also underlies the national innovation system of the country as one of its most important elements. Most often, such cooperation carries a non-commercial partnership.

Over the past decades, most of the world's states, including not only developed but also developing ones, are competing for the greater weight of their national companies in the world market arena, along with increasing competitiveness. Due to the fact that traditional industrial policies no longer bear such fruits as before, innovative clusters, at the heart of which knowledge creation takes place, are in demand.

Practically, innovative clusters do not differ from the already considered cluster definition by Michael Porter, namely: the task of such an informal association of the state, universities, research centers, entrepreneurs, and industry is the dissemination of knowledge, technology and innovation, which later, after the transformation, acts as competitive advantages.

Innovative clusters constantly and at different levels create innovations, whether in marketing, technology or management, which certainly cannot be achieved without quick access to various resources (financial, marketing, etc.). In this regard, even for the leading competition companies definitely have big advantages to be in an innovative cluster, because in this partnership all the conditions that will make the clusters attractive to investment are created.

Thus, innovative clusters form qualitative links among localized organizations and enterprises, as well as scientific institutions, laboratories, universities, etc., that are concentrated around several leading companies. At the same time, all the participants of the cluster are working not only to increase their competitiveness beyond its borders at the expense of their products, but also pursue a reduction in costs against the background of close interrelationships. All participants of the cluster share a spirit of innovation.

It is now clear that an innovation cluster as such can contain a whole technological chain that begins with the development of a product and ends with its market placement. Often, innovative products and services emerging from innovative clusters are designed for the international market, that is, for export. It turns out that it is the innovative clusters that can actually strengthen the positions of this or that state in the global arena.

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