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Formation of industrial clusters using method of virtual enterprises

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Abstract

The paper is devoted to the questions of cluster policy and formation of industrial clusters. The purpose of the research is to investigate the possibility of creating an innovative industrial cluster in the form of a virtual enterprise. During this research, definitions of cluster and cluster approach given by M. Porter were clarified, and benefits and concerns of cluster policy were identified. For cluster to be effective and to achieve such goals as: reducing production and transaction costs, effective collaboration of resources, increasing innovation activity, development of new technologies, etc., it is proposed to apply the method of virtual enterprises in order to form innovative industrial cluster.

In Europe the concept of "virtual cluster" has been used for a long time, being the subject of many studies, and currently there is widespread transition from physical connections in a cluster to virtual communications that helps to create competitive advantage in a rapidly changing innovation economy.

In Russian Federation the concept of a virtual cluster practically does not exist, because there is lack of legislation in this area, lack of necessary infrastructure in the economy and low efficiency of different institutions. However, usage of this form of clusters seems to be effective and promising.

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1. Industrial clusters and cluster policy

Industry is the leading branch of economy in many regions of the Russian Federation, providing strategic development of the country as a whole. At the same time, defining vector of world development is oriented to innovative economy. In solving problems of modernization of the Russian economy, an important role should belong to innovation and industrial clusters.

Popularization of the cluster approach in developed economies has led to the active development of the ideas of M. Porter. According to the definition given by M. Porter, a cluster is a group of geographically

interconnected companies and associated institutions that specialize in a single sphere, and united by common interests and complementary [Porter, 2000].

Cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. Cluster is concentrated around the cluster core - its key parts, which, as a rule, are the companies that produce final goods and services. A distinctive feature of the cluster is to maintain competition between the enterprises of the cluster, located in the same industrial positions.

The active role of government in the formation of clusters and facilitating the effective functioning of the cluster can be considered as a form of public-private partnership - institutional alliance of government and business in order to implement specific projects.

1.1. Cluster approach: benefits and concerns

According to the Committee for Economic Development, Industry and Trade of St. Petersburg nowadays in St. Petersburg the following clusters exist: pharmaceutical, shipbuilding, automobile, radiological, electronics, power engineering and information technology cluster.

Analysis of operation of these clusters and their effectiveness highlights the benefits of cluster policy:

- Multiplying effect of support
- Improvement of innovation environment
- Providing highly skilled jobs
- Accelerated growth of the economy
- Growth of productivity, export growth and high value added
- Growth of domestic investment
- Growth of payments to the budgets on different levels

It is possible to identify a number of problems associated with the implementation of cluster policy, they are:

1. International experiences of using modern tools of cluster policies are often not acceptable for a number of features of the Russian regulatory and business environment.
2. Clusters are "top-down" almost from scratch with no associated industries and services, and the necessary road, energy and educational infrastructure.
3. The widely used branch approach distorts competition by lobbying individual industries, companies or regions, which leads to cost unconditioned "spillover" benefits from one industry to another.
4. Attempts are made to rely on the experience of the Soviet territorial-industrial complexes (TPC), which is a conglomerate of enterprises formed "from above" without regard to their mutual benefit to each other.
5. Lack of a culture of information transparency, which helps create the conditions for unfair competition.

However, the problem lies in the fact that the cluster policy also appears to be selective, and in view of the current information asymmetry, possibility to determine the best ways to develop industries or individual companies is limited.

Practice shows that clusters are often created in our country in certain sectors, development of which is a priority at the moment, and on the principle of "top-down" - regardless of whether it is an advantage to participants or not. Such national measures result in formal joint ventures, which are in fact independent of each other, without common goals, objectives, projects. Moreover, association of such enterprises in the cluster can hinder their activities, since there are no established mechanisms and modes of interaction, cooperation and coordination of resources.

At the same time, there are also some business combinations, institutions, naturally formed for mutual benefit, for effective interaction, which are not formally called clusters, but that really need to integrate their

resources, knowledge, and they really need to receive government support. The difficulty of the cluster policy is to identify such clusters and reasonableness of their support.

1.2. Virtual enterprises for clusters

For cluster to be really effective and contributed to the achievement of such goals as: reducing the total cost of production and transaction costs of interaction, effective collaboration of resources to achieve competitive advantage, increasing innovation activity, development of new technologies, etc., it is proposed to apply a method of forming innovative industrial cluster in the form of a virtual enterprise.

The virtual enterprise has the same capabilities and potential as the traditional, but it is characterized by several other institutional and structural forms. Virtual Enterprise - is a temporary form of voluntary cooperation of several, usually independent partners (businesses, institutions, individuals), which optimizes production of goods and provides the system with great benefit to all participants [Bugorskiy, 2008]. Participants of virtual enterprise share its capabilities in the form of a variety of resources to achieve results better, cheaper, faster, and with a competitive advantage internationally [Serdyuk, 2005]. From the point of view of a consumer, set of participants appears as a single company, which uses the most modern information and communication technologies.

If we talk about the nature of a virtual organization, it is an association of independent business entities (people, groups, companies), distributed geographically, which pool their resources and efforts to achieve common objectives and joint activities.

In our view, the virtual enterprise can be a form of association and the functioning of innovation and industrial cluster. For existence of the cluster to be effective, it is proposed to combine elements of the cluster, including their resources, knowledge, technologies, in a virtual environment. Virtual Enterprise will be the core of the cluster - for example, on the basis of one of the companies belonging to the cluster.

Simplified scheme of virtual enterprise or "virtual cluster" can be represented in the following way, see Fig. 1.

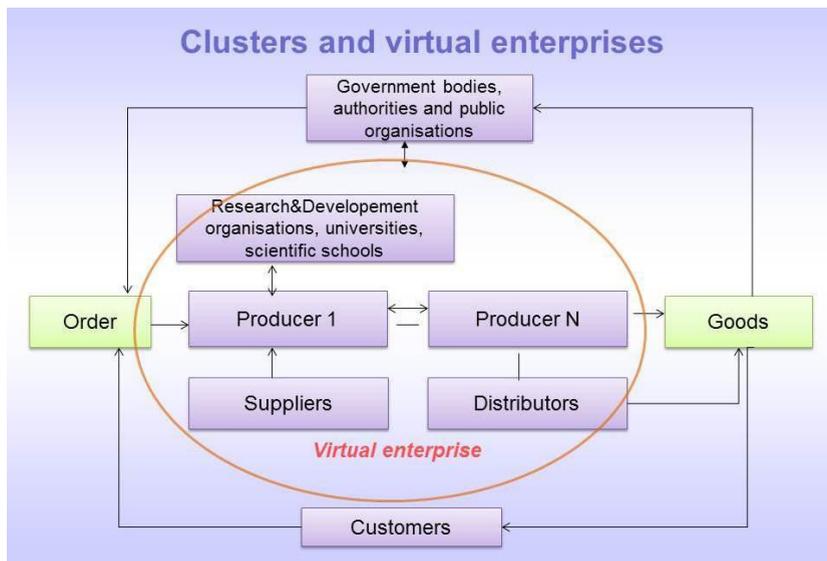


Fig.1. Cluster in a form of virtual enterprise

In virtual environment the following processes can be combined:

- Interaction with customers (buyers), including the search of clients, marketing events, order placement, supplies, etc.
- Interaction with suppliers, including supplies of raw materials and components
- Development of new technologies, innovative activities, cooperation with research institutes, universities, research institutions, R & D, etc.
- Interaction with government agencies, including the placement and execution of government contracts, obtaining grants, benefits, registration of licenses, permits and warranties.

The advantages of "virtual environment" for innovation and industrial cluster will be:

- Effective coordination in order to achieve common objectives and joint projects
- Reduction of total cost of production of goods, works and services
- Reduction of transactional costs (the costs of negotiation, information retrieval, interaction, etc.)
- Ability to perform a large amount of public order and participating in major long-term projects
- Ability to receive state subsidies, grants, benefits
- Flexible adaptation to environmental changes
- Increasing innovation activity of the cluster, the development of new technologies
- Reduction of barriers to enter new markets, including international ones.

Combining cluster in the virtual environment may be effective, for example, in public procurement. This can be possible nowadays as there was created single portal of public procurement, meaning placement of orders through electronic platforms, and therefore it is easier to link the two sides - a virtual cluster and a government agency - in a virtual environment. In addition, the system of e-government, allows obtaining government services electronically.

Thus, the public order can be given to the cluster, and then the cluster itself (the core of the cluster in the form of a virtual enterprise) will distribute, manage and coordinate implementation of public procurement inside the cluster. Sharing capabilities in the form of various cluster resources can lead to such results as reducing total costs, creating a competitive advantage for the cluster internationally.

In Europe, the concept of "virtual cluster" has been used for a long time, that is the subject of many studies, and currently there is widespread transition from physical connections in a cluster to virtual communications, creating a competitive advantage in a rapidly changing innovation economy.

As an example, effective business combination in a virtual environment was demonstrated by the virtual enterprise «VIRTEC Project», developed by the Faculty of Engineering (San Carlos), University of Sao Paulo in Brazil. It combines nine small and medium enterprises. These companies operated in the field of electronics, metals, ceramics, plastics, mechanics, fluid systems, applications and services. Each company specializes in production of one product, for example, one - in making polyurethane hammer, the other - in the production of plastic and rubber, etc. As a result of its activities, VIRTEC virtual company has developed several new products, such as polyurethane rubber, decomposing under natural conditions. Developed type of rubber was cheaper and had a higher on-time life cycle. VIRTEC company is a good example of how a virtual form of organization can reduce the time required to design and manufacture a new product, to reduce its cost and improve the quality parameters in comparison with similar products of other manufacturers.

In Russian Federation, the concept of a virtual cluster practically does not exist, because there is lack of legislation in this area, lack of necessary infrastructure in the economy and low efficiency of different institutions. However, usage of this form of functioning of clusters appears to be effective and promising.

1.3. Conclusion

The paper was devoted to the questions of cluster policy and formation of industrial clusters. During this research, definitions of cluster and cluster approach given by M. Porter were clarified, and benefits and concerns of cluster policy were identified.

It was proposed to apply the method of virtual enterprises in order to form innovative industrial cluster, which means combining elements of the cluster, including their resources and knowledge, in the virtual environment. Association of companies in the virtual cluster can be effective, for example, in terms of public contracts, since it reduces transaction costs, and makes it possible to perform a large amount of government contracts and participate in major projects for attracting long-term financial resources. Thus, the process of formation of innovation and industrial cluster in the form of a virtual enterprise will improve the efficiency of the cluster, and will lead to a more efficient implementation of measures of the state industrial policy, such as, for example, government contracts for industrial products.

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References

- Porter, M., 2000. Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly*, vol. 14, p. 15.
- Bugorskiy V. N., 2008. *Setevaya ekonomika [Network economy]*. Moscow, Finansy i statistika Publ., p. 300.
- Serdyuk V. A., Serdyuk V. A., 2005. *Setevye i virtualnye organizatsii: sostoyanie, perspektivy razvitiya [Network and virtual organizations: State and prospects of development]*. *Menedzhment v Rossii i za rubezhom*, no. 5, p. 40.