Clustering as a Criterion for the Success of Modern Industrial Enterprises

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Abstract: The paper reveals the problems of the use of clusters as an important factor of innovative development of Russian enterprises and territorial entities delineated a theoretical basis for the existence of territorial formations, showing their relationship with the clusters displayed in the cluster's functioning as an open system. All the more important in the formation of innovation territorial entities in Russia acquire the cluster structure based on cooperation of enterprises, financial institutions, educational institutions etc. In the developed countries have long had and continue to have such structures in various industries. In the works of famous foreign scientists clearly defined theoretical bases of formation and functioning of clusters, use cluster models to ensure the competitiveness of the economy, their advantages and disadvantages. Foreign experience can be useful to develop a national strategy for clustering of Russia, with a comprehensive study of its socio-economic development. These tasks at this stage be a priority for Central and local public authorities. Issues related to the principles of clusters, innovation economy, have been studied by many scientists, both Russian and foreign. In published works, the essence of cluster analysis, given the definition of "cluster" classification of clusters, the role of innovative development of economy, experience of the use of cluster models, etc.

Keywords: cluster, cluster management, enterprise, territorial and production cluster, globalization, innovation

JEL Classification: P25, P28, R1, R12

INTRODUCTION

It can be argued that there is no universal concept for the development of enterprises and territorial entities. Since each of them is with their own distinctive characteristics, is of particular importance to local

politics, especially local strategy of innovative progress, which is often formed due to the cluster approach. As emphasized by researchers, the understanding of cluster ideology in the global community is rapidly growing and clusters are a key component of many socio-economic strategies.

In this context should clarify the meaning of "cluster". In accordance with the Big explanatory dictionary of the Ukrainian language a cluster is a subset of objects with defined sets of attributes that can be detected by cluster analysis. In Russian and foreign literature, as well as in a number of works provides the following definition:

– geographic concentration of similar, related or complementary businesses with active channels for business transactions, communications and dialogue that share specialised infrastructure, workers, markets, services and have common opportunities or threats;

– sectoral or territorial voluntary Association of business organizations who work closely with academic (educational) institutions, NGOs and authorities with the aim of increasing the competitiveness of their own products and promoting the economic development of the region;

– network of suppliers, manufacturers, consumers, elements of industrial infrastructure, research institutes, interrelated in the process of creating added value;

– this group is located on the territory of the settlement or in the proximity of interdependent businesses and organizations that complement and enhance the competitive advantages of each other;

– localized group of interdependent companies, suppliers of equipment, components, specialized services, etc., research and training institutions, and other organizations that complement and enhance the competitive advantages of each other.

As you can see, almost each of these definitions contain the same key words, namely: Association, cooperation, competition, specialization, geographic concentration, the enterprises, scientific institutions, etc.

So it's reasonable to summarize that the main idea of the concept clustering is the creation of cooperation ties between manufacturers, contractors, suppliers of resources and technology, and between research financial and credit institutions and.

This kind of cooperation and specialization allow participants to increase the efficiency of your operations, faster implement new technologies and products, etc. the Enterprises participating in the cluster, on the one hand, compete among themselves, and with another – working together to find new ways to solve various problems (among which is the supply of resources, access to new markets, etc.).

Thus, within the boundaries of the cluster peculiar combination of competition and cooperation. With this in mind, we propose the following definition: a cluster is a voluntary Association of geographically concentrated independent from each other economic entities (enterprises, educational and research institutions, banks, insurance companies, etc.) and public authorities without creating a separate legal entity for joint activities in the field of entrepreneurship for more efficient use of resources, stimulate innovation and exploit synergies.

LITERATURE REVIEW

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.

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, M.J. Enright, T. Andersson, C. Ketels, G. Lindqvist, O. Solvell, E.J. Feser, S. Rosenfeld, 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 (Institute for Innovation and Technology – author Dr. Gerd Meierzu Kocker).

In General, in modern scientific literature there is a large number of controversial definitions of a cluster are different from each other. In this regard, interest in the study of various models of the structure and synergy of members of the cluster.

So, in the work of A.A. Glazkov to improve the competitiveness of the forest complex in Novgorod region in the work of the proposed multi-level scheme for the creation of a model enterprise of the forest cluster, a public-private partnership.

In another work of A.T. Berezov used noteworthy approach of indicative planning of development of economic clusters of small enterprises.

In this article the author substantiates the necessity of taking into account the fact that the formation of economic clusters in the regional economy inevitably raises the question about the importance of finding tools forecasting, management, accounting and performance evaluation that in General is quite feasible when using the method of indicative planning. In this regard, the work of this author designed the organization indicative planning of economic activities of clusters of small enterprises in the region, including the composition of the elements of the function of indicative planning, requirements, a system of indicators.

The author proposed to distinguish the components of the organization indicative planning of economic activities of clusters of small enterprises of the region:

1)   indicative planning of economic activities of clusters of small enterprises external side of the authorities of the region;

2) indicative planning of internal activities undertaken by the economic clusters of small enterprises of the region;

3) indicative planning of the activities of individual enterprises-participants of the economic clusters of small enterprises.

MATERIALS AND METHODS

The object of research is the development of clustering of modern industrial enterprises.

The subject of study are management, economic and organisational solutions arising in the process of influencing the members of the cluster as an economic system.

Theoretical and methodological basis of the study consists of theoretical and applied research of domestic and foreign scientists devoted to problems of functioning of the enterprises and complexes in the conditions of market economy, the problems of forming of strategy of development of the regional industry clusters, issues of administrative regulation.

In the process of the study were used General scientific and specific research methods adequate to the set goal and objectives: systemic, functional, statistical, graphical modeling, allowing to prove the tendencies and regularities of development of the studied process (Lebedeva et al., 2016).

Information base of research was made the official data published in the statistical collections of the Federal state statistics service, the legislative acts and normative documents related to the development of clustering in the regions of the Russian Federation, the actual materials presented in specialized publications and the media, characterizing different aspects of the state and functioning of enterprises.

We used the programs of development of industrial complex at the Federal level, regional program, regulatory documents of GosStroy of the Russian Federation, materials of the international scientifically-practical conferences, domestic and foreign scholars, articles in scientific journals.

Scientific novelty of research consists in the application of a systematic and institutional approach to administrative regulation of the industrial complex (cluster) as an economic system in order to enhance sustainability and development effectiveness in the conditions of transitive economy.

DISCUSSION

The analysis of scientific works of foreign and domestic scientists helped to organize 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 (Akhmetshin & Vasilev, 2016; Lomova et al., 2016). 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.

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
1	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.
2	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 (Cellucci, 2011).	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.
3	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
4	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
5	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
6	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
7	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
8	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
9	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

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 policies. Cluster policy is a new and little studied question of modern Russian science (Gazimagomedov, 2005; Kosareva, 2010; Zadorova, 2009). 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 (Berezov, 2012).

Analysis of national and regional programs allowed us to classify programs according to the object. So, it has identified four types of national and regional cluster programs.

The first type of regional programs are programs whose purpose is the study, selection and classification of clusters in the region. It should be noted that in addition to these goals, the content of these programs also included activities such as promotion of cluster ideas, cluster initiatives and the creation of clusters, conducting various seminars, workshops and symposiums that aim to answer such questions as the nature of the clusters, the rules of their functioning, management, and relations between companies within clusters, etc.

The second type of regional cluster programs are programs whose aim is to strengthen competitiveness, increase cooperation and the development of a specific cluster or industry in the region.

The next (third) kind of programs are programs that focus on the development of the region, which developed the program. The purpose of these programs is the creation of a competitive economy in the region (Gapsalamov, 2013). The main activities of these programs are the strengthening of regional clusters, enhancing the competitiveness of priority sectors, the stimulation of innovation and support sectors of the economy and other events. It should be noted that in addition to economic objectives, often the content of these programs, there are social goals, such as increasing employment, improving health, education and the environment.

The last view of the regional cluster programs are encouraging not only the cluster as a whole, and in some parts, a certain level of cluster or intra-cluster correlation between certain of the parties (Figure 1).

Thus, the cluster as a spatially localized economic system, has many unique characteristics, as the presence of innovative activity and internal competitive environment that objectively suggests the cluster as a more efficient form of spatial organization of the economy on sectoral and corporate.

Prospects and challenges of clustering in Russia. The relevance of clustering increases substantially in crisis, due to several factors. First of all, it should be noted that destructive tendencies would be much less ambitious, if in the Russian economy has already been used the cluster approach. He gives the breadth of perception of the market situation. The isolation of the players deprives them of a large amount of
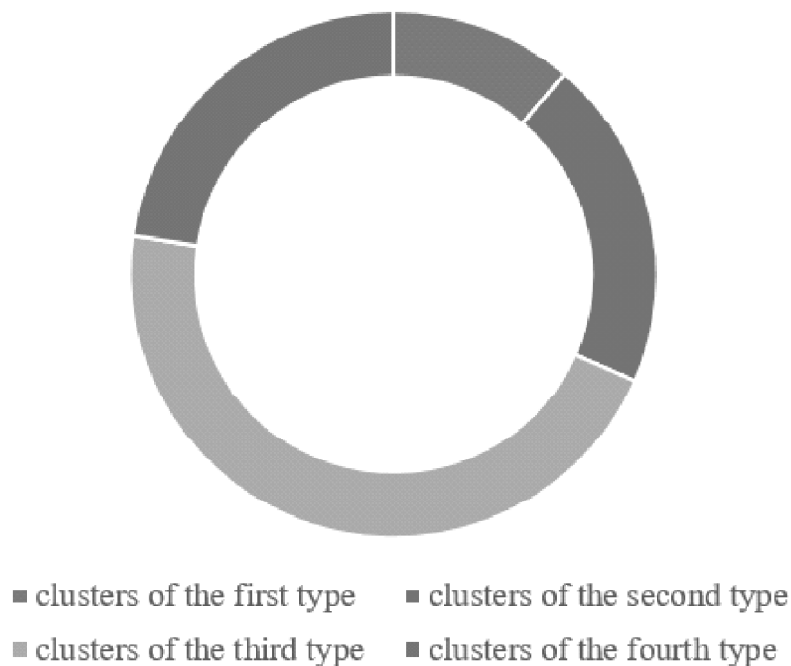
■ clusters of the first type ■ clusters of the second type
■ clusters of the third type ■ clusters of the fourth type

Figure 1: Structure of the regional cluster programs in Europe by type

information is not just necessary, but, in some cases, it is vitally important, while in clusters there is a constant exchange of various kinds of information between members of the cluster.

Today, companies on the market are like the people who work on the same floor but in different rooms: each is trying to cope with their problems on their own. While eavesdropping and spying, to determine what is happening from the nearest neighbors. But there is an alternative: remove the walls to sit down at the negotiating table and to form the most effective strategy of behavior in the current crisis conditions. In other words, "survival" is a good strategy, but it does not create the basis for a radical solution to the problems and moving forward (Kulikovsky, 2009; Goryushkina et al., 2016).

The approach of economic recession, one would anticipate based on economic calculations, even before the fall of 2008. Some companies ignored the crisis trends, and now their situation is unenviable. Many companies have begun to prepare for the upcoming changes, but did so each in their own way, based on limited information and subjective vision. The close relationship between the links of the cluster would bring significant benefits: information and the ability of solving complex problems, which would have won it all, including consumers.

In recent years clusters are of interest not only among Russian economists and businessmen, but also representatives of authorities. So, in 2006 the Ministry of economic development (MEDT) with the Academy of national economy, Ministry of education and science has prepared a draft "concept of development of territorial production clusters" (Mottaeva & Rodionov, 2011).

In our country, the level of trust between business entities is very low. Therefore, to ensure that they sat at the negotiating table and come to a constructive decision, of course, required the initiative of the state. First, it acts as the arbitrator, the arbitrator will have full volume of data, whereas each of the participants

of a potential cluster information is presented in fragments. In addition, the state guarantor of that party, today agreed to concessions in the framework of the cluster, will receive preferences at a predetermined timing and in a predetermined form. Secondly, the cluster formation affects the economic objectives of the state scale, respectively, its support is necessary. To tasks of this type include the protection of the domestic market and output within each sector (Adamova, 2009).

Thus, the formation of the necessary analytical framework and the conduct of activities on information support of implementation of cluster policy at the Federal and regional levels is the first step towards the creation of favorable conditions for success in implementing the cluster policy.

In the framework of this direction to achieve the success of cluster policy in our country must be implemented by the following activities:

- detection and monitoring clusters in the constituent entities of the Russian Federation;
- research barriers and opportunities for development of individual clusters or groups of clusters (Kulikovsky, 2009; Lazareva, 2006);
- implementation of specialized educational programs on issues of development and implementation of cluster policy at the level of constituent entities of the Russian Federation;
- the holding of specialized conferences and forums dedicated to the cluster policy;
- support the participation of Russian delegations to key international conferences on cluster policy;
- the formation of a database of cluster initiatives at the regional level (Adamova, 2009).

An important area of cluster policy is the integration of the cluster approach in the Federal policy for the development of individual industries and sectors of the economy, which implement the corresponding ministries and departments. In this regard, it's need integration of cluster approach into the development programs of individual sectors. Also need to integrate the cluster approach in the development of infrastructure sectors (General and vocational education, R&D funding, transport infrastructure, energy infrastructure, etc.) (Lazareva, 2006).

So, it is undeniable that to enhance competitiveness and improve the economic situation of each region and the country as a whole, it is necessary to conduct an effective economic policy. Cluster policy is quite suitable for this. But it requires certain actions to achieve the goals.

According to the author, because of the peculiarities of economic development of our country, cluster policy implementation will be long enough, and face certain difficulties, but this does not mean that this policy will not be effective for our state.

CONCLUSION

The cluster is an industrial complex created on the basis of territorial concentration of networks of specialized suppliers, main producers and consumers related technological chain and projecting an alternative to the sectoral approach.

The cluster has special characteristics, such as strong ties between members of the cluster, geographical concentration, well-developed information network, a clear specialization within the cluster, innovative predisposition, etc.

It can be argued that the typical cluster includes companies small and medium size, each of which does not receive significant gains from competition with another member of the cluster, but compact arrangement is advantageous because it is possible to use specialized resources. Referring to the territorial location of clusters, it should be mentioned that the very boundaries of clusters are blurred and not clearly defined.

Clusters in economic science are classified according to various criteria, so there are many classifications of clusters, of which two were considered in detail in the work.

Clusters can appear spontaneously, naturally and artificially formed, under the control of the authorities, but to the very creation, existence and functioning of a cluster requires certain conditions, namely:

– the availability of appropriate infrastructures;

– existence of documented organizational and communicative structure, performs administrative functions and provides the formation of the innovation community as a subject of development of the territory acting in partnership with businesses, Central and local authorities;

– refinement of the cluster in the framework of industrial and regional policies of the Central authorities adopted the local innovation community;

– the use of new management technologies

– business initiative

– the possibility and/or necessity of sharing the economic entities of one or more unifying factors.

Each cluster in its development passes through five main stages: agglomeration emerging cluster developing cluster Mature cluster transformation. The characteristics of each stage of the cluster development are presented in the work.

The paper discusses the main features of foreign clusters, as well as peculiarities of clustering in Russia. For foreign clusters characterized by the spread of production-oriented cluster in the related industries, the emergence and development of clusters "the chain", i.e., the sequential appearance and development of interconnected clusters, as well as the provision of separate clusters of competitiveness of the whole country.

As for Russia, here the question arises about the existence of clusters in the country. Legitimate claim only on the formation of the individual, not about the existence of "ready-made" clusters, although opinions vary and many claims already formed about the presence of a functioning cluster. Because of the peculiarities of economic development of the country, cluster policy Russia may not be identical to the cluster policies of other countries, so for the most effective establishment and development of Russian clusters needed for the specific program.

It should be noted that at present in Russia are actively discussing the possibility of applying the cluster approach to the regulation of socio-economic development of territorial systems of different levels: from national to municipal. Developed a draft "concept of development of cluster policy in the Russian Federation" and the remaining project to date.

It is necessary to indicate the significant influence exerted on the cluster by the process of globalization that results to improve the competitiveness of clusters in the global market, the growth of exports of

goods and services firms-participants of the clusters, the rise of the creative competition, as well as in attracting foreign direct investment.

One of the objectives was to identify the shortcomings and advantages of the clustered systems. This problem was resolved and reflected in the work.

So, the advantages of clustering include economies of scale, effect of coverage, effect of synergy, reduction of trigger effect, inherent to a separate, independent companies, etc.

But, despite the apparent advantages of clusters, they have some disadvantages, namely: the probability of corruption in official ranks and the conflict between the individual interconnecting ministries and departments in the state regulation cluster, the occurrence of blocking effect companies, excessive "brandization" cluster etc.

Analyzing the work done, it should be noted that in the beginning the goal has been achieved. The author has discussed in detail the notion of a cluster, and studied the conditions of its origin and development. The main and most significant advantages and disadvantages, analyzes the development of foreign and Russian features of formation of clusters. Also important was the consideration of the impact of globalization on clusters.

In the process of writing the work, the author has developed his own vision of the further development of clusters and cluster policy of Russia in particular. As noted earlier in this paper, cluster policy of our country should be deeply thought out with consideration of peculiarities of economic development of the country, as, in the opinion of the author of the work, it is extremely distinctive.

In conclusion, we can say that cluster policy is indeed effective for improving the competitiveness of individual regions or countries as a whole, therefore, the formation and development of clusters in Russia is important for improving the economic image of the country and improve its economy.

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REFERENCES

Adamova, K.Z. (2009). Cluster policy as a tool of increasing of competitiveness of national economy. *Bulletin of the Saratov state technical University, 38,* 176.

Akhmetshin, E. M., & Vasilev, V. L. (2016). Control as an instrument of management and institution of economic security. *Academy of Strategic Management Journal*, *15* (Special Issue 1), 1-7.

Berezov, A.T. (2012). *Regional bases of formation and development of economic clusters of small enterprises: dissertation.* Vladikavkaz.

Cellucci, T.A. (2011). A Guide to Innovative Public-Private Partnerships: Utilizing the Resources of the Private Sector for the Public Good. *Government Institutes*.

Gapsalamov, A. R. (2013). Regional industry in the period of nationalization: Based on the materials of Tatarstan republic (Russia). *Middle East Journal of Scientific Research*, *15*(11), 1487-1495. doi:10.5829/idosi.mejsr.2013.15.11.11619

Gazimagomedov, R.K. (2005). *Modern regional industrial policy: cluster approach: dissertation*. Moscow.

Goryushkina, N. Y., Shkurkin, D. V., Petrenko, A. S., Demin, S. Y., & Yarovaya, N. S. (2016). Marketing management in the sphere of hotel and tourist services. *International Review of Management and Marketing, 6*(6), 207-213.

Kosareva, T.B. (2010). *Cluster policy in regional development management: financial mechanisms for the implementation: dissertation*. Samara.

Kulikovsky, Ya. (2009). Network economy: creating a cluster capable of solving many of the problems of Russian companies. *Sales Business, 7,* 9.

Lazareva, E.I. (2006). Cluster policy is effective integration of the region into the process of qualitative economic growth. *Economic Bulletin of Rostov state University, 3,* 283.

Lebedeva, T. E., Akhmetshin, E. M., Dzagoyeva, M. R., Kobersy, I. S., & Ikoev, S. K. (2016). Corporate governance issues and control in conditions of unstable capital risk. *International Journal of Economics and Financial Issues*, *6(1S)*, 25-32.

Lomova, L. A., Shiryaev, D. V., Kobersy, I. S., Borisova, A. A., & Shkurkin, D. V. (2016). Marketing techniques in management of enterprises engaged in tourism. *International Review of Management and Marketing, 6*(6), 15-20.

Mottaeva, A.B. & Rodionov, D.G. (2011). *The spatial distribution of transport infrastructure as a basis for the development of business structures of the region: monograph*. St. Petersburg: Asterion.

Zadorova, T.V. (2009). *Cluster policy as the factor of increase of competitiveness of region: on materials of the Chuvash Republic: dissertation*. Moscow.