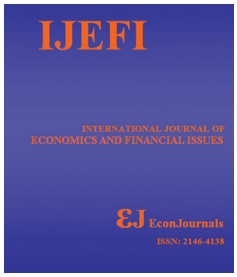

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Functioning of Innovative Territorial Clusters

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ABSTRACT

One of the basic directions of development of modern economy, closely related, primarily, to the innovative nature of this development is in the process of forming clusters. Regional and interregional clusters are considered as a priority inter-sectoral complexes that determine the development of post-industrial information economy at the national and regional level. Their development is associated with the processes of globalization and formation of the industrial structure of the information economy. The tasks of Russia's transition to innovative type of development are associated in particular with the need of formation of innovative clusters. Clusters as a form of spatial associations of enterprises is widespread in the Western economies. Taking into account the necessity of innovative development of Russia in the context of improving the competitiveness of industries and sectors in terms of integration of the country into the global economy, we consider it appropriate in this work to conduct a study of foreign experience of formation of clusters (Cherenkov, 2013). From the definition given by the founder of the modern theory of clusters by porter, that ".A cluster or industrial group, is a group of geographically neighboring interconnected companies and related organizations operating in a certain area, characterized by common activities and complementary to each other."

Keywords: Cluster, Territorial-production Cluster, Globalization, Innovation
JEL Classifications: P25, P28, R1, R12

1. INTRODUCTION

Currently in the socio-economic development of any country increases the value of the separate territorial formations (regions, areas), within which companies operate. This is due to the reorientation of economic studies at the regional level and to find ways of forming competitive regions (Porter, 2000).

Literary sources interpret territorial entity as an economic space, which is characterized by innovativeness and competitiveness. These two signs become the most important characteristics of territorial entities in countries with a market economy. More recently, in our scientific literature it was only about the second of these two signs. The global financial crisis, increased competition in the market of goods and services, resource constraints, decline in demand, technological stagnation, etc. forced domestic theorists and practitioners to turn to the issue of innovation, which will allow territorial entity to gain a competitive advantage in the long term through active development of individual enterprises of one or another territorial entity (Porter, 1993).

Normative-legal base of the research consists of laws and regulatory acts of the Russian Federation and its regions, documents of authorities in the field of regulation of the sphere of innovations and the cauterization.

In the process of research used a systems approach in the unity of its subject-object and functional-structural aspects. In this approach to the study of the problems of improving the process of innovation management and cluster management.

2. DISCUSSION

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 (Leamer, 1984).

In this context should clarify the meaning of "cluster" is a subset of objects with defined sets of attributes that can be detected by cluster analysis. In a number of works provides the following definition:

- Is a geographic concentration of similar, related or complementary businesses with active channels for business transactions, communications and dialogue that share specialized 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;
- Is a 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;
- Is a 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. Therefore, there is reason to summarize that the main idea of the concept clustering is the creation of cooperation ties between manufacturers, contractors, resource providers and technology and between research and financial institutions (Dahmen, 1950; Belousova et al., 2016).

Shown in Figure 1 a graphical model of a cluster shows that such a system is open, since its individual elements interact not only among themselves but also with the external environment. The purpose of the system is the transformation of resources into finished products. The managing subsystem is designed to ensure that within the cluster the specified transformation comprises the relevant organs created by all participants of the cluster formation, administrative offices, technology management, communication tools etc. The composition of the managed subsystem includes workers (employees of cluster members, financial institutions, social services, design organizations, research institutes, etc.), as well as their need for technical, organizational, communication tools, premises, etc.

Literary sources give different classification clusters. In particular, on the basis of innovation there are the following types of clusters:

- Built on the knowledge and characteristic for the enterprises that belong to sectors with high intensity of research and development. Are formed usually around the leading research institutions in the region or state, most often in pharmaceutical, chemical industry, and in aircraft (Ragulina et al., 2015);
- Dependent on suppliers - Have the form of enterprises, innovative activity of which depends primarily on the ability to collaborate with developers of innovative products or technologies. Found in agriculture and forestry;
- Built on information - Typical for companies that operate complex systems of information processing with the goal to provide specialized service to their clients. Operate in the financial, publishing sectors and in the tourism industry;
- Specialized in the supply - Are formed by companies with large expenditures on research and development when attention is paid to product innovation and relationships with consumers. Typical for companies that produce specific goods (e.g. software);
- Built on the creation of innovative technologies. Entities that fall within them, engaged in the development and implementation, interested in innovative technologies. Such clusters are common in mechanical engineering and instrument making (Avdasheva, 2000; Kunelbayev et al., 2016).

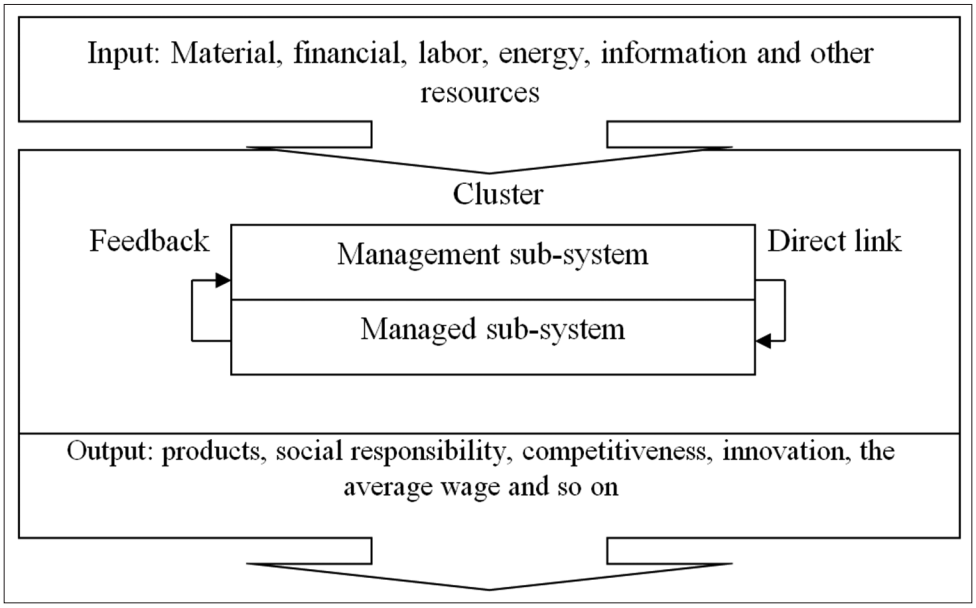
One of the most economically powerful clusters in the world is Silicon Valley (in California), where they have their headquarters thousands of companies that deal with computers, their components, software, Telecom, biotechnology etc. are such famous companies as "Eastman Kodak," "General Electric," "Shockley Transistor," "Lockheed," "Hewlett-Packard." The cluster employs over 1 million people.

There are clusters, usually at the initiative of the enterprises themselves due to such benefits from the cooperation as the best effectiveness, new knowledge, cooperation, etc. the Establishment of cluster connections acts as a priority of many innovative strategies, therefore, public authorities often resort to building business relations through the spread of ideas clustering, support projects for cooperation between industry and science. But, despite the undoubted advantages of cluster-oriented economy for individual territories and for the state as a whole, there are a variety of obstacles along the way (Romanova, 2013).

3. CLUSTERS OF INFORMATION TECHNOLOGY

Currently in political and economic circles of Russia are increasingly aware of the need for innovative development of domestic economy, increasing its competitiveness. With this as a possible mechanism of realization of new industrial and scientific-technical policy refers to economic clusters as a means of transition

Figure 1: A graphical model of a cluster functioning as an open system



to the knowledge economy as a means of establishing dialogue between business and science.

Consider one of several clusters on the territory of Novosibirsk and determine the factors affecting its functioning - the cluster of information technology (IT cluster).

The absence among IT companies clearly defined process chain along with the geographic concentration allows us to characterize the considered cluster as a regional. It is formed mainly by small businesses, mostly gravitating to the Novosibirsk academic campus. It is based on the intellectual capital of Novosibirsk universities and research institutes and infrastructure NNTS (Comarov, 2001; Kirillov et al., 2016).

The phase of the life cycle of this cluster can be attributed to developing - in the power of education, both formal and informal alliances among firms and involvement in these alliances new members.

Participants in the IT cluster are mainly involved in the production of software, automation, telecommunications and information protection. The predominant activities are the production of IT-products and provision of IT services, they are 92% and 69% of the surveyed firms. Moreover, IT companies also provide other related to the main production process of business services, conduct research and development. Slightly fewer firms in the cluster involved in such activities as the distribution of high technology products and service (Tretiak, 2012; Zakharov et al., 2016).

The average lifetime of cluster's firms is 8 years. Firms are mainly represented by two organizational-legal forms are limited liability companies and closed joint stock companies. About 31% of firms consider themselves to be members of the cluster, 23% - no. Managers of other companies for one reason or another found it difficult to answer the question of the ownership of his company to him.

As a base for evaluating the functioning of the cluster, data were collected about the activities of small enterprises by sector "communication" and "information and computing service," which allows you to compare some of the indicators of the cluster with the average. The results of this study are given in Table 1.

In 2012, the average number of staff in the companies of IT-cluster was 53 people by 2014, IT-firms have significantly increased their size (the average is 81 people). The average growth rate of the number of personnel at the companies of the cluster was 38%, which is 2 times higher than in the whole industry. Companies in the cluster have higher revenue growth than the firms of the sector of information and communication technologies: 1.35 against 1.22 for the period 2011-2014 should be particularly noted that the revenue in the IT cluster in 2014 on average, there were 1.53 times.

The average profitability in the cluster for 2012, 2013 and 2014 were respectively 16, 15 and 14%, i.e. in the dynamics slightly decreased. The average rate of change of profitability for IT companies is 0.994. The observed trend can be attributed to the relevant phase of the development of the industry in which these indicators and in the national scale is much worse, as well as higher growth in the prices of factors of production (compared to higher prices for products).

It should be noted that the profitability of companies (especially such labor-intensive as in the information and communication sector) is not a measure to fully characterize the economic efficiency of their functioning (Oleinikova et al., 2016). Because of the greater share of wages in the cost structure of products from IT companies (80%) by the indicator that best reflects the success of the business is added value.

The average share of exported products to companies in the IT cluster made in 2011, 2012 and 2013, respectively 47, 46 and

Table 1: Comparison of performance indicators of it cluster with the average for Russia (Markov et al., 2014)

Objects	The rate of change of revenue		The rate of change in personnel	Changes in the profitability				The rate of change of profitability	
	2014-2011	2014-2012	2014-2012	2011-2005	2012-2011	2013-2012	2014-2013	2013-2005	2014-2012
The ICT sector, Russia	1.22	1.30	1.19	0.38	1.74	0.74		0.79	
IT cluster, region	1.35	1.38	1.38			0.99	1.00		0.99

ICT: Information and communication technologies

44%, strictly decreasing. The average rate of change in the share of exports for the IT companies equal to 0.95, that is probably due to the increased consumption of IT products in the Russian market.

Thus, it is possible to say that the larger IT-companies oriented mainly on domestic market at that time, as firms smaller majority of its products produced for export.

The range and type of activities - Among IT firms large number of personnel from companies involved in the field of Internet and information security, large revenue growth rates differ telecommunication firms, and more profitable Internet company. The proliferation of high-tech products has a positive effect on the number of employees and revenue growth of IT firms, and providing service, having a positive relationship with staff, interacts negatively with the share of exporting companies.

Legal form, period of existence of the companies - Analysis showed no relationship between the legal form of the IT firms and their performance, however a larger company there are more long time. In addition, in the IT cluster there is a positive relationship between the lifetime and the legal form (closed joint-stock companies exist longer).

Of the structural unit - About 80% of the surveyed companies have a production unit, 62% of sales, more than half of the marketing and research departments and 15% in logistics. With firms having sales, are characterized by higher profitability and revenue growth; firms with logistics Department has high staff numbers and the rate of revenue growth; the company's production plant is more cost effective than not having these units, and IT company with a research Department, demonstrating a lower rate of revenue growth.

The system of marketing - The vast majority of the companies of the cluster (85%) use such form of product sales as a Commission. The second most popular form of marketing is orientation but a certain group of permanent and major customers (69%), followed by the use of our own sales structure (54%) and sales channels of other organizations (46%). The analysis showed that the last of these mechanisms for the sale of used mainly the export-oriented IT companies.

Competitive advantage - Its main competitive advantages of the firms of the cluster, consider the ratio of price-quality (100%), exclusivity (78%) and the high quality of products (54%). In addition, the executives of IT companies have noted the close contacts with partners (46%), often based on personal relationships and self-retaining in the absence of a developed system of moving goods to market. Almost a third (31%) of respondents noted competitive advantages of its firms access to cheap factors of production.

Benefits such as good leadership and well-developed services system, referred to were mainly managers from large organizations, and company leaders who highlighted the good leadership, exhibit greater revenue growth (Mattsson, 1987).

The sources of funding - IT companies tend two sources of business financing: Own funds (85% of the surveyed companies) and funds of partners and cooperatives (31%), and between their uses there is a negative relationship that allows to speak about their alternative nature relative to each other. The funds of cooperation partners used by small companies, mainly export-oriented. Separately it should be noted that none of the respondents mentioned the quality of the used way of financing venture capital.

The origin of the developments and ways of organizing R&D activities - The vast majority of the companies of the cluster (over 90%) carry out R&D on their own. However, 30% of the executives surveyed reported using developments created in the non-budget science that will positively affect the revenue growth of companies.

IT companies most often carry out the development of individual expertise available in the region (77%), they demonstrate a relatively lower rate of revenue growth. In 69% of cases the firms in the cluster have their own units engaged in R&D, 31% of firms create temporary groups with outside experts and use team invited specialists (Castells, 2000).

4. THE CLUSTER OF INNOVATIVE COMPANIES

Another way of formation of clusters close to the liberal idea, it is possible to observe in the Novosibirsk region, where a cursory analysis draws attention to the high-tech sector of the economy, occupying a number of areas leading position in the country. The high concentration of knowledge-intensive companies along with the existence of the scientific educational center of international significance suggests the presence on the territory of the Novosibirsk agglomeration innovation cluster. This cluster was formed mainly by small businesses, mostly gravitating to the

Novosibirsk Akademgorodok. The Foundation of the cluster is the intellectual capital of Novosibirsk universities and research institutes and infrastructure NNTS. Originating mostly in the 90-ies in the conditions of crisis the funding of science on the basis of units of SB RAS institutes and the efforts of individual researchers, to date, the cluster companies have become independent, both economically and legally. Thanks to its innovative component they are able to produce unique products. And it allows them to create their own specific niche in demand product. Coordination and cooperation of the companies in the cluster are carried out through participation in business associations, leading of which are non-commercial partnership "SibAcademSoft" and the Association "SibAcademInnovation" (Kuznetsov, 2014; Silnov and Tarakanov, 2015).

Comparative characteristics of the two clusters are given in Table 2. In the degree of diversity both in the cluster can be attributed to the composite, which is a concentration of innovative companies, operating in different, quite distant from each other regions. Such clusters should be considered as a set of smaller sub-clusters, incorporating elements of one sphere of activity. In the case "Altai" is the following areas: Instrument and equipment manufacturing; new materials; biotechnology, pharmaceuticals and cosmetics. In the Novosibirsk cluster specified field is in addition to the IT sector, in contrast to other fields of activity more accurately allocated in a separate sub-cluster, as evidenced by the presence of the formal feature - profile professional associations (non-profit partnership of assistance to development of information technologies "SibAcademSoft").

Both cluster geographical coverage is attributed to urban, and the phase and life cycle - developing the strength of observed formation of formal and informal alliances among firms and involvement in these alliances new members. They are similar in internal dynamics and lack of interactions and identity peculiar to the developed clusters. However, the contrast of the Biysk cluster, which is the backbone of the company, Novosibirsk cluster is clearly symmetric and has evolutionary sources of origin. Analysis

Table 2: Comparative characteristics of Biysk and Novosibirsk innovation clusters (Markov et al., 2014)

Indicators	Biysk innovation cluster	Novosibirsk innovation cluster
The dominant type of relationships	Vertical	Horizontal
The presence of the backbone of the company (asymmetry)	+	-
The presence of state enterprises	+	-
The source of induction	Artificially stimulated	Evolutionary
The organizational form of coordination relations in the cluster	Integrated research and production complex	Non-commercial partnership, association
The degree of diversity	Composite	Composite
The internal dynamics	Potential	Latent
Stage of the life cycle	Developing	Developing
Geographical coverage	Urbanistic	Urbanistic

of the intra-cluster linkages allows us to conclude a predominance of horizontal connections in the absence of a value chain between Novosibirsk companies, while in the Altai cluster is dominated by vertical communication.

The detailed analysis and modeling activities of the clusters showed that the factors that determine the competitiveness of small innovative business, in both clusters include:

- Positive effect of regional bodies of state power;
- Regular contacts with the research institutions and commercialization of the developments created in the science budget;
- The share of personnel engaged in R&D;
- Share of the means of production (raw materials, materials and components, equipment and software), engage with a regional market;
- The quality and diversity of locally available resources and production.

The multivariate statistical method of factor analysis of competitive advantage, were able to identify three sustainable combinations observed in both clusters (Feldman and Audretsch, 1999).

In the first place is the competitive advantages associated with production processes in enterprises (access to cheap factors of production, competent management). However, the company Biysk cluster consider them in conjunction with the promotion of products on the market, and the company of the Novosibirsk cluster service and after-sales service of its products.

The second group of competitive advantages combines the strategy of innovative companies. For the Novosibirsk companies is a combination of competitive advantages, in fact, reflects two main marketing strategies of cost minimization or differentiation strategies in any market niche. As we know from numerous textbooks, these strategies are antagonists, and confirmed that research. In Biysk cluster this group of competitive advantage boils down to the pricing strategy of the company: Either the products are of high quality and in demand regardless of its price or product cheaper than its counterparts, which stimulates demand. These strategies according to the results of the analysis also proved himself as an alternative (Hochberg, 2003).

From an institutional point of view, of particular interest is the third sustainable combination of competitive advantages, observed in both clusters, close contacts with contractors, supported personal relationships. It stresses the importance of informal contacts and communication, increasing as a result of territorial proximity.

5. CONCLUSION

As a result, we can draw the following conclusions:

- For successful functioning and development of meso-economic systems is critical to the favorable economic conditions generated by the regional authorities;
- Important factor of the competitiveness of innovative meso-systems are social networks and ongoing interpersonal contacts, promoting networking, building trust and information exchange;

- For companies in an asymmetric cluster, which are at different stages of the life cycle, an important different source of origin of the institutional environment.

Therefore, based on the fact that one of the goals of development policy clusters (regardless of the type of the object of regulation) should be the formation of networks of small and medium business, today we can speak of a fundamentally different models of cauterization.

In some cases, the emergence and development of clusters becomes possible thanks to the cooperation of large companies with medium and small enterprises through the above-mentioned techniques of outsourcing and subcontracts. While large enterprises, with the exception of the production chain a range of business processes and transferring them to small, have the opportunity to focus on your core business, simplify the management structure, reduce costs. Small and medium businesses taking on these orders, began to cooperate with large enterprises on an ongoing basis. This allows him to reduce certain risks and transaction costs, increase the volume of produced goods or services, accordingly reducing the size of fixed costs per unit of output. The role of the backbone enterprises in this model is crucial, especially in the initial stages of cluster development.

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