

Foreign Experience on Cluster Development: Methodological Aspects

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Abstract. The article represents the results of the comparative analysis of implementing cluster policy in foreign practice. Researched methodology is based on the main characteristics of clusters that characterize them as complex economic structures. Creating clusters involves a number of studies at the territorial level, which, above all, relate to determining the competitive advantages of the territory in a particular industry.

Keywords: Industry, clusters, cluster organizations, foreign experience, region, industrial enterprises.

1. INTRODUCTION

Since the 90s of the 20th century, a process of revision of the fundamentals of industrial policy, fundamentally different from the previous dominant models of centralized management, has been observed. The new approach is expressed by increasing the importance of local organizations in the formation of the regional development strategy, paying serious attention to the quality of local competitive advantages and regional production systems; clusters are becoming a slogan of development policy, they are growing as an object of a new type of industrial policy, the main goal of which is to increase the competitiveness of the country or region.

2. LITERATURE REVIEW

As production capacities and economic activities of industrial enterprises increase, a special role is given to the directions of cluster development. A large number of scientists are exploring this area of neoplasm, which is the main direction, a strategy for improving the economic development of a particular region. To understand what industrial clustering is, let's study the basic ideas of the concept of "cluster", which were given by Russian and foreign authors.

For example, the importance of industrial clustering is determined by E.V. Kozonogova, D.S. Kurushina, Yu.V.Dubrovsky. The cluster approach is established by the authors based on the visualization of the task of identifying industrial clusters, which actually allows further prediction of the behavior of this field of activity.

O.L. Ksenofontov understands the concept of a cluster as a complex of industrial enterprises that are located on the territory of a separate region. The concept of the cluster approach O.L. Ksenofontova expressed it as follows: "As the experience of many countries shows, the cluster approach not only serves as a means of achieving goals in the competitive struggle of regions, but also enhances innovation, is a powerful tool that affects the increase in employment, wages, deductions to budgets of various levels, and increases efficiency. and the sustainability of the industry of the region, which contributes to the development of the region". She notes that clusters create an opportunity for regional authorities to manage the socio-economic situation of the region.[15]

Yu.A. Salikov, S.V.Vandyshva, L.V. Smarchkova, E.A. Chudakova are of the opinion that in order to achieve socio-economic development, strategies of the region, the most effective direction is the modernization of the regional industrial sphere, the cluster approach will be widely successful and have a positive impact on small and medium-sized businesses. This approach will have a serious impact both on the innovative development of the region and on the scientific, technical and reproductive activities of the industrial complex of the region.

G. Ya. Belyakova, D.V. Bezrukikh express the idea that the cluster approach is the basis for structuring the regional economic system. M.A. Khaidarova notes the development of the budgetary efficiency of the regions as the essence of the cluster approach, and the most important task, in her opinion, is "to clarify the difficulties that impede their implementation".

K.V. Pisarenko is of the opinion that it is the clustering of regions that contributes to the economic development of the interaction of competition and cooperation. It means that clustering contributes to the formation of an increase in the economic stabilization of regions, an increase in the profitability of enterprises, an increase in production activity and regional competitiveness.

3. ANALYSIS AND RESULTS

In the cluster concept of entrepreneurship development, attention is paid to the relations between corporate structures, investment, mediation, scientific, educational, public organizations in the region. The essence of the cluster concept is to realize the combined potential of the regions, whose economic territory is the basis for the development of European cooperation, and solving the problems of the regional economy is one of the main activities of the European Community.

A distinctive feature of clusters organized according to the regional principle is the specificity of the regional internal environment, infrastructure, macro-system level, as well as the ability to realize competitive advantages in the regions through integration. The cluster is considered a stimulating factor of economic development, and regionalism is a unique base for the sustainable development of the cluster, and it is important in choosing priority directions for investments in the region, as it reduces the risk of uncertainty in the assessment of investment projects. [1]

The effectiveness of investments through clustering is related to the strengthening of relations between the economic entities that are members of the cluster, the simplification of the use of new technologies, various forms of joint economic activity, including the establishment of joint scientific research, experimental construction developments (ITTKI) for the purpose of sharing risks when entering foreign markets together.

The main goals of clustering are to create and increase the competitiveness of cluster members through the introduction of new technologies, reduce costs and increase the efficiency of knowledge-intensive services due to synergistic effect and unification of approaches in the fields of logistics, engineering, information technology, engineering, information technology, quality management.[2]

It can be noted that the regional cluster is a stable regional and network cooperation of enterprises and entities united on the basis of an innovative program for the introduction of advanced technologies for the purpose of sustainable development of the region and increasing the competitiveness of these entities. In the context of Russia, great interest in regional clusters arose as a result of successful experiences in the development of industrial regions in countries that began to use the cluster approach.[16]

regional clusters are as follows: diversity of territorial resources; the need for prevention and recreation of the environmental condition of the regional economy; the need for regional programs for the development of economic entities included in the cluster; self-sufficiency of resources for regional cluster development.

Regional clusters The formation and development of the Italian model is largely related to the successful development of industrialized regions (industrialized districts). In the classic small business country, about 2 percent of the 4 million firms are considered large (employing 1,000 or more workers). All industrialized regions, as a rule, are located in small cities, characterized by a high concentration of small craft firms employing a few workers.

Craft firms are highly competitive in the world market, which is achieved through the cooperation of small producers, the creation of collective institutions and the maximum use of opportunities for product differentiation, high innovation activity of firms, their flexibility and quick response to new consumer demands.

In the formation and development of regional clusters, it is necessary to note the important role of the state in giving discounts on exports, supporting and attracting investors, providing consulting services, which made it possible to produce competitive products in local and foreign markets.

The peculiarity of the formation of regional clusters in France is that the transition to new forms of development was much more difficult here than in other countries. This can be explained by the fact that the centralized public sector in the country has traditionally been strong. Only after the adoption of the regional organization and development program, the regional development management organization and their development fund were established. Later, about 100 regional development programs integrated with the system of production clusters were developed and approved.

It was during this activity that a network system was formed through the cooperation of enterprises, which contributed to the concentration of about 30 large companies, as well as the concentration of small and medium-sized businesses. In France, the focus is on strengthening links between universities and industry in order to develop small innovative businesses. In accordance with this, an innovative law aimed at establishing a new innovative business was adopted.

It should be noted that all research in the field of innovation was carried out by the national planning agency, that is, it was supported by the state. The law envisages increasing the mobility of scientific staff of state scientific research centers and giving them wide freedom to establish their own companies and provide advice to private industrial firms.

Thus, clusters are mainly created through cooperation between local industrial groups, universities and scientific

research institutes; cluster development is carried out jointly by local government bodies and regional departments of the Ministry of Economy, Finance and Industry.

According to the concept of regional development, the UK is very good at delivering economic recovery through local development, so there is a need to bring regional policy closer to local decision-making centres. Regional planning is initiated by the central government, which only provides general coordination and financing, while provincial and municipal governments actually manage the projects. In the economic development of the regions, entrepreneurial activity began to take an incomparable place, where special attention was paid to increasing its level of competitiveness in the field of advanced technologies, biotechnologies, information technologies and telecommunications.

Formation of industrial clusters is one of the directions in the field of business support. Taking into account the development of the direction, the state is implementing targeted regulation and promotion programs of business activities. For more than 10 years, Scotland, Wales, Northern Ireland and the North East of England have demonstrated successful regional dynamics in traditional industries such as automotive, electronics, chemicals and food and beverage, clothing and textile production.[3]

In the 1980s, the expansion of forms of interaction between business and higher education was promoted as the main direction, various programs of state funding of scientific research began to work, as a result of which science parks and technology transfer agencies increased.

In the USA, the cluster approach is the basis of the regional economy development strategy. A distinctive feature of American clusters is that their activities are based on the principles of partnership and scientific research is focused on the commercialization of experimental design developments. In the United States, the task of forming and strengthening regional innovation clusters has been placed among the most important national priorities. In the state, through the federal contract system, the following rights are granted to the contracting corporations (executors of scientific research, experimental construction development programs): free use of the state's industrial equipment and scientific laboratories; benefits in the purchase of raw materials and materials at the expense of state agencies and state funds; tax benefits; premature obsolescence of fixed assets; free lease of state land property; subsidizing companies' own development, etc.[4]

Active government policies and strong financial support for universities (especially research universities) have given them a privileged position and spurred development. Under the influence of the nationalization of scientific activity, the conditions of science in the business sphere have changed. In many sectors, scientific units were established and developed by corporations only to fulfill the state order.

is a vivid example of a cluster operating in the United States. This cluster is based on direct cooperation between research centers and venture capital. It is they who represent the material, tangible basis of the cluster, because they influence the rest of the cluster members. Research centers and venture capital create the necessary infrastructure, stimulate the formation of new players in the cluster. Innovation is produced through interaction.

In the USA, the task of forming and strengthening regional innovation clusters has gradually become one of the most important national priorities. The experience of Japan is an example of the process of creating clusters. The main distinguishing feature of the cluster in Japan is the important role of a large company that implements economies of scale internally and is a leader in new technologies. A regional cluster represents a system of connections between a certain number of large enterprises and a network of medium and small enterprises, and there is a strict hierarchy in the network.

The active policy carried out by the state helped the emergence and formation of clusters, the latter of which focuses on the development of science. All the adopted laws on science, technology and technology are strategic programs for the long-term development of the country's scientific and innovative sphere, and the provision on the need to activate the attitude of regional authorities to science was among the most important.

The state has an important role in the comprehensive coordination of scientific research in the country. The regional administration focused on the importance of supporting the development of science, strengthening cooperation between local production, higher education and state scientific organizations. In the future, the regional government will determine the direction of innovation clusters, which should be formed by local initiative. The science and technology state financial plan envisage increasing the competitiveness of industrial technologies through the cooperation of corporations, the government and the academic sector.

An emerging cluster support initiative was developed, which facilitated the formation of administrative teams to coordinate collaborative research. The establishment of cooperative research centers under national higher educational institutions was supported, in their material and technical base scientific research works are carried out on the basis

of joint contracts with industry. One of the tasks of these centers is to coordinate their research and development topics with local industrial goals.

Japan adopted innovations from other countries and continued to improve them on its territory, moving to independent development of certain technologies. Therefore, it can be said that the development of clusters was mainly carried out taking into account foreign, primarily American experience, but there are also differences. Clusters in Japan were established in order to advance the most modern science and technology fields (large-scale integrated circuits, nanotechnology, creation and production of robotics).

Mixed industry: biomanufacturing, environment and bioinformatics are of particular importance. The main difference between clusters in Japan and such clusters in Europe is that in Japan clusters are dominant in mixed industries, while in Europe they are dominant in traditional industries.[5]

The advantage of the cluster method is that it allows for a comprehensive, systematic study of the situation in a group of interrelated enterprises belonging to different industries. In addition, the cluster approach makes it possible to use the initiatives proposed and implemented by business leaders as the "core" of the cluster development strategy, while guaranteeing successful implementation. At the same time, the success of cluster projects (especially long-term) largely depends on the effective management of cluster activation processes, in addition to the relevance and necessity, activity and "strategic" of business leaders, the approaches of local leaders (government and/or business) and the cluster. depends on the realization of the existence of a development strategy.

Based on the above considerations, it is necessary to highlight the role of clusters in increasing the competitiveness of the region aimed at solving the main problems of the national economy:[6]

- first of all, when implementing clustering policy, it is necessary to develop a competitive market, to support competition as a driving force of companies' competitiveness;
- secondly, in cluster policy special attention is paid to microeconomics - analysis of local markets and companies on the basis of factors of production that are not inherited, but primarily created. A microeconomic approach to clustering policy allows to take into account the local characteristics of development and develop effective targeted programs to accelerate the development of companies and increase their competitiveness;
- thirdly, the implementation of the clustering policy is based on the organization of mutual cooperation of state authorities and local government authorities, entrepreneurship, scientific educational institutions on coordination of efforts to increase the innovativeness of the production and service sector, which leads to mutual improvement in work efficiency and serves to increase;
- fourthly, the implementation of the cluster policy is primarily aimed at stimulating the development and innovation potential of small and medium-sized businesses, which form the main part of clusters and cluster initiatives and are the main object of the cluster policy.

In general, based on the experience of foreign countries, it can be said that the development point of the regional cluster can be studied as the core of the innovation-oriented economy. Regional clusters have all the potential to be competitive and, most importantly, attractive for investment, while the economy is of key importance. The regional cluster acts as a tool, stimulates the development of the region, creates a particularly favorable environment for the development of small, medium and large businesses, and not only has a positive impact on industrial development, but also has a multiplier effect, improves the living standards and quality of the population of the region.

Only 15 countries, including Switzerland, Sweden, the US, Singapore and France, or 11% of all countries ranked this year, scored well on all 7 components of the GII.

However, some countries that rank lower in the overall GII ranking are also leaders in certain areas. Examples include Turkey (26th), which ranks high in terms of human capital and research; Thailand, Vietnam and Uzbekistan with relatively high market complexity ratings (27th, 22nd and 24th respectively); and Mongolia entered the top 30 creative output (28th place). These inconsistencies in productivity in the economy, as well as innovation systems, are changing and dynamic, pointing to the potential to improve overall productivity in the future (Table 1).

In the third type of clusters, as a rule, technologies are imported in the form of means of production and intermediate products. The effectiveness of innovative activities is largely determined by the ability of companies to interact with suppliers. In the fourth round, participants work closely with each other and with clients. In such clusters, research and development are actively carried out, but the innovation process is focused on the specific needs of consumers. Following this classification, science and technology clusters are focused on innovation, where a team of employees is busy creating promising technologies, developing and implementing technologies that require new science.

Table 1: The best cluster organizations in the countries of the world S & T (new science oath technology) [7]

Rank	Cluster name	Economy	Rank change
1	Tokyo–Yokohama	JP	0
2	Shenzhen–Hong Kong–Guangzhou	CN/HK	0
3	Beijing	CN	1
4	Seoul	KR	–1
5	San Jose–San Francisco, CA	US	0
10	Paris	FR	0
15	London	GB	0
19	Amsterdam–Rotterdam	NL	–1
20	Cologne	DE	–1
27	Tel Aviv–Jerusalem	IL	–3
28	Taipei–Hsinchu	TW	–1
29	Singapore	SG	–1
31	Melbourne	AU	4
32	Moscow	RU	0
35	Stockholm	SE	–2
36	Eindhoven	BE/NL	–2
40	Toronto, ON	CA	–1
41	Tehran	IR	2
43	Brussels	BE	–2
46	Madrid	ES	–1
48	Milan	IT	0
49	Istanbul	TR	2
50	Zürich	CH/DE	–1
56	Copenhagen	DK	–2
62	Bengaluru	IN	–2
66	São Paulo	BR	–5
71	Vienna	AT	–1
74	Helsinki	FI	–6
92	Lausanne	CH/FR	–3
100	Warsaw	PL	–1

Source: WIPO Statistics Database, April 2021

It is worth noting that innovation clusters, unlike territorial and industrial clusters, developed mainly through the mechanism of competition, cooperation works in (collaborative) mode, that is, coordination and cooperation in the field of innovation is the basis for their mutual cooperation. Cooperation in such structures corresponds to the modern concepts of open innovation (G. Chesbrough) and the triple spiral. Thus, according to the first mentioned approach, such a dynamic environment is formed in the cluster, in which companies are not only based on their research results, but also actively use the ideas and technologies of other organizations, as well as transfer their developments to other members of the cluster.

According to the concept of the triple helix, the effectiveness of cooperation is achieved through the direct

interaction of 3 institutions – universities [8], business and government - all elements of which fulfill their functions and complement each other. Such a model shows the interaction of certain institutions at each stage of the creation of an innovative product. In the initial stage of knowledge production, the government and the university interact, then in the process of technology transfer, the latter cooperates with the business community, and the result is jointly marketed by the government and business.[9]

A three-way spiral is very relevant. This is confirmed by many documents of the European Union, which indicate that research clusters should be based on the principle of a triple spiral and include elements of the public sector, business and science. [10]

Clusters are widespread in the EU countries, they are important for the development of the knowledge economy, pan-European innovation space and regional innovation cooperation. As noted, such organizations have highly educated and qualified workforce, unique know-how and experience, highly developed scientific due to the presence of research infrastructure, close relations between companies, and strong infrastructure, it creates the ground and institutional basis for the innovative activity of the region. [11]

These data show that many European clusters are active in information technology, biotechnology, automotive, environmental technology, healthcare and medicine. These are the new generation (innovative, scientific-technical, innovative and industrial) structures that have been created in the EU countries since the mid-1990s .

Let's look at the characteristics of innovation clusters in the European Union as an example of the biotechnological and pharmaceutical industries. Analysis of their development led to the following conclusions:

- Biotechnology companies form the basis of all bioclusters. The criteria for their classification are as follows: scientific (firms develop or use relevant products, as well as offer services in this field); cultural (dynamic and flexible, capable of working in a biotechnological environment and producing biological products and services); structural (mainly related to SMEs, conducting research, obtaining venture capital, using biological processes in research or production). [12]

The analysis of clusters in other sectors of the EU economy showed that the composition of such structures is characteristic of practically all countries: small, medium and large business; scientific, financial and state institutions; auxiliary organizations and so on. A business entity that meets at least one of the following requirements is considered a cluster member: it has signed a partnership agreement, letter of intent, or similar written form of commitment; pays membership fees and continuously supports cluster management; actively contributes to its development, for example, participation in projects, seminars and working groups;

- most biocluster companies have fewer than 50 employees. 30 of the firms More than % consists of 1-5 people, about 10 of the total number of enterprises About 100 people work. In general, bioclusters are characterized by the least number of employees. For example, only 1,416 people work in Germany's Walheim e (Upper Bavaria), 76,381 people work in the business services cluster, and 84,360 people work in the automotive industry;
- the activity of large and successful bioclusters (for example, Cambridge, BioValley, Paris/Ile de France) shows that the following components are necessary for their development : a strong scientific base (universities, scientific research institutes, scientific centers); venture capital; small biotechnological companies and large firms (divisions of leaders in the production of certain goods); developed infrastructure (including incubators, scientific parks, laboratories);[13]
- one of the main conditions for the successful operation of bioclusters is state support, the most common means of which are: innovation promotion (including preferential taxation and availability of appropriate infrastructure); assessment of consular activities and innovative projects; technology transfer; scientific centers and business consulting services; access to laboratories and equipment; financing (public and private); legal assistance (including assistance in patenting); training and education of employees; organization of business relations of various entities. It should be noted that the initiators of the creation of bioclusters are mainly state authorities, which is related to the importance of these structures in increasing the competitiveness of national economies, as well as their special role in the development of state benefits;
- there is the formation of transnational bioclusters with the participation of several countries (Medicon Valley, BioValley), as well as their tendency to unite within one country . For example, in Great Britain, the question of merging three bioclusters (Oxford, Cambridge and London) into one supercluster, which will become the second largest cluster in the world, is being developed.

to the European business practice, it is advisable to use the existing experience to gain a competitive advantage, in particular, to use benchmarking tools for the development of clusters. Its application in the EU pharmaceutical sector (based on data from ESCA and the European Cluster Excellence Initiative) highlights the following:

- The most common organizational and legal forms of clusters are registered associations, limited liability companies, hybrid forms (a mixture of associations and LLCs). It is worth noting that individual clusters may be older than cluster organizations (specialized structures that coordinate their subjects, have an address, a website and, as a rule, are legal entities), that is, at the initial stage, participants interact on the basis of signed agreements on cooperation without a legal form;
- in benchmarking, ESCA and European Cluster Excellence rank clusters according to the level of efficiency: strong cluster - excellent level (minimal improvements can be made); medium - acceptable (there is potential for improvement); weak - essential not (minimum criteria for effective performance are not specified). 70% of the industrial enterprises usually belong to the strong. About 50% include one or more scientific research organizations, as well as state advertising institutes and companies performing marketing functions. The weak do not have scientific and educational institutions;
- 70% of the active participants are located at a distance of 150 km or more from the headquarters or from each other, that is, the distance for them is not an obstacle as in territorial structures;
- the average age of strong clusters is more than 4 years, that is, it is appropriate to assume that some time is required for their effective operation, even when all conditions and conditions are present; covers almost the entire region, that is, most of the companies in this and related sectors (types of economic activity) are involved in its activity.

In weak areas, on the contrary, all existing regional development there are many subjects whose potential is not used and the clustering process is not covered; [14]

- the role, tasks and functions of the management organization in an excellent cluster are clearly defined, the management team has special knowledge (including training on cluster management);
- in successfully functioning clusters, their activity is constantly monitored, as well as strategic planning is carried out;
- 75% of logistics financing in point clusters is carried out by third parties, but joint scientific research works are carried out at the expense of their own funds (without their external participation). Long-term (at least 2 years) financial stability is guaranteed;
- the level of innovative entrepreneurship in strong clusters is 75% higher than in other entities. They are also 60% more active in mediating and collaborating with external partners vis-à-vis weaker clusters. In addition, they are distinguished by a high level of internationalization of their activities. Their representatives make frequent appearances in the media, and foreign companies actively approach with proposals for cooperation.

4. CONCLUSIONS

In conclusion, it can be noted that the principle of partnership should be studied as the main principle of activation of the process of cluster formation in the country, in practice: establishing new institutional structures based on joint business networks or relations with various social and economic partners; development of public-private partnership that leads to mutual cooperation of cluster structures with authorities in the implementation of priority and (or) socially important projects for the national economy; It is manifested in the formation of inter-cluster networks that go beyond national borders (cross-border and transnational cooperation of clusters).

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