

Theoretical and methodological framework establishing the conditions for the development of innovation clusters



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Abstract. The article proposes certain methodological approaches to the formation of conditions for the development of innovation clusters, aimed at the structuring, appraisal and promotion of innovation processes. The article highlights some efficient conditions for the formation and development of “ideal” innovation clusters on the basis of these approaches.

Key words: cluster, innovation cluster, regional economy.

Currently, more and more representatives of scientific community acknowledge that the regions, which establish and develop clusters on their territory, are becoming leaders in the technological and economic development of the country. The presence of such leading regions determines the competitiveness of national economies. Of course, the effectively functioning cluster structures accelerate technological process, and the cluster project participants develop certain advantages like openness to innovation, the improvement of business processes and the efficient growth of labor productivity. Clustering is an objective process caused by globalization that spurs the growth of international competition, including

the competition for investment resources and for the enhancement of network and informal relationships between entities. Clustering is expanding worldwide; it accelerates the development of innovation-technological processes in national economies.

Thus, the Address of the President of the Republic of Kazakhstan Nursultan Nazarbayev to the People of Kazakhstan “The Strategy “Kazakhstan-2050”: new political course of the established state” that took place on December 14, 2012 sets out a goal “to join the 30 most developed states of the world” [1]. Note that the cluster approach should become the main tool in the implementation of the strategy “Kazakhstan-2050”.

In view of the above, the following factors become especially important: choosing a suitable location for the construction of facilities; scientific substantiation of the most rational location of innovation technologies with regard to their provision with least mobile labor, material and natural resources and achievement of maximum production efficiency.

Current experience of developed countries shows that the regions' efficient economic development depends to the full extent on the oriented system of interrelated factors, among which the geographic location and highly qualified personnel are very important. An effective and dynamic growth takes place in those regions that have formed the very innovation clusters as an alternative to the traditional branch-wise approach. And the most active and viable clusters are formed on the basis of intersectoral relations diversification.

The phenomenon of cluster as an industry agglomeration of economically interrelated enterprises in some territory is known from the times of handicraft production. However, industrial-innovation clusters began to be regarded as an important factor in the regions' economic development only in the last quarter of the 20th century [2].

So, the main feature of a cluster is its innovation. It includes the entire innovation chain, from generation of scientific knowledge and formation of business ideas on their basis to the sales of marketable products in traditional or new markets [3]. Cluster structure leads to the creation of a "comprehensive innovation product" – a special form of innovation [4]. The unification into a cluster on the basis of vertically oriented integration establishes an efficient system of transfer of new knowledge and technologies rather than just a concentration of various technological and scientific achievements. The formation of sustainable relations between all the cluster participants is the most important condition for

the effective transformation of achievements into innovations, and innovations into competitive advantages [5].

The cluster approach is a relatively new tool for Kazakhstan. But it begins to play a most important part in the strategies for the country's innovation development. Certain mechanisms for promoting and supporting the development of clusters are formed at the state level.

In general, it is necessary to point out that the cluster initiative is being implemented in accordance with the President's Address to the people of Kazakhstan "To the competitive Kazakhstan, competitive economy, competitive nation" dated March 19, 2004 [6]. The main objectives of Kazakhstan's cluster initiative is to create the necessary conditions for the fullest use of the country's competitive advantages in order to develop the non-primary sector of economy with the involvement of private business structures and enhancement of the competitiveness of domestic enterprises.

Kazakhstan in the course of its development has approached a situation when the diversification of production is strongly required in order to avoid further dependence on the oil sector. The expected entry into the WTO (World Trade Organization) urges the country to take immediate measures of innovative and technological nature. In this context, without major changes, economic growth will acquire extensive character, and the ability of enterprises to withstand market changes will decrease gradually. In this connection, a special role belongs to the cluster model that facilitates the realization of comparative advantages, turning them into competitive advantages.

Let us distinguish five basic theoretical concepts that support the cluster theory [7]:

- external economies;
- innovation environment;
- cooperative competition;
- rivalry;
- path dependence.

We should note that the provisions of these theories are directly connected with Porter's diamond model of competitiveness, and, as a matter of fact, a cluster enhances the competitive advantage of producers [8, p. 92] increasing the productivity of processes and resources of individual enterprises by forming and localizing specific sustainable sources of its competitive advantages. A cluster is formed within a single institutional environment with a high degree of specialization, cooperation and competition. Thus, as M. Porter notes, the region should have at least two leading industries, involved in the technological chain.

However, Porter's closest follower M. Enright argues that a cluster is formed only by competitive enterprises. He speculates that competitive advantages are created not on the supranational or national level, but on the regional level where historical prerequisites such as the development of regions, the diversity of business practices and organization of production, and education play the leading part [9]. These circumstances cast doubt upon the ways of adjusting the cluster technologies for their use in Kazakhstan.

At that, there are some organizational problems that hamper the formation of innovation clusters in the country; they are conditioned primarily by the necessity to enhance the cooperation and interaction of organizations within the cluster structures. M. Porter defines four factors as the sources of competitiveness in the global economy:

- 1) technological capacity;
- 2) access to a large-scale, integrated, and rich market;
- 3) the difference between the production costs of the producing party and prices in the target market;
- 4) political opportunities of national and international institutions for managing the growth strategies of countries and regions under their jurisdiction [10, p. 205].

It becomes evident that these very sources provide competitiveness, because they represent institutional, operational and economic conditions for the formation of clusters.

Currently the cluster approach is used in many countries for enhancing the competitiveness of national economy. Thus, the European experts who monitor the development of small and medium-sized enterprises have analyzed several types of clusters, and using the research by M. Storper [11, p. 92] they have worked out a scheme of development of the "ideal" cluster that includes six stages:

- 1) establishment of pioneer companies on the basis of local production specifics, spin-off process;
- 2) creation of a system of suppliers and a specialized labor market;
- 3) formation of new organizations (often governmental) to support the firms;
- 4) attraction of external domestic and foreign firms, highly skilled personnel into the cluster as an impetus for the establishment of new cluster firms;
- 5) creation of implicit assets (knowledge) between firms; for promoting the diffusion of innovations, information and knowledge;
- 6) the possible period of cluster's decline due to the exhaustion of its innovation potential, lack of its openness for external innovation [12, p. 93-94].

However, not all the "ideal" innovation clusters go through the six stages of development: some stage, perhaps, will be completed, while others simply fall out. In addition, the formation of any "ideal" innovation cluster requires a high level of interaction and partnership between enterprises, research and public organizations, and the government. Each organization can be a valuable tool in the creation of the cluster, and it can effectively perform its functions and tasks, only as part of a smoothly running **synergetic mechanism** *that is a set of functional elements in the form of separate subsystems that have specific tools for fulfilling the functions of this mechanism.*

World practice shows that developed countries are currently at the stage of assimilation of innovation advantages, and the rest are mainly at the stage of assimilation of factor advantages and partly – investment advantages in terms of attractiveness, China, for instance. The strategy of orientation to the world market, provides developing countries with an opportunity to use a kind of “advantage of backwardness”. As for the transition to technological competitive advantages, it requires that the government should coordinate investments in technology with the development of “human capital”, and its objective multidimensional assessment [13]. Kazakhstan has significant problems connected with the reduction in fundamental science financing, and with the reforms in the education system.

The most successful innovation clusters are formed in the places that have opportunities for establishing a well-functioning synergetic mechanism in the field of breakthrough technologies with subsequent access to global markets. Thus, the consolidated groups participating in the cluster on the basis of vertical integration, form a strictly oriented system of knowledge and innovation transfer, rather than just a spontaneous concentration of various technological innovations.

Germany represents a most successful example of innovation clusters formation on the basis of a smooth interaction within one and the same region. Sectoral and cross-sectoral networks of companies, created in the framework of the federal state of North Rhine-Westphalia, allow the regional authorities to form their own international brand under the name “Exzellenz NRW”, considering it part of the common strategy for positioning the region to attract investments.

The Ministry of Economic Affairs and Energy of the State of North Rhine-Westphalia, which supervises the project, adheres to the official standpoint that “the cluster policy has been adopted in order to stimulate economic

growth and transform the industry into creative economy” [14, p. 20]. A task of innovation clusters of this territory is to initiate creative processes and, for this purpose, to form close unions of complementary companies, research organizations, and associate members like credit institutions and educational establishments.

Therefore, the “ideal” innovation clusters create conditions for attracting investment resources; they also promote the growth of business activity of entrepreneurial structures, the development of social, economic, information and integrated systems; this in turn, enhances the competitiveness of the national economy.

In this regard, we suggest a *step-by-step methodology for the creation and development of innovation clusters*, which represents an order of interrelated procedures that make it possible to create a cluster formation.

In our opinion, the step-by-step creation of innovation clusters should be based on the methodological approaches that provide for the reduction in organizational challenges in the sphere of clusters formation:

- *process approach* creates a basis for the structuring of technological processes and formation of the processes management system, which includes control over the execution of the processes and efficiency of their organization;
- *resource-based approach* is aimed at assessing and identifying the resources required for the efficient implementation of the functions of innovation clusters, and their capacity;
- *result-oriented approach* ensures the operation of a control mechanism that assesses the achievement of the goal of innovation cluster formation and specifies the direction of development; besides, this mechanism promotes the integration of all the structural elements of the cluster for the implementation of common strategic tasks;
- *innovation approach* facilitates the development of innovation processes and forms

the ability of the cluster to use resources and knowledge efficiently.

We propose to define several efficient conditions for the formation and development of “ideal” innovation clusters on the basis of the above methodological approaches: scientific potential, i.e. research institutes and centers, university and factory (industrial) science;

- institutional prerequisites that can be highlighted on the basis of the cluster approach – governmental support for the idea of establishing an innovation cluster, possibly in the framework of a high-priority sector;

- political prerequisites, which are manifested in the determination of the leadership to develop innovation activity as one of the strategic priorities of development;

- social prerequisites that are connected with social interaction within the cluster, as well as the availability of human resources;

- production prerequisites, namely, the level of innovativeness of region’s industry in general and that of individual enterprises constituting the cluster;

- economic prerequisites that are manifested in the presence of competitive enterprises capable of attracting additional investment and loan capital.

Therefore, the cluster structure of organizing innovation activity leads to the creation of innovation product. Such innovation is the product of joint activities of business entities, which will promote their dissemination through an interconnected network in the common regional economic space. Furthermore, a variety of different sources of technological knowledge and contacts facilitates the achievement of competitive advantages and becomes a prerequisite for innovation. Consolidation into an innovation cluster on the basis of vertically oriented integration forms a concentrated system

for the dissemination and adoption of new technologies, rather than just spontaneous concentration of various technological inventions.

The innovation cluster, as the most effective tool for enhancing competitiveness, is a synergetic mechanism of efforts undertaken by different organizations, industrial enterprises, research centers, government authorities, higher educational institutions and public organizations.

The system of relations between the participants of the innovation cluster is complex in its nature and should include the legal, organizational, economic, innovation, information and other mechanisms. Therefore, it is necessary to pay special attention to the harmonization of the cluster participants’ interests. In our opinion, the interests of an enterprise should be considered from the perspective of its profitable interaction with the subjects of external environment carried out permanently or during a certain period of time on a compulsory basis or at the enterprise’s own choice.

In this regard, the efficient conditions for the formation of innovation clusters should consist, first of all, in creating sustainable spatial framework of various structural cluster zones of priority (innovation) development, which could spread innovations to the extensive periphery of the country. Thus, “ideal” innovation clusters create conditions for attracting investment resources; they also promote the business activity of enterprises and entrepreneurs, the development of social, economic, information and integrated systems; this, in turn, enhances the competitiveness of national economy. This approach ensures the efficient transformation of inventions into innovations, and innovations – into competitive advantages of the cluster.

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