

Theoretical Approaches and Principles of Cluster Structures Formation

Nadezhda Alekseevna Neustroeva¹ & Svetlana Viktorovna Meshkova¹

¹ Perm Institute of Economics and Finance, Perm region, Perm city, Russian Federation

Correspondence: Nadezhda Alekseevna Neustroeva, Perm Institute of Economics and Finance, Perm region, 614068, Perm city, Bolshevitskaya street, 141, Russian Federation.

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Abstract

Relevance of the research subject is determined by an increasing role of production clusters in conditions of transition of the Russian economy to the innovative type of development that forms a basis of sustainable growth of any economic system, creates conditions for accumulation of scientific and technical potential, modernization of the industry and accelerated development of its most competitive industries.

The innovative economy represents the economy functioning on the basis of enterprise networks as innovative cooperation between the enterprises and the organizations mainly provides an exchange of new knowledge and technologies forms the investment and innovative environment. In this regard the research objective is development of theoretical approaches and principles of formation and development of cluster structures.

Keywords: cluster, cluster formation, cluster interaction, intra cluster integration, cluster approach

1. Introduction

Cluster approach to structuring of the economy, justification of strategies of the regional production policy and increase of competitiveness of economic systems is widely accepted in developed countries. As global experience shows, activation of innovative processes in the economy and, therefore, strengthening of competitive advantages of economic systems of all levels is provided immediately through substantial interaction of certain managing subjects (enterprises, firms, public authorities), i.e. through formation and functioning of production clusters of the innovative type.

Currently, the approach to the regional development, based on clusters, is getting recognition in Russia. In this regard, we consider it is necessary to analyze approaches to cluster definition with designation of its basic elements, to reveal necessary conditions and basic advantages of cluster interaction, to define principles of interaction of enterprises in a cluster system.

2. Materials and Methods

Works of outstanding economists on studying of the regional development issues and cluster strategies formed a theoretical and methodological basis of this research. The theoretical base of the cluster concept was put at the beginning of the XIX century in works on economy of agglomeration of Von Thunen (von Thünen, 1966) and his follower, (Weber, 1909). Cluster approach has the basis in works of A. Marshall and J. Schumpeter (Alfred, 1909; Schumpeter & Joseph, 1934; Tolenado, 1978, pp. 149-158; Soulie, 1989; Dahmen, 1950; Feldman & Audretsch, 1999, pp. 409-429; Afanasyev & Myasnikova, 2005, pp. 75-86; Tsikhan, 2003; Winters, 2014; Collart, 2014; Abidin, 2014; Lin, 2013; Cummings & Worley, 2014; Walras, 2013; Mäler & Maler, 2013; Barbier, 2013; Gwartney, 2014 etc.)

The methodical basis of work is formed by traditional methods including general scientific methods (dialectic, deduction and induction, analysis and synthesis) which helped to analyze approaches to a cluster concept, its essential features, and also economical and statistical methods (comparison, grouping, analysis) which helped to designate the major factors defining intra cluster interaction of firms to identify and group the principles of intra cluster interaction.

3. Results and Discussion

In the economy the concept "cluster" was for the first time introduced by the American economist Michael Porter

in 1990 who gives the following definition to a cluster: "The cluster is a group of geographically adjoining interdependent companies and related organizations operating in the particular sphere and being characterized with a shared activity and complementary to each other". (Porter, 2005). M. Porter paid attention to the fact that one or several firms, reaching competitiveness in the world market, extends the influence on the community: suppliers, consumers and competitors. In turn, progress of the community has positive impact on further growth of competitiveness of this company. As a result "cluster" is formed-the community of firms, closely related branches which are mutually promoting growth of competitiveness of each other.

A. A. Migranyan considers that "cluster" is a concentration of the most efficient and interdependent types of economic activity, i.e. set of interdependent groups, successfully competitive companies which form "the Golden Section" of the whole economic system of the state and provide competitive positions in the branch, national and world markets. A. A. Migranyan considers that the main principle of existence of a cluster is creation of complete system of production of high-quality end products by incorporation of all production, research, commercial, intermediary and other relations and productions which have any relation to the quality of an end product. (Migranyan, 2007)

From the point of view of T. V. Tsikhan, a cluster is a community of firms, closely related branches which are mutually promoting growth of competitiveness of each other. T. V. Tsikhan specifies that for the whole economy of the state clusters play a role of growth points of domestic market to which other organizations affiliate. Clusters can be presented on the regional level by restricted economic institutes, vertical production chains and industries. (Tsikhan, 2003)

M. Afanasyev and L. Myasnikova consider distribution of innovations across all the chain of value formation and a uniform logistic window for interaction with environment as the main thing in the structure of a cluster. (Afanasyev & Myasnikova, 2005, pp. 75-86).

M. V. Nikolaev and I. E. Egorova distinguish a cluster from existing earlier industrial complexes on appearance of synergetic effect. (Nikolaev & Egorova, 2006).

T. V. Mirolyubova defines a cluster as a network of independent companies (suppliers, producers, etc.) and the related organizations (educational institutions, state authorities, infrastructure companies), localized in the particular area and interconnected by means of a value-added chain, carrying out export of goods or services to consumers out of the region. (Mirolyubov, 2010, pp. 36-48).

T. Yu. Kovalyova defines a regional cluster as a group of territorially localized in the region interdependent enterprises, suppliers of resources, specialized services and technologies, research centers, institutes and other organizations making a value chain, operating in allied industries or spheres and strengthening competitive advantages of each other and a cluster at large. (Kovalyova, 2011, p. 31).

Having studied works of the modern scientists-theorists in detail it should be noted that each of the listed authors gives the own definition of a cluster. Multilateral interpretation of this concept allowed us to identify its common features: concentration of geographically adjoining and interdependent enterprises; synergetic effect from this interaction; community of made production; competition and cooperation. (Neustroyeva, 2013, pp. 114-125).

Therefore, having generalized above-mentioned concepts of a cluster, we identified its following essential features:

- Existence of the leading firms, capable to have an essential share in the domestic and foreign market, added with the specialized serving organizations;
- Concentration of participants of a cluster in the restricted territory representing unique advantages;
- Existence of the developed infrastructure providing a transfer of knowledge and technologies;
- Interaction of participants of a cluster among themselves for the purpose of production, competitive in the internal and external markets;
- Existence of the internal competition between participants of a cluster;
- Accelerated distribution of innovations due to developed network of information transfer;
- Stability of economic relations of the incorporated firms;
- Decrease in transactional expenses,
- Access to technologies, suppliers of qualified labor;
- Flexibility of the structure, lack of rigid formal restrictions and barriers interfering expansion and narrowing of

a cluster;

- Openness of a cluster as a system.

Selection of these approaches allowed to formulate the own definition of a cluster or cluster formation.

The cluster is a sustainable territorial and branch voluntary alliance of enterprises, various spheres of production and service sectors of the economy, directed to increase their competitiveness both on the internal and external markets. (Neustroyeva, 2013, pp. 114-125).

Clusters represent one of rhombus sides (allied and supporting branches), but it is better to consider them as display of interactions between all four sides (14). Thus each of sides represents a direct connection among themselves. This alliance allows clusters to influence competitive fighting by three ways: first, increasing of efficiency of incorporated firms and branches; secondly, increasing of ability to innovations and thus, increasing efficiency; and, thirdly, stimulating new businesses supporting innovations and expanding borders of a cluster. Many advantages of a cluster are based on the external economy or on overflowing of advantages through different firms and branches. (Many advantages of clusters belong also to divisions inside firms, such as departments of research and development, a manufacturing department). Thus, the cluster can be defined as a system of interdependent firms and organizations, which significance as whole exceeds the sum of constituents (synergetic effect).

By consideration of organizational mechanisms of intra cluster integration we will signify the major factors defining intra cluster interaction of firms:

Firstly, access to specialized factors of production and labor.

Determination of location in a cluster can provide exclusive or cheaper access to such specialized factors of production, as components, machine inventory, business services, the personnel, in comparison with remote localizations - vertical integration, the formal alliances with external structures or with "import" of production factors. Therefore, the cluster represents a spatial organizational form which on the internal substance can be more efficient concerning configuration of production factors - in case of availability of competitive local suppliers.

Secondly, access to the information. Broad knowledge of marketing, technologies, and also other specialized types of information is accumulated in a cluster, in firms and local organizations. Access to this information can be better organized and require smaller expenses for firms in a cluster, allowing them to work more efficiently and to come to the advanced performance level. A flow of the information between divisions of one company has similar influence. Nearness to each other, communications on deliveries and technologies, and also existence of continuous personal contacts and public relations facilitate moving of the information in clusters.

Thirdly, complementarity. The cluster promotes increase of efficiency not only by acquisition and adjustment of production factors, but also by providing complementarity development between activities of participants of a cluster.

Fourthly, access to organizations and public benefits. Clusters create many production factors which otherwise would be too expensive in the sphere of public or quasi-public goods/services.

Fifthly, motivation and efficiency measurement. Clusters allow solving or softening effects of organizational problems arising in more isolated geographical regions and in firms with larger vertical integration. Clusters increase the value of incentives in companies for achievement of more high efficiency for several reasons. First of all, due to competitive pressure.

Therefore, on the basis of 5 above-mentioned advantages of intercompany interaction inside a cluster, it is possible to say that clusters allow increasing efficiency of incorporated firms and branches, increasing a susceptibility to innovations and creating side conditions for development stimulating of new businesses.

In our opinion, associations of production enterprises, financial institutions, research centers, government authorities on the basis of voluntary interaction form additional benefits (access to specialized factors of production and labor, access to the information, complementarity, access to organizations and public benefits, stimulation and efficiency measurement) for each incorporated subject, eventually, facilitates increase of its competitiveness in the regional, interregional and global markets. (Neustroyeva, 2013, pp. 114-125).

In this regard it is necessary to define the principles by which clusters are formed.

In our classification the principles are grouped in three types: general, system and principles of intra cluster interaction. (Figure 1).

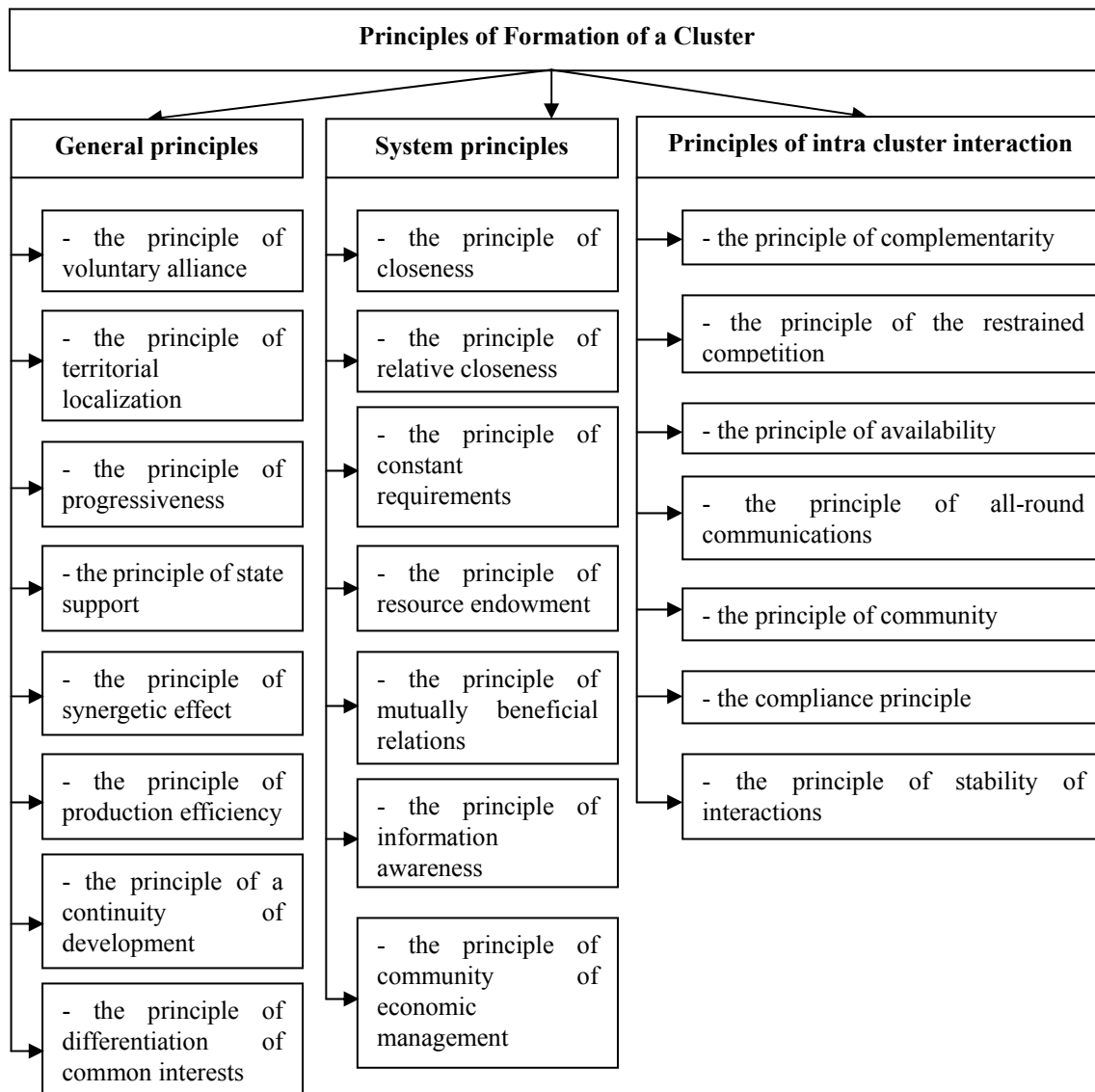


Figure 1. Principles of formation of a cluster

Let us consider the offered principles of formation of a cluster on the designated groups.

The first group includes the common principles:

- The principle of voluntary alliance is based on voluntary association of production enterprises, research centers, financial institutions, government authorities for achievement of the common goals directed on increase of competitiveness both of the enterprises, and a cluster as a whole;
- The principle of territorial localization means interaction of the geographically close located enterprises which are engaged in the related activity, gaining positive effects from such interaction;
- The principle of progressiveness means that one or several successful companies have positive impact on the community, providing progressive development of all elements of a cluster;
- The principle of state support assumes complex support by federal and regional authorities in creating favorable conditions for cluster development;
- The principle of synergetic effect shows that sustainable partnership of interdependent enterprises and organizations has a positive effect as whole exceeds the sum of constituents ;
- The principle of production efficiency assumes rational use of material, labor, financial resources, allowing to lower expenses, prime cost, to increase profitability, to improve quality of a finished product due to mutually beneficial relations of the enterprises of a cluster;

- The principle of a continuity of development characterizes ability of the enterprises to reach competitiveness at the continuous development, i.e. perfecting of the activity on the basis of consolidation of efforts of the enterprises in cluster system;
- The principle of differentiation of interests defines mutually beneficial relations between subjects of a cluster on the basis of the contacts related to interests of deliveries and acquisition, thus their own interests have to be the major motivating factor of every participant. The second group of the principles includes the system principles:
- The principle of closeness assumes that the flow directed on satisfaction of needs of the participant of a cluster closes on the incorporated enterprise;
- The principle of relative closeness means that along with flows in a cluster, resources can join the system from the environment for efficient implementation of projects in a cluster;
- The principle of constant requirements means that the incorporated enterprise has a constant need for some resource during all cycle of the existence;
- The principle of resource endowment defines that the incorporated enterprises providing resources are capable to satisfy demand for these resources in a cluster;
- The principle of mutually beneficial relations says that resources for participants in a cluster are delivered on preferential terms;
- The principle of information awareness assumes providing projects in a cluster with informational support, i.e. the information about occurring changes in production, various innovative processes has to be available to participants of a cluster;
- The principle of community of economic management defines availability of means of production necessary for implementation of complex projects, and also guarantee services of financial structures inside a cluster for providing with the fixed and current assets of the incorporated enterprises.

Therefore, all these principles allow the enterprises to unite in the integrated system, called a cluster. Informational, cash and other flows are easily found between the enterprises with improved relations. Intensity of use of flows demonstrates significance of communications in a cluster. Optimization of flows causes strengthening of interrelation and interdependence of the enterprises inside a cluster. Interaction under mutually beneficial conditions demonstrates longevity of such relation and reliability of partners. It is necessary to notice that interrelations between two enterprises of one cluster can be traced by means of flows, at the same time any of them interrelates others, and respectively communication between them will be realized in other directions. All participants of a cluster are in continuous interaction and they have to follow particular rules. These rules help to keep the advantages in a cluster, to make them available to all participants of the system. The fundamental principles regulating intra cluster relationship constitute the third group of the principles (Figure 1):

- The principle of complementarity: the chain of relations in a cluster has to promote achievement of the shortest term of manufacture and the least product cost and services of the incorporated enterprises;
- The principle of restrained competition: the enterprises of one branch included in one cluster, should not confront, and have mutually beneficial cooperation, satisfying requirements inside a cluster, and also outside requirements;
- The principle of availability: the cluster has to keep branch development by attracting new ideas for realization of internal projects, engaging new partners proposing more efficient solution of internal tasks;
- The principle of all-round communications: the incorporated organizations, not only have to care of their own development, searching of more favorable partners, but also to support horizontal communications inside a cluster, to carry out support of the projects aimed at the development of a cluster at large;
- The principle of community: relationship between various groups of companies should have cooperation agreements not only fixed on paper. Heads of the large incorporated organizations have to develop the common direction of cluster development, and, if possible, branches at large;
- The compliance principle: activity of the large enterprises of the industry has to correspond to the direction of a state policy of industrial support;
- The principle of stability of interactions: stability of a cluster is reached only through sustainable interrelations between its elements.

In our opinion, the principle of stability of interaction of the incorporated enterprises is the main thing as sustainable interactions characterize positive relationship in a cluster, providing its progressive development. Existence of such interrelations is the mandatory characteristic of a cluster. (Neustroyeva, 2013, pp. 114-125).

4. Conclusion

Results of this research allowed us to define a cluster as a complex of enterprises and their sustainable relationship united by the shared objective of branch development in the certain (local) region.

Therefore, a necessary condition of definition of a cluster is identification of sustainable interactions between economic agents, promoting growth of their competitiveness.

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