

High Knowledge Level for an Innovation Cluster Environment Formation in the Russian Federation

Galina Belyakova¹, Elina Stepanova^{1,2} and Evgeniy Zabuga³

¹Siberian Federal University, Krasnoyarsk, Russian Federation

²Krasnoyarsk State Agrarian University, Krasnoyarsk, Russian Federation

³Siberian Institute of Business, Management and Psychology, Krasnoyarsk, Russian Federation

belyakova.gya@mail.ru

elina.economissa@mail.ru

zews74@mail.ru

Abstract: A system for the evaluation the knowledge development level of cluster innovation environment in Russia is presented in this article. Building on concepts of the innovation environment, the author emphasizes the importance of human capital and knowledge development as key elements for the innovation of cluster environment formation. A complex system of interacting elements of an innovation environment providing innovation development of a socio-economic system in the interests of society and the individual is known as an innovation environment cluster. The main prerequisites for the emergence of an innovation environment are the availability of social connections and networks for the exchange of ideas, information and knowledge development. The article identifies the need for creating new specific knowledge to improve innovation cluster. To ensure the effective functioning of the cluster, you must have a coherent information infrastructure. In the management formation and development of innovation environment through the application of tools designed for cluster development, the cluster management company' work creates a particular mode of doing business, favourable institutional conditions and aims to achieve synergies. To evaluate the knowledge level of cluster innovation environment, basic indicators are needed. We believe that assessment of the state of a cluster's innovation environment must be preceded by the definition of measurable indicators as described in this article.

Keywords: knowledge development level, knowledge flow of innovation clusters, cluster innovation environment, clustering process, cluster development, Russian Federation

1. Introduction

In the modern economy of world countries, the role of knowledge as an essential resource for the development of socio-economic system is increasing (Ketels, 2009; Solvell, 2008). In the Russian Federation, the organization of the theory of knowledge management in market conditions began to form 2000. Economical changes, conducted by the country's leadership, objectively caused the need to develop the methodology and tools of knowledge management. The effectiveness of knowledge management largely depends on improving the quality and increasing the level of stability of the entire institutional environment - legal, regulatory, social and entrepreneurial (Kotov, 2012; concerning the business environment in the constituent entities of the Russian Federation). In recent years, particular attention has been paid to the development of innovation clusters in regions of Russia as sources of the formation and accumulation of specific knowledge (Porvatkinam, 2011). The main idea of a study of the functioning of Russian clusters is to find out the process of managing territorial innovation clusters and determining the necessity for creating conditions for their successful development. In order to answer such questions the paper is divided into 7 sections; in section 2, we present the literature review, in section 3, we present the Russian cluster setting, in section 4, we describe the methodology and the data, in section 5, we present the results, in section 6, we discuss the results and in the last section 7, we indicate the conclusions.

2. Literature review

In a modern economy knowledge has become a key resource (Shongwe, 2016). The importance of knowledge for competitive advantage understands academic and business organizations (Grant, 2015). Obviously, it can be noted, the most advantageous structure for knowledge creation, storage, application and transference is an innovative cluster (Shongwe, 2016). This form integrates business and academics as well as innovative infrastructure and government should support it (Pohjola, 2016).

A growing interest in the phenomenon of clustering has occurred since the 1990s last century almost in all developed and in some developing countries. The well-known cluster concept by Porter [Porter 1990,

1996,1998] developed all over the world, Freeman 1995, Rabellotti 1999, Giuliani 2002, and Malmberg 2002, 2003. This approach is applied in innovative policies, social-economic strategies in countries and in regions. The first country, which experienced the cluster concept, was USA (Silicon Valley), followed by Europe (Italian industrial districts). The successful cluster developments encouraged the governments in China, Mexico, India and Brasil and they also tried to introduce clustering to achieve international competitiveness.

Most of scholars researched the clustering process in different countries and regions, and described the results, based on an evaluation system, worked out by the Cluster Initiative Book (2011, 2012). We examined approaches to the cluster formation and discovered a literature gap concerning the start up for clustering conditions. Because environments are different due to economic, technological, geographic, political and legal conditions this becomes a problem to direct cluster initiative to in a proper way. The start up environment for cluster formation and development differs for innovative cluster firms, which work in the same sphere (such as IT, biotechnology, automobile, tourism) that caused the successes or failure of clustering process in these countries. We identified the main feature of the functioning of clusters in modern conditions, which implies that the nature of interactions leads to the superfast creation of new knowledge and innovative products in accordance with constantly changing demands of consumers. Due to the existing institutional, economic and branch features of economic systems, their innovative development and the formation of infrastructure support occurs at different rates and depends on environmental factors that promote or constrain the development of innovative systems (Lu Xingqi, Zhang Hongle; Smorodinskaya, (2012). The research question is how to explain the influence of the environment in innovative cluster formation and the role of knowledge cluster system in this process.

The localized knowledge in innovative clusters creates a specific atmosphere, where new ideas circulate from one company to other cluster participants, promoting collective innovation (Guiliani 2005). The cluster benefit depends mainly on geographical and social proximity to the cluster's organizations (Beccatinni, 1989; Asheim, 1994; Saxenain, 1994; Audretsh and Feldman, 1996; Maskell, 1999; Bellussi, 2000; Baptista, 2000). It should be noted; a special innovative environment is of great importance for cluster development (Kaiser,2016). Intra-cluster learning is determined as the basis for knowledge flows within the innovative clusters, in the territory bounded communities (Malmberg, 2001, 2002, 2003, Amin and Cohehned, 2004). This may be indicated as the degree of extra cluster openness (Cohen and Levintahtal, 1990) to defuse and exploit cluster knowledge (Guiliani, 2002). An intra cluster knowledge system which absorbs more knowledge (Coleman1990, Shrader, 1991; Lane 1998). Intra cluster firms' cooperation influences the innovative environment formation for local communities of personnel, who share special knowledge and develop a cluster knowledge system (Haas, 1992; Wenger and Shnyder, 2000; Lissoni, 2001, Chourides, 2016). Conditions for clustering require more specialization on value chain activities (Jarillo, 1995; Lazerson, 1995; Baptista and Swann, 1998). Therefore, the formation of the proximate environment for knowledge circulation should be important (Sterberg, 1995; Moore, 1997, Genet, 1997).

3. Russian cluster setting

The initial stage of the study was to assess the conditions and performance of Russian territorial innovation clusters. In the final stage, the necessity for creating an innovative cluster environment is determined in order to continuously improve the level of specialized knowledge within a particular cluster.

The process of the formation of territorial innovation clusters in the Russian Federation (RF) was started in 2012. The government was the initiator of this process, a call was announced for government financing of the innovative clusters development. For the first time in our country, the creation of a network of territorial production clusters that realized the competitive potential of territories was envisaged on the basis of the Concept for the Long-Term Socio-Economic Development of the Russian Federation, approved by Instruction of the Government of the Russian Federation of November 17, 2008 No. 1662-r (The concept of socio-economic development of the Russian Federation for the period up to 2020). In 2012, the "List of pilot programs for the development of innovative territorial clusters" was formed in Russia; in 2016 the list was further to 27 clusters. The creation of industrial clusters was provided in the Russian Federation Government Decree No. 779 of July 31, 2015 "On Industrial Clusters and Specialized Organizations of Industrial Clusters" (Decree of the Government of the Russian Federation No. 779 of May 31, 2015). The significance of the industrial clusters development was defined in the Russian Federation Government Decree No. 41 of January 28, 2016 "On Approval of Rules for Providing Subsidies to Industrial Clusters from the Federal Budget for Reimbursement of Part of Costs for Implementing Joint Cluster Industrial Production Projects for Import Substitution" for the industrial production of the cluster for import substitution (Decree of the Government of the Russian Federation No. 41 of January 28, 2016).

The purpose of creating an industrial cluster is to create a set of stakeholders in industry connected by relations in this area due to geographical proximity and functional dependence and located in the territory of one subject of the Russian Federation or the territories of several subjects of the Russian Federation producing industrial products (Reference materials on the creation of an industrial cluster). The participants of the industrial cluster are the subjects of activity in the sphere of industry who have concluded an agreement with the specialized organization of the industrial cluster in participation in the industrial activity of the industrial cluster.

Orientation of innovative development of clusters to world level became a priority direction of support from the Ministry of Economic Development of Russia. In this regard, on June 27, 2016, Order No. 400 was adopted "On the Priority Project of the Ministry of Economic Development of Russia "The Development of Innovative Clusters – Leaders of World-Level Investment Attractiveness" and on July 15, 2016, the methodological recommendations were developed for developing an innovative cluster development strategy - a member of the above-mentioned priority project (Decree of the Government of the Russian Federation of December 08, 2011, No. 2227-p 4).

The study of the results of economic development of cluster-based territories has led to the conclusion that the formation of clusters that react flexibly to changing market needs to allow regional economies to consistently deepen their specialization, accumulate certain knowledge and focus on new, more specific activities (Porter, 1996). The territories where clusters appear actively to attract investors, including foreign ones are sources of the formation and development of new knowledge (OECD Strategic Response).

The advantages of the cluster approach in managing the innovative development of the Russian Federation regions are the following:

Firstly, regional innovation-industrial clusters are based in the established sustainable system for the extension of new technologies, knowledge and products, the so-called technological network, which relies on a joint scientific base.

Secondly, enterprises of cluster have additional competitive advantages due to the ability to carry out internal specialization and standardization to minimize the costs of innovation implementation.

Thirdly, an important feature of innovation clusters is the presence in their structure of flexible entrepreneurial structures - small enterprises, which allow the formation of innovative points of economic growth in the region.

Fourthly, territorial innovation clusters are extremely important for the development of small businesses: they provide small firms with a high degree of specialization in servicing a specific entrepreneurial niche, as this facilitates access to capital of an industrial enterprise, and also actively exchanges ideas and transfers knowledge between specialists and businessmen (Belyakova, 2010).

3.1 Innovation cluster environment formation

The author of an innovative cluster environment considers the combination of these factors that influence the speed and effectiveness of the innovation process. To determine the possibilities of implementing the process of forming an innovative environment, the author considers it appropriate to specify the conditions that facilitate or constrain this process. This is presented in Table 1.

Table 1: Conditions affecting the formation of an innovative environment

Conditions conducive to the formation of an innovative environment	Conditions hindering the development of the innovation environment
High innovation activity of business	Low investment attractiveness of innovation due to long payback period and high risk
Scientific activity of participants in the innovation process	Insufficient level of demand for scientific research
High innovation potential	Lack of investment to implement innovation potential
Governmental support of innovation	Difficulties in the implementation of innovation development programmes due to a weak existing mechanism for stimulating innovation and insufficient funding
Governmental funding of innovation	The high cost of the commercialization process of innovation

Innovative infrastructure supporting innovation	Lack of coordination in the actions of government, business, science, education, financial organizations and society
Implementation of innovation policy	Low interest of subjects in the implementation of innovation
Developed information support system at all stages of innovation	Underdeveloped information links of innovation activity participants
Developed system of statistical accounting and monitoring of innovation results in the region, country	Inconsistency of statistical data and criteria for evaluating the effectiveness of innovation activities
Favourable conditions for the commercialization of scientific research	Lack of capitalization leverage and motivations for scientific research
Demand for innovation	Lack of innovative susceptibility on the part of stakeholders
High competitiveness of innovative products	High risks associated with innovation
Most favoured for innovative enterprises	Insufficient regulatory support defining benefits for innovative enterprises

Analysis of the functioning of territorial innovation clusters of the Russian Federation allowed us to identify the main characteristics of the innovation environment, based on the theory of cluster development, (Stepanova, E., Zabuga. E., 2016):

- fully mastered innovation field;
- a material value chain that unites the interests of the main participants in the innovation process: education, science, business and the government;
- the existing infrastructure basis for the support of science and innovation;
- Institutes for venture financing of innovative business, transfer and commercialization of technologies, combining all elements of the innovation infrastructure;
- centres for the generation of new knowledge from university, research and production teams;
- centres for attraction of scientific-technical, innovation and human potential;
- small innovative business;
- a business environment to support and stimulate innovation.

In the National Report on Innovation in Russia (2015, 2016), presented by the Ministry of Economic Development of the Russian Federation, OJSC Russian Venture Company (RVC) and the Open Government the innovation environment was represented as an innovation pyramid, Figure 1:

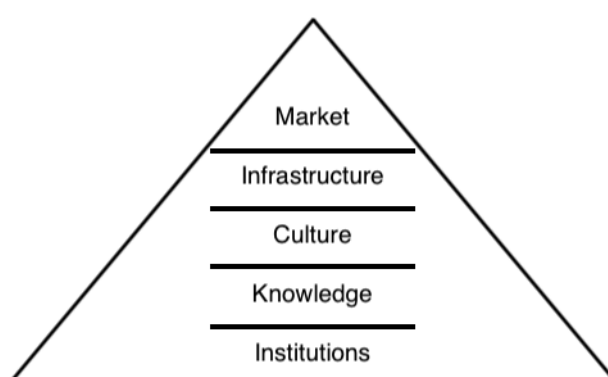


Figure 1: The Innovation Environment Pyramid

At the present stage of development, it is necessary to focus on the foundation of the pyramid: knowledge and institutions, as the most significant elements of the innovation environment.

A study of the development of functional areas and structural elements of regional innovation clusters since its adoption in 2012 concerning decisions the formation of a list of innovative territorial clusters and the development of government support measures for their development have shown that some clusters are

developing constructive interaction between cluster entities, which gradually accumulate knowledge and experience. However, this process is slowed down due to poor coordination of the activities of cluster members and weak communication flows between representatives of various functional areas, leading to a slowdown in the process of cooperation of cluster members and consequently a decrease in the speed of implementation of innovative projects (Stepanova, E. et al, 2015).

The main function of the innovation environment is to stimulate the generation of new knowledge and the production of innovative products by enhancing the communicative interaction of the participants in territorial innovation clusters. The interrelation of the functional elements of the innovation environment of a cluster influences the formation of its structure and is provided by the connecting processes of cluster communications. The dynamics of the implementation of innovative processes is determined by the continuity and speed of interaction of these functions (Lavrishcheva, 2013). Based on this, the interrelations and the order in parallel of the sequential inclusion of the selected functional areas in the implementation of innovation activities within the boundaries of the innovation cluster through connecting communication processes were determined.

4. Methodology and the data

As a result of the analysis, it was revealed that in 2013 the total volume of innovative products shipped from the own production of 25 innovative regional clusters amounted to 725 billion rubles and 720 billion rubles in 2014, major manufacturers were:

- Kama territorial innovation cluster - 219 billion rubles (30%) in 2013, 227 billion rubles (32%) in 2014;
- Shipbuilding innovation cluster - 131 billion rubles (18%) in 2013, in 2014 there was a decrease to 1.99 billion rubles, due to the modernization of production.

A group of 8 clusters was selected that produced innovative products from 15 to 40 billion rubles, which constituted from 2% to 6% of the total respectively, and the smallest volume of innovative products shipped from their own production rose to 15 billion rubles, from 0.5% to 6% falls on the remaining 15 clusters.

Federal funding for pilot innovation clusters amounted to 1.3 billion rubles in 2013 and increased to 2.5 billion rubles in 2014 (Shadrin, A.E., 2014). Despite the growth of investment in the development of regional innovation clusters, the effectiveness of their activities is also almost 2 times lower, also by twice as much. It is revealed that for 1 ruble of federal investment the volume of products shipped amounted to 558 rubles in 2013 and 288 rubles in 2014 as it is shown in the Table 2.

Table 2: Key indicators of the development of clusters of the Russian Federation, 2013-2014

№	Value of the indicator	Number of employees of organizations - participants (thousand people)		Number of high-performance jobs (units)		Average output per employee (million rubles per person per year)		The volume of investment costs of organizations participating in the cluster (billion rubles)		Total investment in the development of the cluster, (billion rubles)		Scope of work and projects in the field of research and development, (million rubles)		The volume of shipped innovative products of production, (billion rubles)	
		2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1-13	∑	533,3	535,6	9251	11803	23,7	26,25	215,9	268,4	258,7	266,4	58183	66487	403,9	441
14-25	∑	371,7	376,4	26008	27897	43,8	48,3	186,5	261,7	206,5	248,1	31409	30514	321,5	279,4
1-25	∑	905	912	35259	39700	67,5	74,6	402,4	530,1	465,2	514,5	89592	97001	725,4	720,4
	Min	2,4	2,4	22	52	0,6	0,7	0,2	0,3	0,1	0,2	163	120	2,6	1,9
	Max	367	367	9500	9800	16,4	18,4	145	193	174	181	16716	18387	219	227
	Average value	36,2	36,5	1410,4	1576	2,7	3	16,1	21,2	18,6	20,6	3583,7	3880	29	28,8

Evaluation of key indicators was carried out according to the developed author's methodology, which allows the identification of the rating of a particular cluster by key indicators. The algorithm for implementing the technique is as follows:

1. Defined indicators characterizing the conditions for the formation of an innovative environment in the following areas:

- conditions for building up the innovation potential of the cluster based on technological innovations;
- terms of financial support of the cluster;
- results of scientific and industrial cooperation of cluster members.

Data on the development of 25 pilot clusters for 2013-2014 are presented in Table 2 and 3.

2. The maximum and minimum values of key indicators, reflecting the degree of formation of individual elements of the innovation environment were determined; the average value of each indicator was calculated.

3. The level of attainability of the selected indicators was determined on the basis of a rating score.

The level of favourable conditions of the innovation environment was assessed as the degree to which the planned results are achieved when implementing targeted programmes for the innovation development of clusters (The Global Innovation Index 2012). The result of the calculation of generalizing indicators characterizes the conditions of the innovation environment, which are necessary for the implementation of selected areas of innovation development.

Table 3: Key indicators of research and production cooperation of clusters of the Russian Federation, 2013-2014, in millions.

№	Value of the indicator	The cost of patents, licenses for the use of inventions, industrial designs		The cost of know-how		The cost of research and development		The cost of machinery and equipment		The cost of raw materials, materials and components	
		2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1-13*	∑	1555,8	1628,8	85,6	149	3353,4	3694,8	3222	3464	8321,6	8885,1
14-25**	∑	128,0	148,5	8,3	9,9	532	635,3	190,3	224,6	4015	4655
1-25	∑	1683,8	1777,8	93,9	158,9	3885,4	4330,1	3412	3688	12337	13540
	Min	0,7	0,8	0,3	0,4	0,6	0,8	0,3	0,6	8,4	9,1
	Max	1000	1100	77	140	2450	2650	2296	2342	6860	7203
	Average value	67,4	71,1	3,8	6,4	155,4	173,2	136,5	147,5	493,5	541,6

Note to table lines:

*1-13 - Clusters supported from inter-budget subsidies in 2013,

**14-25 - Clusters supported by inter-budget subsidies in 2014.

On the basis of the obtained results, the level of innovative susceptibility of cluster subjects and the degree of readiness to produce and consume innovative products is determined. The obtained results can be viewed as indicators of the problems of cluster innovation development and as priority areas for improving the innovation environment.

The main goal of developing a system of indicators for assessing the state of the cluster innovation environment is to determine the level of development and the degree of diffusion of the specific knowledge of cluster members. To determine the level of development, key indicators developed for obtaining federal funding for the development of territorial innovation clusters are supplemented with special indicators for assessing the components, which, in our view, are most important for the formation of the cluster innovation environment.

In assessing the quality of the innovation environment of the cluster, the study examines the dependence of achieving synergy effect and developed communication system of cluster members, as indicators of assessing the state of the innovation environment of the cluster, which are important for increasing the level of knowledge within the cluster. There are presented in Table 4.

The study examines the dependence of the further dissemination of knowledge within the cluster on the degree of system development of internal communications and influencing the quality of the innovation environment. For a comprehensive and systematic assessment of the state of the innovation environment, it is recommended to supplement the developed system of indicators with the qualitative characteristics of the implementation of modern forms of communication in the innovation environment cluster.

Table 4: Indicators for assessing the state of the components of the innovation environment of the cluster, significant for increasing the level of knowledge within the cluster structure

Components of the innovation environment	Indicators, units
Science environment	<ul style="list-style-type: none"> - the number of scientists participating in the cluster, people; - the number of issued patents to cluster members, units; - the share of costs for research and development in the cost of production, million rubles; - knowledge intensity (the ratio of R & D costs to sales), million rubles; - the number of people employed in the field of science and high technologies, people; - budget financing of R & D cluster, million rubles; - the volume of foreign direct investment in R & D , million rubles; - availability of community centers, units
Cluster communications system	<ul style="list-style-type: none"> - degree of formation of the communication system,%; - speed of knowledge dissemination, hour; - intensity of interaction between cluster members, k; - amount of information transmitted between cluster members, kb; - the total amount of information transmitted within the cluster, kb; - availability of a communication platform for the implementation of modern forms of communication of cluster members, units
The degree of maturity of the innovation environment of the cluster (synergistic effect)	
The result of the cluster entities functioning in the innovation environment	<ul style="list-style-type: none"> - growth in the number of innovatively active enterprises in the cluster structure,%; - growth in the volume of innovative products of cluster members, including export-oriented,%; - growth of the share of innovations in the cluster,%; - growth of the share of cluster innovations in the regional economy,%; - growth of efficiency indicators of innovation-active enterprises (growth of profits, profitability, turnover, labour productivity, equipment renewal, etc.),%; - indicators of social utility of innovations (growth of incomes of the regional population, influence on the budgetary occupancy of the region, growth of the social security rating among the regions of the Russian Federation),%; - improvement of the quality of life and the amount of consumption of innovative products,%.

To build a system of interaction between cluster members based on a process of active communications and interconnections, analysis of flows between cluster subjects, it is necessary to specify the subject of the transfer. The variability of flows includes material (goods, capital, etc.) and immaterial (knowledge and information). The level of dissemination of knowledge in the cluster determines the basis for the implementation of the communication process in the territorial innovation cluster. The level of knowledge dissemination refers to the cumulative amount of data, information, know-how, and knowledge gained from internal sources acquired by the employees of the cluster. The main parameters characterizing the level of dissemination of knowledge in a cluster are the level of innovation of cluster members, the intensity of interaction and the level of personnel employment in innovative projects.

$$Z_{ij} = \frac{Y_i Y_j N_i N_j}{D_{ij}}, \text{ where}$$

Z_{ij} – level of knowledge dissemination

$Y_i Y_j$ – the level of innovation of the cluster members

$N_i N_j$ – staff employment in innovative projects

D_{ij} - interaction intensity between cluster members i and j

$$D_{ij} = \frac{V_{ij}}{\sum_{i,j=1}^n V_{ij}}, \text{ where}$$

D_{ij} - interaction intensity between cluster members i and j

V_{ij} - amount of information transferred from member i to member j

$\sum_{i,j=1}^n V_{ij}$ - the total amount of information transmitted within the cluster.

The intensity of interaction between cluster members is measured as the ratio of the amount of information transmitted from member i to member j (Internet, email, cellular communication) via existing communication channels to the general internal information exchange in the cluster (kilobytes).

5. Results

Successful experience in creating an ecosystem with favourable conditions for the innovation process is presented in the Innovation Center Skolkovo as a combination of the infrastructure of the territory of the Innovation Center Skolkovo and the mechanisms of interaction between people involved in the project, including through the use of this infrastructure defined in Federal Law No. 244 -FZ from August 23, 2010 (Federal Law No. 244-FZ of September 28, 2010,). After comparing the indicators characterizing the results of the functioning of the regional innovation clusters and the Innovation Center Skolkovo, the following results are obtained and presented in Table 5.

Table 5: Comparison of indicators for assessing the state of the components of the innovation environment of innovation structures

Indicator reflecting the level of the innovation environment development	Innovation Center Skolkovo	Average value by territorial innovation clusters	Relationship ratio Skolkovo / TIR
Number of members, residents	1147 residents	from 15 to 127	from 9 to 77
Number of jobs, units	13500	1576	8,5
Participants' revenue, billion rubles	43,6	28,8	1,5
The volume of investments, billion rubles	- private investment - 11.1; - grants - 10.6	20,6	1,1
Number of applications for registration of intellectual property rights, units	1288	No data	-
Number of patents, units	500	No data	-
The ratio of investment to the volume of innovative products shipped	498	288	1,7

A comparative analysis of indicators characterizing the final values of the functioning of innovative structures led to the conclusion that, despite the same funding conditions, the Innovation Center Skolkovo for innovative development outpaces territorial innovation clusters by 1.5 to 9 times. Therefore, it is necessary to pay special attention to the conditions of cluster innovation, to continuously monitor the state of the cluster innovation environment.

6. Discussion

The concept of "innovative environment of an innovative territorial cluster" is a new concept in an innovative economy and reveals the features of the functioning of territorial innovation clusters. Research carried out of

the development level of the innovative environment of innovative territorial clusters in the Russian Federation made it possible to identify and systematize specific characteristics associated with the specifics of the implementation of the innovation process in cluster structures. In addition to identify the features of the innovative environment in clusters of the Russian Federation depending on the core of the cluster: the scientific or industrial component. Nevertheless, the dependence of the innovative development of cluster structures on the level of special knowledge is insufficiently studied and requires further development of methods for determining the impact at a on high knowledge level for an innovation cluster environment formation in the Russian Federation.

7. Conclusion

Based on the results of the assessment of the state of the innovation environment of the cluster, measures to promote and stimulate the innovation activity of the cluster structure participants are being developed, tools for creating conditions for efficient innovation within the cluster are also being developed. Programmes are being introduced to form and develop functional areas, infrastructure, communication system and interaction of cluster members. In this regard, it should be noted that the innovation process is possible to implement if there is interest from the subjects of the innovation process, provided that well-established communication networks within the cluster will contribute to the cyclical nature of the innovation process.

Modern forms of communication at stages of the innovation process, allow the increase of specialized knowledge and the specification of the tasks of managing the communication flows of the cluster subjects in order to create an innovative cluster environment. Preliminary work should consist in the formation of a database of existing innovation enterprises, government innovation support bodies, funding institutions, innovation advisory bodies, scientific institutions, innovation consumer enterprises and other parties interested in innovation. At the following stage of the formation of the innovation environment of the cluster, the parameters for assessing the level of knowledge of the cluster members are established to determine further directions for the development of the innovation cluster. Further research on the development of clusters in Russia will be continued in the presence of open information on the results of the functioning of Russian clusters. The implementation of support measures creates favourable conditions for satisfying the innovative and economic interests of the participants in the innovation cluster and contributes to the growth of knowledge. The mature innovation environment creates the prerequisites for enhancing the innovation activity of the cluster entities, thereby realizing the direction of the priority development of territories put forward by the country's government. Accelerated innovative development of cluster-based territories is necessary to increase the competitiveness and economic influence of these regions and reduce economic dependence in the context of the growing influence of world economic processes on the development of countries.

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