

## Artículo de investigación

# Influence of cluster integration on innovation activity: evidence of Russian regions

Influencia de la integración de clusters en la actividad de innovación: evidencia de regiones rusas

Influência da integração de cluster na atividade de inovação: evidências de regiões russas

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## Abstract

The article studies regional integration and its innovative forms as well as the formation of innovative environment as an important condition for strengthening the competitive advantages of economy.

The importance of the article is stipulated by the need for conditions necessary to ensure progressive scientific, technological and socio-economic development of the regions in modern economic, political, technological, social and other trends. This situation becomes evident in the asymmetry of economic development of the territories as a result of inter-corporate interaction intensity and different types of business activity in them.

The purpose of this research is to identify the impact of cluster integration on the volume of innovative products, works and services. We solved following tasks: review results of the researchs dealing with interrelation of integration level and innovative activity at the regional level; ranking of regions in Privolzhsky Federal district of Russia according to the degree of integration and the volume of innovative production, works, and services; assessment of interrelation of cluster integration level and indicators of innovative processes. On the basis of evaluation of innovation activity, we divided the regions into the following groups: innovative-advanced, innovative-developed and innovative-developing.

## Resumen

El artículo estudia la integración regional y sus formas innovadoras, así como la formación de un ambiente innovador como una condición importante para fortalecer las ventajas competitivas de la economía.

La importancia del artículo está estipulada por la necesidad de las condiciones necesarias para asegurar el desarrollo científico, tecnológico y socioeconómico progresivo de las regiones en las tendencias económicas, políticas, tecnológicas, sociales y de otra índole. Esta situación se hace evidente en la asimetría del desarrollo económico de los territorios como resultado de la intensidad de interacción inter-corporativa y los diferentes tipos de actividad comercial en ellos.

El objetivo de esta investigación es identificar el impacto de la integración de clusters en el volumen de productos, obras y servicios innovadores. Resolvimos las siguientes tareas: revisar los resultados de las investigaciones relacionadas con la interrelación del nivel de integración y la actividad innovadora a nivel regional; clasificación de regiones en el distrito federal de Privolzhsky de Rusia según el grado de integración y el volumen de producción, obras y servicios innovadores; evaluación de la interrelación del nivel de integración de clusters e indicadores de procesos innovadores. Sobre la base de la evaluación de la actividad de

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The authors' hypothesis is based on the rationale for the development of mutually beneficial partnership in the regional economic systems, which in turn contributes to the stimulation of innovative processes in the sectoral and territorial directions. The formation and development of innovation clusters can determine the further vector of progressive innovative development of Russia as a whole.

The study was based on the methodology of cluster analysis and methods of empirical research.

The results of the research in the field of innovative processes can become a practical basis for the development and implementation of innovative development programs in the regions of Russia.

**Keywords:** cluster integration, high-tech production, innovative development, integration processes, regional economy.

innovación, dividimos las regiones en los siguientes grupos: innovadores-avanzados, innovadores-desarrollados e innovadores-en desarrollo.

La hipótesis de los autores se basa en la justificación para el desarrollo de una asociación mutuamente beneficiosa en los sistemas económicos regionales, que a su vez contribuye a la estimulación de procesos innovadores en las direcciones sectoriales y territoriales. La formación y el desarrollo de clusters de innovación pueden determinar el vector adicional del desarrollo innovador progresivo de Rusia en su conjunto.

El estudio se basó en la metodología del análisis de conglomerados y los métodos de investigación empírica.

Los resultados de la investigación en el campo de los procesos innovadores pueden convertirse en una base práctica para el desarrollo y la implementación de programas de desarrollo innovadores en las regiones de Rusia.

**Palabras claves:** integración de clusters, producción de alta tecnología, desarrollo innovador, procesos de integración, economía regional.

## Resumo

O artigo estuda a integração regional e suas formas inovadoras, bem como a formação de ambientes inovadores como condição importante para o fortalecimento das vantagens competitivas da economia.

A importância do artigo é estipulada pela necessidade de condições necessárias para assegurar o desenvolvimento científico, tecnológico e socioeconômico progressivo das regiões nas modernas tendências econômicas, políticas, tecnológicas, sociais e outras. Essa situação torna-se evidente na assimetria do desenvolvimento econômico dos territórios como resultado da intensidade da interação entre empresas e diferentes tipos de atividade empresarial neles.

O objetivo desta pesquisa é identificar o impacto da integração de cluster no volume de produtos, obras e serviços inovadores. Resolvemos acompanhar as tarefas: revisar os resultados das pesquisas que tratam da inter-relação do nível de integração e da atividade inovativa em nível regional; classificação das regiões em Privolzhsky Distrito Federal da Rússia de acordo com o grau de integração e o volume de produção inovadora, obras e serviços; avaliação da inter-relação do nível de integração de cluster e indicadores de processos inovadores. Com base na avaliação da atividade de inovação, dividimos as regiões nos seguintes grupos: inovador - avançado, inovador - desenvolvido e inovador - em desenvolvimento.

A hipótese dos autores é baseada na justificativa para o desenvolvimento de parcerias mutuamente benéficas nos sistemas econômicos regionais, o que, por sua vez, contribui para o estímulo de processos inovadores nas direções setoriais e territoriais. A formação e o desenvolvimento de clusters de inovação podem determinar o novo vetor do desenvolvimento inovador progressivo da Rússia como um todo. O estudo foi baseado na metodologia de análise de cluster e métodos de pesquisa empírica.

Os resultados da pesquisa no campo de processos inovadores podem se tornar uma base prática para o desenvolvimento e implementação de programas de desenvolvimento inovadores nas regiões da Rússia.

**Palavras-chave:** integração de cluster, produção de alta tecnologia, desenvolvimento inovador, processos de integração, economia regional.

## Introduction

Regions are important engines of economic development, therefore innovation must be considered at the regional level. Regional Innovation have become the focus of many academic studies and reports. Discuss several most interesting from them.

Research on regional development is centered on the spatial dimension of economic activity. The regional aspects proved important in shaping innovation and to use it efficiently. Audretsch D. and Aldridge T. showed that the production innovation have a spatial determination (Audretsch & Aldridge, 2009).

Innovative activity differences in Europe are rated by Regional Innovation Scoreboard 2017 (European Commission, 2017). In this document authors made important conclusions: innovation is not uniformly distributed across regions, they tends to be spatially concentrated, regions with similar innovation capacity have different economic growth patterns.

Paper (Lain-Tze Tee et al., 2014) examines the high role of finances in promoting innovation-related activity using panel data for seven East Asian countries.

There is a widespread consensus in academic debates that knowledge and innovation are eminently important for securing competitiveness, dynamic growth and prosperity of regional economies (Asheim, Grillitsch & Trippl, 2015). As showed Cooke P., good progress in regional innovation policy at regional level proceeds apace (Cooke, 2016).

The relationship between innovation intensity and economic indicators in the regions of Romania was proved by regression analysis and correlation in the paper (Dachin & Postoiu, 2015).

In paper (Navarro et al., 2008) depicts a typology of regions, capturing the diversity of regional innovation systems. Based on the results of cluster analyses, we identify seven types of regional innovation system where the 186 regions group together according to their specialization, technological and economic capacity, and performance.

Russia have an important in the global industrial production (Finlay, Turpen & Kellett, 2008), moreover it have the existing scientific potential (Simpach, 2013). Development of innovations in Russia till 2020 described in Strategy (Strategy innovative development of the Russian Federation, 2011).

The research becomes topical due to the need to realize this strategy and identification the effects of regional factors on innovation processes for more effective, rational and efficient cooperation production and science, contributing to the formation and development of the knowledge economy, the creation of an innovative platform for regional development.

The development of integration processes involves sustainable, mutually beneficial cooperation on priority scenarios: firstly, the search for harmonization of corporate interests of cluster subjects in the field of innovative development; secondly, a balanced regional cluster policy and some actions in the field of scientific, technological and socio-economic development of the territory.

Identification of cause-and-effect relationships and the impact of cluster development on innovation processes will allow to solve global challenges development in a timely manner regional growth points, but also those of the national economy as a whole.

Hypotheses about the relationship and impact of integration and innovation processes are quite common and have both working and scientific certainty. The justification of this scientific assumption mainly implies the following: first, the availability of the resources concentrated on a certain territory; secondly, sectoral and inter-sectoral interaction; thirdly, current and existing communications. Thus, regional effects have a significant impact on innovation processes.

The purpose of this research is to identify the impact of cluster integration on the volume of innovative products, works and services. This direction assumes the solution of the following priority tasks: review of theoretical standpoints and results of the research dealing with interrelation of integration level and innovative

activity at the regional level; ranking of regions according to the degree of integration and the volume of innovative production, works, and services; assessment of interrelation of cluster integration level and indicators of innovative processes.

### Theoretical background and methods of research

Recently, the influence of the following negative factors on Russian regional economic development has increased:

- 1) labour migration;
- 2) reduction of economic relations stability in the regions remote from the center in Russian economy and increase of fragmentary foreign trade operations in the border areas;
- 3) increase in the level of inter-regional differentiation;
- 4) introduction and tightening of economic sanctions against Russia which has a negative impact on foreign economic relations as a whole.

We believe that the processes of regional innovative development in Russia should be considered in relation to the production and technological type of specific areas taking into account their preferred transformations in future. On the one hand, it's stipulated by the high industrial specialization of the industrialized regions of Russia as well as fundamentally different needs for innovations (taking into account industry specifics and science intensity) (Head, Sukhovey & Nikulina, 2017). This approach makes it possible to implement the concept of creating a multi-level interregional innovation system in Russia where regions leading in the development of scientific and technical potential as well as contributing to the generation and development of innovations could play the role of a growth point in the innovative transformation of the economy and ensure the implementation of more balanced decisions on the priorities and specific features of regional innovation systems and their development. Recognizing the high differentiation of Russian regions in terms of innovative opportunities, we consider this fundamentally important for Russia (Tatarkin, 2008).

It should also be noted that the Russian economy is characterized by uneven regional development

which in turn is mainly due to structural problems — the imbalance between consumption and production (Gubanov, 2010). Glazyev S. Y., for example, connects this change in reproductive structure of the economy with technological changes in production and economic systems admitting that the discrepancy between them reduces the efficiency of management (Glazyev, 2011).

It becomes obvious that in order to develop proposals for addressing topical issues in the field of sustainable innovative regional development it is necessary to conduct a detailed analysis of innovations in regions and to identify both general and regional trends of innovative development.

Internationally, cluster analysis is often used for segmentation of regions. Kronthaler F. differentiated groups of German regions based on their economic potential (Kronthaler, 2005). Labudkova S., Bednarzhova P. and Valentova V. based on cluster analysis explored the relationship between levels of regional decentralization and economic imbalance in Europe (Labudkova, Bednarzhova & Valentova, 2016). Simpach O. structured some municipalities in the Czech Republic according to the level of their demographic development (Simpach, 2013). Mertlova L. and Prokop M. clustered the regions according to a set of macroeconomic indicators (Mertlova & Prokop, 2015; Shubat & Shmarova, 2017).

The development of innovative processes in an integrated environment contributes to the active economic development. Such trends in the transformation of business environment should be used as a resource for corporate structure and regional socio-economic policy development.

In recent years, there has been an increase of innovation activity in economic systems where organizational and functional tools do not change; however, the process of joint interaction is intensifying creating favorable conditions for the development of corporate structures and the economy of their territories (Pustynnikova, 2012).

According to Freeman C., global technology (General Purpose Technology) can be used in most sectors of the economy as well as in a variety of other activities (Freeman, 2003). Innovative development of economic systems has become a very important issue nowadays.

Studying the works of scientists it is worth noting, first of all, method developed by Kronthaler F. based on a hierarchical cluster analysis of factors (Kronthaler, 2005). Theoretical aspects of innovative development of economic systems are also discussed in the writings of Galbraith J. (Labudkova, Bednarzhova & Valentova, 2016), North D. (Douglas, 1997), Porter M. (Porter, 2005), Strickland A. and Thompson A. (Thompson & Strickland, 1998), Ketels C. (Ketels, 2018), Cooke I. and Myers P. (Cooke & Mayers 1996), Warner M. (Warner & Witzel, 2005). Tanaka H. (Tanaka, 2011) presented the strategy of competition confrontation based on integration development in the market hyperspace. Hamel G. and Pahalad K. developed a theory of economies of scale and progressive effect of growth (Hamel & Pahalad, 2002).

Theoretical and practical aspects of innovative processes in the regional economic system have also been thoroughly studied by Russian scientists: Gubanov S. (Gubanov, 2010), Golova I. (Head, Sukhovey & Nikulina, 2017), Shubat O. and Shmarova I. (Shubat & Shmarova, 2017), Glazyev S. (Glazyev, 2011), Gagarina G. et al. (Gagarina et al., 2017), Tatarkin A. (Tatarkin, 2008). It should be noted that despite numerous existing methods and mechanisms of innovation processes management, due to some trends in economic, technical and social development, methodological management tools have to be updated.

Solution of the tasks stimulating regional innovation processes must base on the account the influence of both external and internal factors faced by economic entities. Among key external factors influencing the innovative regional development the following ones are presented: uneven technological development of industries, climatic conditions, government regulation, logistics; the internal are as follows: natural resources, population density, and sustainable partnership. These factors determine the specifics of innovation processes and their directions.

To identify the main trends in innovative regional development, we analyzed the indicators of integration processes. The administrative territories of Privolzhsky Federal district have become the subjects of the study. This district

include such regions as: Bashkortostan Republic, Republic of Mari El, Republic of Mordovia, Republic of Tatarstan, Udmurtia Republic, Chuvash Republic, Perm territory, Kirov region, Nizhniy Novgorod region, Orenburg region, Penza region, Samara region, Saratov region, Ulyanovsk region.

In the research we used data from the Ministry of economic development of Russia (Ministry of economic development of Russia, 2018), as well as official statistical information (Federal state statistics service, 2018) for 2011-2017.

The study was based on the methodology of cluster analysis. In addition, were used methods such as analysis and synthesis, induction and deduction, generalization as well as methods of empirical research (observation, description, measurement, and comparison).

## Results and discussions

Since 2016 Russia has been implementing a support program for 25 pilot innovative territorial clusters (ITC) which contributes to the increase of regional economic development in the places of their location. According to the Russian Ministry of economic development, more than 95 000 high-performance job vacancies were created or upgraded at the enterprises participating in the clusters. The range of investments is significant; the total volume of investments in the development of clusters from extra-budgetary sources has exceeded 360 billion rubles, the total cost of cooperative research projects has amounted to 75 billion rubles.

The level of innovative enterprises in Privolzhsky Federal district in 2018 has amounted to 11.4%, while the volume of innovative products, works and services has amounted to 1029 bln rubles. According to data, presented in tables 1 and 2, the tendency of positive dynamics of the sold goods, works, and services of innovative type in all regions of Privolzhsky Federal district is evident. However, in these regions we observed differentiation in volume of innovative products and services. That is typical for the modern development of innovative activity (Eder, 2018).

Table 1. The volume of innovative goods, works, services in the context of regions of the Privolzhsky Federal district

Region	2011	2012	2013	2014	2015	2016	2017	Average value
Privolzhsky Federal district	546,0	781,9	950,6	1128,6	1179,5	1198,9	1418,3	1029,0
Bashkortostan Republic	44,7	58,3	62,2	74,7	111,9	139,3	122,3	97,6
Republic of Mari El	1,6	3,4	0,8	1,5	9,9	10,3	11,5	5,5
Republic of Mordovia	21	21,7	27,3	28,8	29,5	33,7	45,9	29,7
Republic of Tatarstan	161,2	196	272,6	322,3	338,1	373,2	391,2	293,5
Udmurtia Republic	8,8	10,5	19,6	15,9	43,0	17,3	85,2	28,6
Chuvash Republic	9,2	7,8	32,2	16,1	16,7	17,8	23,0	17,6
Perm territory	65,3	77,4	83,3	186,9	109,0	96,3	193,8	116,0
Kirov region	7,3	9,6	10,1	9,8	11,3	9,0	13,9	10,1
Nizhniy Novgorod region	76,5	153,2	152,0	172,7	215,7	185,8	223,5	168,5
Orenburg region	11,7	14,2	9,2	8,9	6,9	14,7	25,3	13,0
Penza region	3,7	7,1	12	9,5	8,2	12,4	15,3	9,7
Samara region	96,2	185,5	242,6	239,0	245,6	232,9	217,3	208,5
Saratov region	17,2	7,7	10,6	13,2	8,5	23,2	16,1	13,8
Ulyanovsk region	21,6	30,0	16,0	29,3	25,3	32,9	33,9	26,9

Table 2. The share of organizations implementing technological innovations in the total number of surveyed organizations by regions of the Privolzhsky Federal district

Region	2011	2012	2013	2014	2015	2016	2017	Average value
Russian Federation	7,9	8,9	9,1	8,9	8,8	8,3	7,3	8,5
Privolzhsky Federal district	10,2	11,2	10,8	10,4	10,4	9,5	8,4	10,1
Bashkortostan Republic	10,0	12,6	12,6	10,6	8,9	7,9	6,2	6,2
Republic of Mari El	6,9	6,7	7,9	7,0	6,2	7,5	4,6	4,6
Republic of Mordovia	9,1	11,0	12,1	16,0	16,9	14,9	12,4	12,4
Republic of Tatarstan	12,9	16,4	16,9	18,7	18,9	19,5	20,0	20
Udmurtia Republic	10,4	14,3	12,2	9,5	9,9	9,3	6,6	6,6
Chuvash Republic	13,7	13,8	20,1	17,5	22,6	22,7	23,1	23,1
Perm territory	19,3	12,7	12,9	10,2	9,8	9,4	7,1	7,1
Kirov region	5,6	7,0	7,0	7,6	8,3	8,3	8,2	8,2
Nizhniy Novgorod region	11,4	13,6	13,6	13,7	12,5	11,1	11,3	11,3
Orenburg region	12,5	13,3	10,0	10,3	11,0	10,1	6,1	6,1
Penza region	7,8	9,8	10,0	14,6	16,3	12,1	17,5	17,5
Samara region	10,8	8,5	5,7	5,0	5,3	4,7	3,6	3,6
Saratov region	5,4	5,2	6,6	5,4	6,5	5,4	4,0	4
Ulyanovsk region	6,1	6,4	5,1	6,4	4,4	4,3	3,2	3,2

Based on the Pareto Principle, according to data in tables 1 and 2, we distributed all regions of Privolzhsky Federal district by the criterion of innovation activity in three groups: innovative-advanced; innovative-developed and innovative-

developing. ABCXYZ innovative activity matrix of Privolzhsky Federal district and its regions (table 3) reflects the grouping of its regions according to their level of development.

Table 3. The matrix of innovative activity regions of the Privolzhsky Federal district

<b>Innovative-advanced</b>		
AX	AY	AZ
<p>* the volume of innovative benefits is more than 150 bRUB / year; * density of organizations, technology innovation, over 10%</p> <p>Republic of Tatarstan</p>	<p>* the volume of innovative benefits is more than 150 bRUB / year; * density of organizations, technology innovation 5-10%</p> <p style="text-align: center;">-</p>	<p>* the volume of innovative benefits is more than 150 bRUB / year; * density of organizations, technology innovation not higher than 5%</p> <p style="text-align: center;">Samara region Nizhniy Novgorod region</p>
<b>Innovative-developed</b>		
BX	BY	BZ
<p>* the volume of innovative benefits is more than 100 bRUB / year; * density of organizations, technology innovation, over 10%</p> <p>Perm territory</p>	<p>* the volume of innovative benefits is more than 100 bRUB / year; * density of organizations, technology innovation 5-10%</p> <p style="text-align: center;">Bashkortostan Republic</p>	<p>* the volume of innovative benefits is more than 100 bRUB / year; * density of organizations, technology innovation not higher than 5%</p>
<b>Innovative-developing</b>		
CX	CY	CZ
<p>* the volume of innovative benefits is not higher than 100 bRUB / year; * density of organizations, technology innovation, over 10%</p> <p>Republic of Mordovia; Chuvash Republic; Penza region</p>	<p>* the volume of innovative benefits is not higher than 100 bRUB / year; * density of organizations, technology innovation 5-10%</p> <p style="text-align: center;">Udmurtia Republic; Orenburg region; Kirov region</p>	<p>* the volume of innovative benefits is not higher than 100 bRUB / year; * density of organizations, technology innovation not higher than 5%</p> <p style="text-align: center;">Ulyanovsk region; Saratov region; Republic of Mari El</p>

The first group "A": AX, AY, AZ include regions that we named innovative-advanced. This group includes the Republic of Tatarstan, Samara and the Nizhny Novgorod regions. The average volume of production of innovative goods over the past 5 years has amounted to more than 150 bln rubles; the density of innovative organizations is up to 20%.

The second group "B": BX, BY, BZ include regions that we named innovative-developed. This group includes: Perm region and the Republic of Bashkortostan. The average volume of innovative products over the past 5 years ranged from 97.6 to 116 billion rubles; the

density of innovation organizations comes to 11.3%.

The third group "C": CX, SU, CZ include regions that we named innovative-developing. This group includes all other administrative territories of Privolzhsky Federal district: the Republics of Mari El, Mordovia, Udmurtiya, Chuvashiya; regions: Kirov, Orenburg, Penza, Saratov, Ulyanovsk. The average volume of innovative products in the last 5 years ranged there from 5.5 to 29.7 billion rubles; the density of innovative organizations ranged from 23.1% to 3.2%.

In order to identify the conditions and prospects of innovative development in Privolzhsky Federal

district it is necessary to consider some features of regional integration activity. All regions of

Privolzhsky Federal district were included in the selection (table 4).

Table 4. Analysis of integration development regions of the Privolzhsky Federal district

Region	Cluster industry	Number of industrial enterprises in cluster	Associations	Interregional cluster interaction	Stage of development of Special economic zone (SEZ)
Group AX					
Republic of Tatarstan	Engineering	132	+	+	
	Innovative production	213			I works, I creates
	Nanotechnologies	12			
Group AZ					
Samara region	Motor industry	59	+	+	
	Space	13	+	+	
	Medical and pharmaceutical technologies	55	-	-	I creates
Nizhniy Novgorod region	Mechanical, engineering instrumentation	33	+	+	-
Group BX					
Perm territory	Space	44			
	Optics and Photonics	34			I creates
Group BY					
Bashkortostan Republic	Petrochemical production	87	-	-	-
Group CX					
Republic of Mordovia	Instrument making	24	-	-	-
Chuvash Republic	Engineering	23	-	+	-
Penza region	IT	11	-	-	-
	Pharmacy	15	-	-	-
	Instrument making, microelectronics	11	-	-	-
Group CY					
Udmurtia Republic	Engineering	61	-	-	-
Orenburg region	-	-	-	-	-
Kirov region	-	-	-	-	-
Group CZ					
Ulyanovsk region	Aircraft building	37	-	-	I creates
Saratov region	Nuclear innovation	14	-	-	-
Republic of Mari El	-	-	-	-	-
Ulyanovsk region	-	-	-	+	-

According to the results presented in table 4, it can be concluded that the density and stability of inter-corporate as well as inter-cluster interaction has an impact on the volume of innovative products, works and services.

Thus, the results of our analysis have revealed the dependence of regional differentiation according to their innovation and integration development. This conclusion is consistent with the results of other studies. For example, according to the results obtained by a team of scientists (Gagarina et al., 2017), it was found that the regions of group A are characterized by an average level of development, the regions of group B are below the average level, the regions of group C have low level of development. We share the opinion on the existing significant reserves for the realization of existing potential in these regions and the possible transition from low to higher levels of economic development.

For example, three clusters with a total number of 357 participating organizations successfully operate in the Republic of Tatarstan, the leader in the production of innovative goods in Privolzhsky Federal district. In the industry format, these enterprises are developing not only on terms of inter-corporate interaction. Associative conditions of integration are also formed between industrial enterprises which affects the progressiveness of joint development. At the same time, there is a kind of inter-cluster cooperation with Samara and Moscow regions. It should be noted that at present it is the only region in Privolzhsky Federal district with a special economic zone.

Samara and Nizhny Novgorod regions demonstrate a lower level of high-tech products. In contrast to the leader, in these regions we can note a multiple difference in the density of cluster participants and the lack of a special economic zone here.

The group of innovative-developed regions includes Perm region and the Republic of Bashkiria where the number of participants in cluster systems is much smaller, and there is no associative and inter-cluster integration in comparison with innovative-advanced regions which negatively affects the volume of high-tech products, goods, works and services.

The fragmentariness (incompleteness) of clusters can be observed in the group of innovation-developing territories. In such regions

as Orenburg, Kirov, and Saratov regions and the Republic of Mari El there are currently neither active clusters, nor associative forms of cooperation which is reflected in the relatively low rates of innovative development.

In Penza region, 3 clusters have been formed. They currently begin their development including some steps towards inter-cluster interaction. It is obvious that this trend will further increase Gross regional product including the volume of innovative benefits.

In the Mordovian, Chuvash and Udmurt Republics there are machine-building and instrument-making clusters which in turn implies further development of associative forms of integration and inter-cluster interaction. Such trends can help to realize the potential in these regions. Integration trends in Ulyanovsk region are also worth mentioning. First of all, it is the only region in Privolzhsky Federal district with nuclear innovation and aircraft clusters. This circumstance, on the one hand, gives uniqueness but at the same time reduces the format of integration intra-cluster interaction. The development of associative forms of integration in this aspect is seen as one of the real conditions for the strategic development of innovative growth points.

In order to develop the fundamentals of innovative processes management in regional economic systems, the authors put forward the concept of management actions implementation for the development of integrated environment.

### **Conclusion and proposals**

The analysis of innovative processes development based on integration and its features allows us to draw the following conclusions.

First, the development of integration processes contributes to the stimulation of innovative trends in the economy which in turn creates the opportunity to obtain a synergetic effect as an additional resource for economic development. In turn, this trend ensures the spread of active innovative development impulses through the chains of interactions.

Secondly, the impact of motives initiating cooperation and limiting barriers increases through the development of integration processes. It was also revealed that in the format of cluster interaction the restrictions are

"smoothed" due to the regional interest in the development of innovative growth points which can become impulses of economic development of the region. This conclusion will make it possible to substantiate the expediency of associative-cluster economic systems development.

Third, the results of the research showed that innovation processes in the regions of Privolzhsky Federal district are developing unevenly. In accordance with this, the regions were differentiated by groups: innovative-advanced; innovative-developed and innovative-developing. On the basis of interaction analysis between the enterprises of the mentioned groups, the dependence of innovative development on density of participants as well as forms of integration interaction was revealed. For example, on the territory of the Republic of Tatarstan, the leader of innovative development in Privolzhsky Federal district, there are various forms of integration: corporate, inter-corporate, cluster, including interregional, which ensures the successful economic and innovative development of enterprises of the Republic and corresponds to the strategy of innovative development of the region.

The results of the analysis allow us to form a group of regions with similar typification which in turn will serve as a justification for the development and implementation of methodological apparatus for managing innovation processes in the regional economy.

Thus, the analysis of innovative development in Privolzhsky Federal district allowed us to justify the feasibility of measures aimed at stimulating innovative processes on the basis of the development of associative-cluster integrated environment.

As a proposal to create favorable conditions for the development of integration promoting innovation processes in the region, we suggested management mechanism involving basic aspects.

The first aspect determines the criteria for the formation of participants in economic system. For example, during the formation of the association, its subjects are focused on more dense information interaction, certification, licensing, etc. Cluster form of integration provides for the active participation of local governments which in turn contributes to obtaining advisory support, surety.

The second aspect establishes the type of integration, we may say that associative integration contributes to the development of mutually beneficial inter-corporate partnership between enterprises of the same industry, for example, logistics unions, mining association and others. It should be noted that cluster integration contributes to the development of inter-corporate relations, both industry and inter-industry, thereby contributing to the availability of the necessary benefits for an integrated and balanced development, flexible response to market trends.

The third aspect is in coordination of tasks and interests between subjects of the integrated environment and creates stability of interaction. Thus, it should be noted that in cluster format social and economic partnership is possible, thereby coordination of tasks can promote distribution of innovative development impulses.

Innovative, investment, and fiscal aspects of integration in the associative format involve the implementation of industry and corporate development interests while cluster conditions saturate the integration of financial resources with consulting support, reducing administrative barriers, thus creating more favorable innovative conditions for development, both for the enterprises and for the region as a whole.

The above-mentioned ways for the creation of an integrated environment will provide interregional associative-cluster interaction which is an important condition for the development of innovations in the future. This is confirmed by the theoretical knowledge of economic theory. According to P. Samuelson, the stability of organizational relations between economic entities contributes significantly to the better use of existing resources in future (Samuelson & Nordhaus, 2006).

On the basis of the study and economic justification of new activities of enterprises in the region, the development of technological innovation in industry areas of Privolzhsky Federal district, it becomes obvious that as a result of increasing the density of subjects integrated into cluster and associative systems and the activity of interregional cooperation, the amount of innovative benefits produced during the five-year horizon of calculation will increase. The regions of the innovative-developing group will move to the innovative-developed group, which generally characterizes the strengthening

of Privilzhzsky Federal district and its competitive advantages.

In our opinion, these proposals can serve as a methodological basis for the implementation of the state innovation policy for Russian Government and authorities in the regions. Further development of the research is connected with the study of the peculiarities of innovations in different types of economic activity.

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