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Trends and Promising Models Forming Industrial Clusters in the Russian Federation*

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Abstract. The purpose for the research is to develop and substantiate the models forming regional industrial clusters amid modern Russian economy. The article presents performance indicators of economic space clustering in Russian regions, identifies the main stages and prospects for generating of the "fourth wave" of clustering. The study formulates the quantitative approach to identifying regional industrial clusters and their further parameterization in the framework of a comprehensive multi-level clustering model of economic space of the region. In contrast to similar studies, the research focuses on trends in the formation of innovative multi-cluster units which integrate cluster initiatives for the development of high-tech industrial production. The scientific novelty is presented by the model of inter-sector interaction between current regional industrial clusters, as well as the author's model of perspective development of cluster initiatives amid innovation-driven economy. The article presents results of analyzing the correlation between sectoral specialization of regional economic systems and processes of cluster formation in Russia based on the calculation of localization index of aggregate economic activities and industrial production sectors. The example of clusters such as microelectronics, instrumentation engineering and information technology focuses on the organizational aspects of the formation of regional industrial clusters. Based on the values of the Herfindahl-Hirschman index and concentration ratios, the authors developed scientifically new models of organizational development for clusters such as microelectronics, instrumentation engineering and information technology. The contribution to the Russian cluster

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theory lies in highlighting major trends and patterns of clustering of Russian regions, which revealed that successful cluster initiatives combine a developed innovation-driven core, a substantial industrial framework and a significant number of participants representing small and medium forms of innovation-driven entrepreneurship. There is a promising conclusion for further research about possible synthesis of organizational forms of economic development of clusters and territorial industrial complexes with the aim of realizing the potential of regions with developed territorial industrial complexes and large industrial enterprises. Analysis of industrial and organizational aspects of cluster development in Russian regions has helped conclude that cluster support under government programs remains relevant. The research data will be useful for improving the existing regional socio-economic development strategies and sectoral programs of production clustering.

Key words: industrial clusters, innovation-driven multi-clusters, clustering models, industrial aspects, production localization.

Introduction. In modern Russian conditions the formation and development of regional industrial clusters remains the main area of raising the competitiveness of the national economy. The issues of practical implementation of the cluster concept of regional development are made relevant due to the need for accelerated implementation of the policy of import substitution and expansion of high-tech product output. The best solution to these issues is possible relying on existing clusters and individual large enterprises outside the clusters. A key feature the author's model of innovative multi-cluster is the possibility of synthesis of organizational forms of economic development of regional industrial clusters and territorial-industrial complexes with the aim of minimizing negative impacts and weaknesses of the implementation of the traditional cluster concept.

Research methodology. Economic science has developed a number of conceptual approaches to the implementation of the regional cluster policy. Yet the development of a comprehensive approach for quantitative modeling of key aspects of cluster development remains relevant. Problems of territorial industrial clusters in the EU countries are monitored by the European Cluster Observatory. In the USA, the main scientific school on issues of cluster policy is represented by Institute for Strategy and Competitiveness at Harvard business school. The scientific schools whose approaches were used in analysis of issues of the clustering processes regulation and innovative development of economic systems in Russian regions include the Russian Cluster Observatory at National Research University Higher School of Economics, M.V. Lomonosov Moscow State University, Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences. Alternative methodological approaches [1, 2, 5, 6, 10, 12, 16] mainly focus on constructing organizational cluster schemes and abstract graphical modeling, or refer to some quantitative aspects of the clusters. These approaches include the basic organizational cluster model by Ö. Sölvell [20], the cluster model by E. Feser based on balance of supply and demand [17], the institutional cluster model by Ch.Ketels and G. Linqvist [18]. Russian economic literature practically does not consider

Table 1. Areas of integration of innovative and industrial clusters into multi-cluster formations amid innovation economy*

Innovation clusters developing breakthrough technology of the following technological order	**Clusters of innovation technology and means of production initiating multiplier effects**	**Clusters of high-tech products mass-producing innovation technology**
Clusters of new composite and polymer materials	Clusters of additive technology and digital simulation facilities	Clusters of heavy and medium mechanical engineering
Clusters of sensoric and mechabiotronics	Clusters of robotic technology	Clusters of precision engineering
Clusters of quantum communication and cryptography	Clusters of new communication technology	Clusters of personal security systems
Clusters of new and portable energy sources	Clusters of distributed power generation technology	Clusters of power-efficient light engineering
Clusters of genomics and synthetic biology	Clusters of biopharmaceutics and biomedicine technology	Clusters of personalized medicine
Clusters of nuclear physics research	Clusters of radiation technology	Clusters of nuclear mechanical engineering
Clusters of nanotechnology	Radioelectronic clusters	Clusters of microelectronics and tool engineering
Clusters of photonics	Clusters of laser and fiber optics technology	Clusters of industrial and medical equipment
Clusters neurotechnology	Clusters of virtual and alternate reality technology	Clusters of artificial components of conscious and psyche
Clusters of artificial intelligence and Big Data Clusters artificial intelligence and Big Data	Clusters of block chain systems	Clusters of IT, decentralized financial systems
	Clusters of unmanned sea transport, driverless motor vehicles	Clusters of aerospace technology, shipbuilding clusters, automobile clusters
Innovative environmental clusters	Clusters of environment protection and recovery	Wood industry clusters and clusters of mineral resource management
	Agrotechnological clusters	Clusters of personal food production and delivery
	Clusters of intelligent systems of water supply and disposal	Clusters of drinking water production and treatment

* Compiled from: Areas of implementation of National technology Initiatives (NTI). Available at: http://asi.ru/nti/

modern trends of cluster formation with mixed sectoral specialization and territorial clusters associations [7, 8, 15, 19].

The reviewed model of clustering of the economic space of Russian regions is based on the dialectical law of the negation of the negation: the policy of cluster development replaces the previous cluster concept [2] but in practice it uses the established industrial and infrastructure base. This negation of the negation contributes to institutional synthesis which is one of the conceptual foundations of models of formation and development of regional industrial clusters, developing based on cluster conglomeration. In the framework of the author's concept of development of an integrated model of clustering of the regional economy, industrial clusters are considered as a fundamental segment of innovative multi-clusters whose development is considered as one of the areas of differentiation of development priorities of mixed economic systems in Russian regions. Innovative and industrial formed during the implementation of state programs can be considered as part of the author's model of gradual integration of three cluster levels presented in *Table 1* into the multi-cluster.

Research methodology. The research includes analysis of cluster initiatives implemented in the framework of the following state programs:

– support for clusters included in "List of pilot development programs for innovative territorial clusters" (Ministry of Economic Development of the Russian Federation);

– support for clusters included in the "List of industrial clusters" (Ministry of Industry and Trade of the Russian Federation);

– support for clusters from the Center for Cluster Development in the framework of the Program of Ministry of Economic Development to support small and medium enterprises (Ministry of Economic Development of the Russian Federation).

We also analyzed innovation and industrial clusters included in the register of the Russian Cluster Observatory, National Research University Higher School of Economics [14]. The Index of Production Localization (I_L) is taken as a criterion for specialization of the regional economic system in certain types of economic activities. Given the fact that, in contrast to regional production complexes, clusters are characterized by production localization and its institutional de-concentration, we justify the use of Herfindahl–Hirschman Index (HHI) traditionally used to assess the degree of production monopolization within a particular industry [4, 9]. Special attention in identifying objective prerequisites for the formation of regional industrial clusters is given to economic activity concentration ratio (CR) which is calculated as the sum of market shares of three (for a number of industries – four) major economic agents of the territory.

It should be noted that the use of values of the above indicators is not a sustainable and only approach to managerial decision-making about supporting cluster initiatives at the regional level. The author's methodology complements the existing approaches to assessing the effectiveness of cluster development; its application requires detailed analysis of characteristics of the socio-economic development of a specific territory. The advantage of using these indicators is the ability to generate a complex of cluster development patterns to select the best strategy for economic clustering for each specific area, as well as differentiate clusters from regional production complexes and quasi-clusters.

Based on data from the Federal State Statistics Service of the Russian Federation for 2014, we calculated the values of localization index by Russian constituent entities. Analysis of the relations between sectoral specialization of regional economic systems and processes of innovation and industrial cluster formation in Russia was carried out for consolidated types of economic activity and industrial production [11, 13]. The choice of consolidated economic activities and industrial production for analyzing the relations between sectoral specialization of regional economic systems and the processes of innovation multi-cluster formation stems from to the following reasons. The main reason for this choice is the economic essence of innovation multi-clusters representing economic systems integrating production in related types of economic activity. Moreover, modern Russian conditions are characterized by clusters integrating traditionally unrelated economic activities. The choice of 2014 as the period for calculating the

values of production localization index based on official statistics is based on the following considerations. In 2014–2015, here was the highest number of cluster initiatives for the whole implementation period of the state policy of cluster development in Russia. As of 2014, we can also talk about the beginning of full implementation of projects of the "third wave" of formation of pilot innovation clusters as relatively new forms of economic development.

Research results. Analysis of successful initiatives in formation of clusters in Russian regions has showed trends in the development of multi-cluster formations in modern Russian conditions. *Figure 1* presents a model of intersectoral interaction of operating regional

Table 2. Dynamics of cluster formation in Russia*

Years	Number of established clusters, units	Number of participant organizations in 2016 (units) in clusters created in the relevant period	Number of employees in 2016 (people) in clusters created in the relevant period
1999–2007	1	66	20,838
2008	1	11	2,532
2009	4	125	35,130
2010	7	178	68,955
2011	4	48	33,175
2012	19	970	558,553
2013	11	295	129,407
2014	27	656	231,661
2015	23	599	161,488
2016	4	71	25,925
Total	101	3,019	1,267,664

* Compiled from: List of clusters of the Russian Cluster Observatory at National Research University Higher School of Economics. Available at: http://clusters.monocore.ru/list

Table 3. Dynamics of the number of Russian regions successfully implementing cluster initiatives*

Years	Number of regions implementing cluster initiatives		
	Total in the given period (units)	Including those implementing for the first time (units)	Total number of regions implementing cluster initiatives since 1999 (units)
1999–2007	1	1	1
2008	1	1	2
2009	4	2	4
2010	5	3	7
2011	4	2	9
2012	16	15	26
2013	10	6	32
2014	17	8	40
2015	16	7	47
2016	4	0	47

* Compiled from: List of clusters of the Russian Cluster Observatory at National Research University Higher School of Economics. Available at: http://clusters.monocore.ru/list

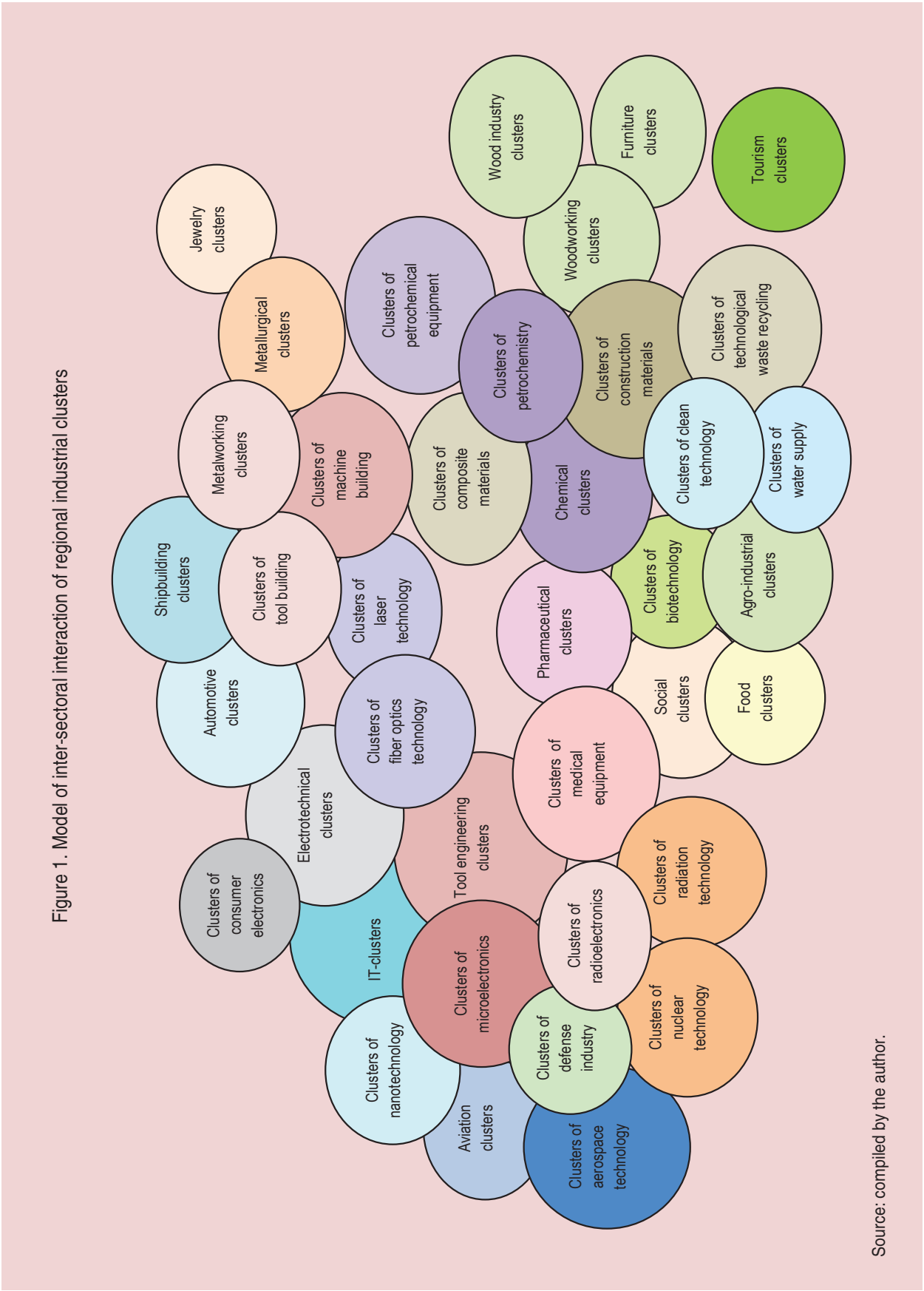
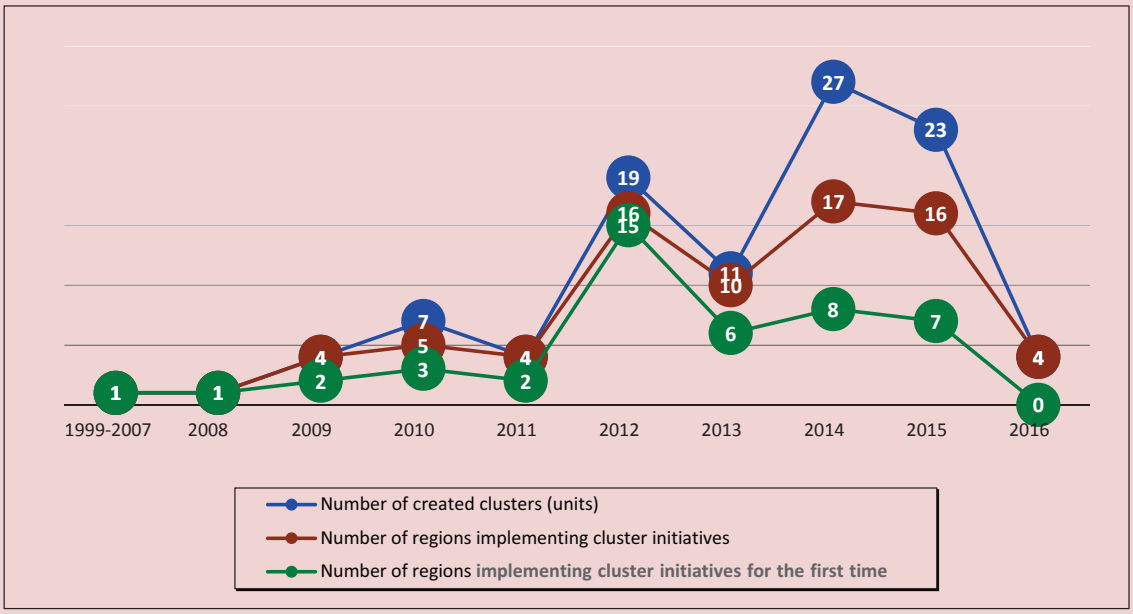


Figure 1. Model of inter-sectoral interaction of regional industrial clusters

Source: compiled by the author.

Figure 2. Waves of clustering of economy of Russian regions



Source: compiled by the author based on data of Table 2, Table 3.

industrial clusters. Clusters integrating production in related economic activities became widespread; we also identified clusters integrating traditionally unrelated economic activities (Innovation cluster for Information and biopharmaceutical technology in the Novosibirsk Oblast, Innovative territorial cluster "Pharmaceutics, medical equipment and information technology in the Tomsk Oblast", Territorial Innovation cluster of aircraft and shipbuilding in Khabarovsk Krai, etc.) [14].

This combination of industries within cluster projects demonstrates the willingness of executive authorities in Russian constituent entities to strengthen potential clusters though multiplier and synergy effects. Dynamics of cluster formation in Russian regions are presented in *Table 2*. *Table 3* demonstrates dynamics of the number of Russian regions effectively implementing cluster initiatives.

Accordingly, there are three "clustering waves" of the economic space of Russian regions: the first is the period from 2009 to 2011, the second – 2011–2013, and the third – 2013–2016. The waves of clustering are presented in *Figure 2* as an overlay of data from tables 2 and 3.

When analyzing the dynamics of the number of Russian regions effectively implementing cluster initiatives the following criteria were used:

– compliance with the requirements established by the government of the Russian Federation No. 779 "On industrial clusters and specialized associations of industrial clusters", dated 31.07.2015 (the number and composition of cluster participants, industrial output used by other cluster participants; technological and educational infrastructure; labor productivity and the number of highly productive workplaces);

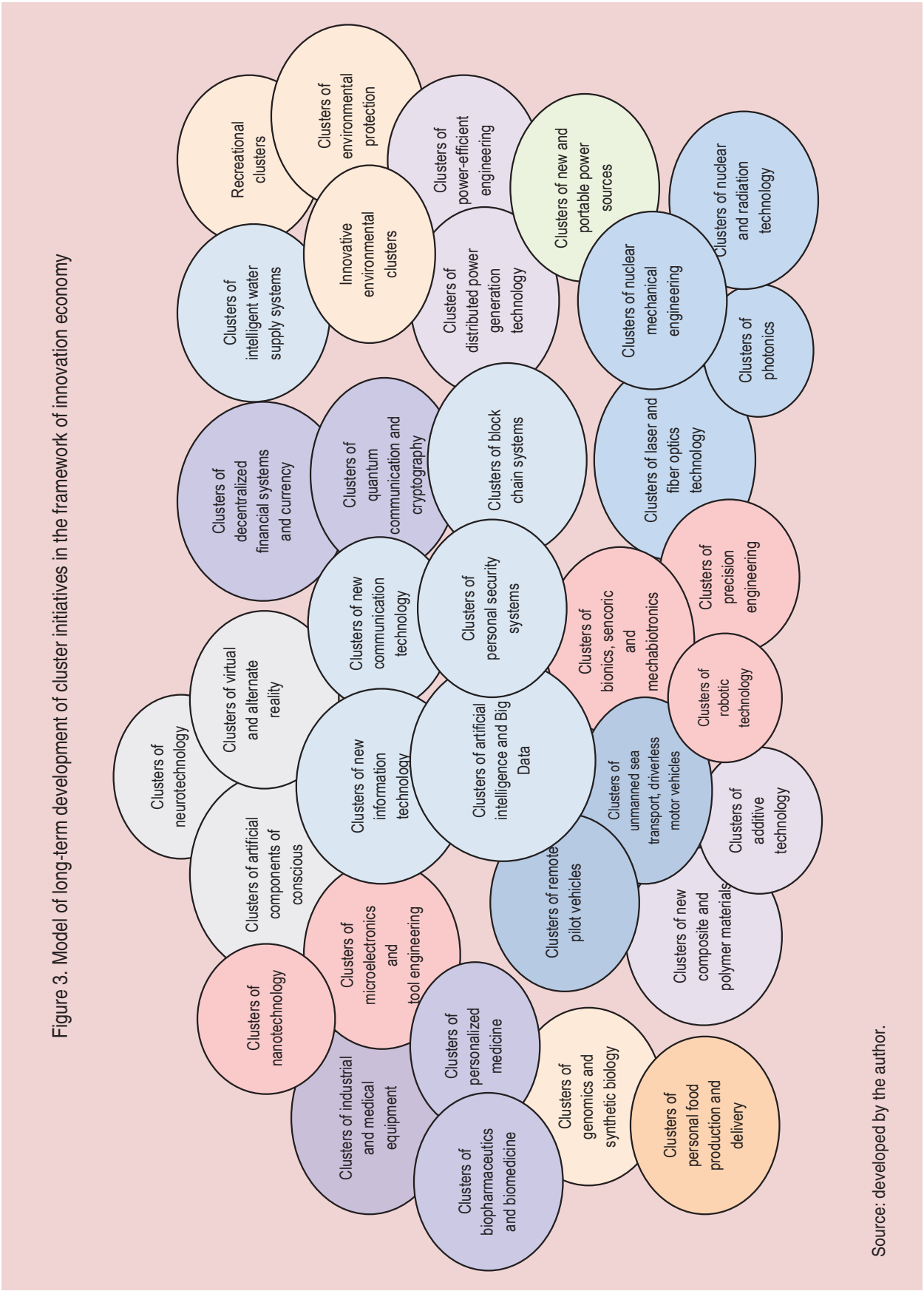


Figure 3. Model of long-term development of cluster initiatives in the framework of innovation economy

Source: developed by the author.

– the procedure for competitive selection for government cluster development program support;

– assessment of the level of cluster development provided by the Russian Cluster Observatory [14].

Accordingly, the key objective of the research is the development and parameterization of the organizational model of cluster development able to become a factor in the "fourth clustering wave" generation in Russian regions. However, lack of implementation of tools of the cluster policy at the level of Russia's constituent entities in the development of strategies and programs for regional development hinders the optimal use of the potential of innovation infrastructure facilities. Addressing the issues of economic development and modernization of old industrial economic systems in Russian regions makes relevant the objective of practical implementation of the model of prospective development of cluster initiatives presented in *Figure 3* in the framework of the innovation economy.

Table 4. Organizational aspects of cluster formation in microelectronics, tool engineering and information technology (2016)*

Cluster	RF constituent entity	HHI	CR_3	CR_4
Cluster of radioelectronics in the Voronezh Oblast	Voronezh Oblast	1721	0.61	0.69
Cluster "Voronezh electrical engineering"		1828	0.63	0.75
IT cluster	Perm Krai	2094	0.73	0.82
Innovative territorial cluster of fiber optics technology"Photonics"		1384	0.54	0.70
Zarechenskii cluster of technology integration (CTI)	Penza Oblast	2981	0.78	0.89
Penza tool engineering cluster "Security"		1709	0.63	0.73
Innovation technology cluster "Southern constellation"	Rostov Oblast	2603	0.84	0.90
Innovative territorial cluster of civil marine engineering "Marine systems"		3302	0.89	0.93
The cluster of information and communication technology (ICT cluster) in the Rostov Oblast		1734	0.61	0.77
Innovation territorial cluster "Zelenograd»	Moscow	1064	0.53	0.60
The cluster of high-tech components and systems in the Omsk Oblast	Omsk Oblast	1452	0.58	0.68
Scientific and industrial cluster of tool engineering and electronics on the Oryol Oblast	Oryol Oblast	1666	0.61	0.74
Development of IT, electronics, tool engineering, communications and infotelecommunications	Saint Petersburg	283	0.21	0.25
Power-efficient light engineering and intelligent light control systems	Republic of Mordovia	1637	0.64	0.74
Innovation cluster of information and biopharmaceutical technology in the Novosibirsk Oblast	Novosibirsk Oblast	1034	0.47	0.54
The IT cluster in the Vologda Oblast	Vologda Oblast	1636	0.62	0.70
The IT cluster in the Novgorod Oblast	Novgorod Oblast	6497	0.87	0.88
The IT cluster in the Republic of Tatarstan	Republic of Tatarstan	4103	0.74	0.76

* Compiled from: List of clusters of the Russian Cluster Observatory at National Research University Higher School of Economics. Available at: http://clusters.monocore.ru/list

The author identifies two innovative multi-clusters integrating adjacent clusters of microelectronics, tool engineering and information and communication technology within the borders of the region: the Innovative multi-cluster of the Penza Oblast, the Innovative multi-cluster of the Rostov Oblast. It is also necessary to highlight the Innovative cluster of information and biopharmaceutical technology of the Novosibirsk Oblast which is a multi-cluster formation of an inter-sectoral type. The Moscow and Leningrad oblasts are characterized by the formation of multi-cluster formations on a cross-sectoral and territorial basis, which unites high-tech industries established in the framework of regional production complexes and technology cities. Trends and promising models of formation of regional industrial clusters in Russia are reviewed on the example of the economic systems of regions which formed clusters specializing in information technology, microelectronics, tool engineering, optics and photonics. *Table 4* presents the characteristics of these clusters.

We selected areas of region's economic specialization which, from the point of view of the proposed concept of innovative multi-cluster development, should influence the processes of formation and development of clusters of microelectronics, engineering and IT from the list of integrated economic activities and branches of industry; the values of production localization index are presented in *Table 5*.

Table 5. Values of production localization index of consolidated types of economic activities and industries in Russia's constituent entities with created clusters of microelectronics, tool engineering and information technology (2014)*

Russia's constituent entity	Agriculture, hunting and forest management	Manufacturing	Food production	Wood processing	Manufacture of machinery, transport vehicles and equipment	Manufacture of electrical, electronic and optical equipment
Penza Oblast	2.43	1.21	2.37	1.31	0.93	2.47
Novosibirsk Oblast	1.24	0.74	1.95	0.92	1.1	2.02
Rostov Oblast	2.5	1.01	1.49	0.15	1.52	0.68
Moscow	0.45	1.16	1.67	1.46	1.1	1.11
Saint Petersburg	1.33	1.39	1.69	2	1.77	1.72
Omsk Oblast	1.98	2.09	0.64	0.15	0.15	0.54
Voronezh Oblast	3.17	0.78	2.47	0.15	0.95	2.3
Perm Krai	0.62	1.74	0.33	1.08	0.78	0.91
Vologda Oblast	0.95	1.9	0.51	4.08	0.34	0.07
Novgorod Oblast	1.55	1.94	1.52	6.77	0.52	0.75
Republic of Tatarstan	1.21	1.04	0.65	0.38	1.54	0.7
Oryol Oblast	3.31	1.05	2.47	0.23	1.19	1.67
Republic of Mordovia	2.45	1.29	2.52	1.15	0.61	3.09

* Compiled from: Calculation of production localization indices based on data from the Federal State Statistics Service of the Russian Federation. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139918730234

Low values of index of localization of production of electrical, electronic and optical equipment for the regions under review is attributed to the following factors:

– focus of IT clusters in the Novgorod and Vologda oblasts on innovation-technological support of processes of forming timber industry clusters);

– focus of the cluster of high-tech components and systems in the Omsk Oblast on manufacturing in general;

– focus of the IT cluster in the Republic of Tatarstan on high-tech production in general, in particular: manufacture of machinery, transport vehicles and equipment, petrochemical production, etc.

The analysis of the relations between sectoral specialization of regional economic systems and processes of cluster formation in microelectronics, tool engineering and IT in Russia has helped propose a model of cluster development in the industry. Accordingly, the organizational aspect of the economic clustering model in Russian regions based on forming the clusters of microelectronics, tool engineering and IT is presented in *Table 6*.

The obtained parameters of the clustering model are based on the following data. According to the Russian Cluster Observatory, among the clusters under review, the Innovative cluster of information and biopharmaceutical technology in the Novosibirsk Oblast (60 organizations, 12,869 employees) and the cluster "Development of IT, electronics, tool engineering, communications and infotelecommunications in Saint Petersburg" are at a high level of information development (66 organizations, 20,838 employees). The Innovation territorial cluster of fiber optical technology "Photonics" (34 organizations, 15,762 employees), Innovation territorial cluster "Zelenograd" (48 organizations, 7,772 employees), the IT cluster in the Vologda Oblast (31 organizations, 6,182 employees), and the cluster "power-efficient light engineering and intelligent light control system" (24 organizations, 9,866 employees) are at the mid level of organizational development. Accordingly, HHI and concentration ratio values for these clusters are presented in Table 4. Other reviewed clusters are at the initial level of organizational development.

Table 6. Organizational aspect of economic clustering in Russian regions based on forming clusters of microelectronics, tool engineering and IT*

Economic clustering model parameters	Level of cluster organizational development		
	Low	Medium	High
1. Number of participant organizations (units)	10< … <25	25< … <50	>50
2. Number of employees (people)	>500	>5,000	>10,000
3. Herfindahl-Hirschman index (HHI)	>1,800	<1,800	<1,000
4. Economic activity concentration ratio CR_3	<0.90	<0.60	<0.50
5. Economic activity concentration ratio CR_4	<0.95	<0.75	<0.60
* Calculated from data from Table 4.			

Table 7. Model of organizational development of clusters of microelectronics, tool engineering and IT*

Number of participant organizations in the cluster, units	Herfindahl-Hirschman index (HHI)and economic activity concentration ratio (CR_3, CR_4) values		
	HH I> 1,800, CR_3 < 0.90, CR_4 < 0.95	HHI < 1,800, CR_3 < 0.60, CR_4 < 0.75	HHI < 1,000, CR_3 < 0.50, CR_4 < 0.60
10–25	The cluster formed based on the typical software complex. Priority: development of small and medium innovative entrepreneurship.	The cluster with a distinct core. Priority: development of small and medium innovative entrepreneurship.	The cluster with a developed competitive environment. Priority: development of the innovative infrastructure.
25–50	The cluster formed based on TLC. Priority: formation of growth points of industrial production.	The cluster with a distinct core. Priority: development of the innovative infrastructure.	The cluster with a developed competitive environment. Priority: development of the innovative infrastructure.
>50	The cluster formed based on the typical software complex. Priority: formation of growth points of industrial production.	The cluster with a distinct core. Priority: development of the innovative cluster core.	The cluster with a developed competitive environment. The development of the institutional environment of the cluster.

* Compiled from data from Table 6.

Table 8. Sectoral aspect of the economic clustering model in Russian regions based on formation of clusters of microelectronics, tool engineering and IT*

Type of economic activity	Values of industrial production localization index in the framework of types of economic activity		
	Minimum	Threshold	Recommended
1. Manufacture of electrical, electronic and optical equipment	**0.05**	**0.5**	**>1.5**
2. Manufacturing in general	**0.7**	**1**	**>1.5**
3. Manufacture of machinery, transport vehicles and equipment	0.1	0.5	>1
4. Agriculture, hunting and forest management, food production	0.25	1	>1.8
5. Manufacture of wood and wood products	0.1	1	>2

* Calculated by the author based on data from Table 5.

Systematization of the findings is presented in the form of models of organizational development of clusters of microelectronics, tool engineering and IT in *Table 7*. The models of organizational development of clusters of microelectronics, tool engineering and IT are based on the need to combine the "core" cluster of large enterprises and the institutional development environment of small and medium enterprises, which is evaluated based on parameters presented in Table 6.

The sectoral aspects of the economic clustering model in Russian regions for clusters of microelectronics, tool engineering and IT are presented in *Table 8*. The minimum values of the localization index are calculated based on lowest values of the localization index presented in Table 5. The lower boundary of the group of "medium" regions with index values below average is used as threshold values of the localization index. The recommended value is calculated as the lower boundary of the group

of regions with localization index values above average for this type of economic activity.

Accordingly, for the reviewed clusters of microelectronics, tool engineering and IT the value of index of localization of production of electric, electronic and optical equipment, and manufacturing in general are a key criterion for determining the potential of the region's economic system for forming multi-cluster formations.

The values of industrial production localization index in the framework of related types of economic activity also serve as criteria for determining the type of territorial economic systems with the potential to form this type of clusters. Systematization of the findings is presented in the form of models of clustering of economic systems in Russian regions based on formation and development of clusters of microelectronics, tool engineering and IT in *Table 9*.

Conclusion. Analysis of values of production localization indices in regions with created clusters has helped conclude that high values of production localization index is a factor in successful development of cluster initiatives. It is necessary to stress that the efficiency of the cluster policy is determined by production localization in key cluster industries in the framework of both cluster's key activity and consolidated types of activities and consolidated types of industrial production. However, as noted, the high value of localization index is not a crucial success factor in the formation of innovation clusters developing technology of the next technological order.

Table 9. Models of clustering of economic systems in Russian regions based on formation and development of clusters of microelectronics, tool engineering and IT*

Value of localization index of adjacent types of economic activity	Level of cluster's (multi-cluster's) organizational development		
	Initial	Medium	High
Recommended	Innovation multi-cluster (cluster of high-tech products and new technology as a point of innovative growth of cluster agglomeration	Innovation multi-cluster (innovation cluster as a center for innovation transformation of the territory's economic system)	Innovation multi-cluster (innovation cluster as a center for innovative transformation of the territory's economic system)
Threshold	Innovation multi-cluster (cluster of high-tech products and new technology as an innovative core of conglomerate of potential clusters)	Innovation multi-cluster (innovation cluster as a center of integration of the conglomerate of potential clusters)	Innovation multi-cluster (innovative cluster as a scientific and technological core of the integration centre of the conglomerate of potential clusters)
Minimum	Cluster of high-tech products and innovation technology	Innovation cluster developing breakthrough technology of the next technological order	Innovation multi-cluster (innovation cluster as a center of integration of the conglomerate of potential clusters)

* Compiled from data from Table 8.

This trend is resulting from the fact that innovation clusters form a technological core of the economic space modernization in the region as a whole.

The clusters, being mostly providers of innovation technology, new materials and means of production, shape the institutional environment for streaming successful management practices.

Therefore, an additional criterion for differentiating clusters from regional production complexes is their development in region's non-traditional economic activities, the focus on both large enterprises and small and medium forms of innovative entrepreneurship.

The feature of development of clusters of microelectronics, tool engineering and IT is an opportunity to implement cluster initiatives beyond the industrial framework of large clusters. The research highlights areas of clustering in Russian regions, whose interaction with clusters of microelectronics, tool engineering and IT has the potential to develop innovation multi-clusters to implement the multiplier effects in the framework of regional economic systems. The identifies areas of economic systems clustering in Russian regions are: nuclear and radiation technology, medical industry, biopharmaceutical technology, aviation and aerospace industry, manufacture of machinery and equipment, new materials, car manufacturing and production of car components.

The author's approach to modeling the processes of industrial clusters formation complements the existing concepts of cluster development based on the relations between parameters of organizational cluster development and localization of related economic activities. Objective limitations of the proposed approach include a quantitative approach to identifying criteria for cluster development, which is rather formal and automatic. The debatable nature of the findings is also explained by the fact that a cluster is a relatively new form of territorial production management for the Russian economy. The obtained results serve as a framework for further study of the problems of regional industrial cluster modeling including spatial modeling based on methods of geostatistics.

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