

# CLUSTER POLICY IN THE RUSSIAN FEDERATION: A CASE STUDY OF INDUSTRIAL CLUSTERS

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**ABSTRACT:** The article describes cluster policy in the Russian Federation regarding industrial clusters. In the first part, the authors explain the definitions of basic concepts related to clusters that are used in Russia, the features of cluster policy in the light of European experiences, and bring closer the Russian literature on the subject. In the second part, they distinguish and describe five stages of cluster policy in Russia. In the third part, they present basic quantitative data describing clusters in Russia, including their spatial diversification, the number of entities creating clusters, employment, etc. A particular role of the state in creating clusters and subsequent cluster policy programs is described, paying attention to their low efficiency.

**KEY WORDS:** Russia, clusters, industrial clusters, clustering, cluster policy, regions of the Russian Federation, federal districts of the Russian Federation

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## Introduction

The example of many countries shows that the shaping and development of clusters is an effective instrument not only in increasing the efficiency of the activities of the companies within the cluster but also of the regional policy. In Russian literature, a cluster is understood as a group of mutually related companies producing ready-made and complementary products and specialised services concentrated in a certain region (Gorkin 2013). Yet, as the same author notes, in recent years this notion has been increasingly used to mark territorial complexes of any specialisation and different hierarchical levels (hence such terms as 'industrial cluster', 'intellectual cluster', 'harbour cluster', etc.). Therefore, at the

beginning it should be noted that the article only deals with industrial clusters and the cluster policy concerning them<sup>1</sup>. An accompanying term is clustering (clustering processes), i.e. activities aimed at creating clusters, which can be defined as a set of actions undertaken by the state and social units in order to associate various enterprises in clusters to establish network collaboration between them. This definition particularly relates to the Russian Federation economy, because in this country the development of clusters is impossible without state participation. The spatial structure of Russia's economy has been shaped

<sup>1</sup> Whenever the term 'cluster' is used in the article, it is understood as an industrial cluster, unless it is otherwise indicated.

for many decades. Intensive industrialisation and central planning in the Soviet times shaped Territorial and Production Complexes. However, this took place in the absence of a free market, and sometimes without taking into account the needs of local communities (Maryński 1987). After the collapse of the USSR, market mechanisms and the establishment of companies or their groups in the free market conditions were rather unknown and extremely poorly developed. This justified the state aid in the creation and development of clusters, at the level of both federal and regional authorities. For these reasons, cluster policy began to develop in Russia. This term (cluster policy) is understood as a complex of activities focusing on: 1) the formation of conditions (including the business environment, competition and infrastructure development) for the development of clusters; 2) support for cluster initiatives<sup>2</sup>. The implementation of cluster policy is focused on the following tasks: 1) promoting the competitiveness of enterprises and organisations which are part of territorial clusters; 2) development of innovative, industrial, transport, energy, residential and social infrastructure of territorial clusters; 3) assistance in attracting investment to a cluster territory; 4) development of a system of professional and continuing education; 5) development of small and medium-sized enterprises; 6) creation, development and replication of effective mechanisms of the public-private partnership; 7) development of international scientific, technical and production cooperation (*Karta klasterow Rosii...*).

Clustering processes and cluster policy exist in economies of various types and usually testify to the higher levels of economic and organisational development of the country. However, national economic determinants and traditions can give these processes specific features, hence the question of how clustering works in the territory of the Russian Federation. Therefore, the purpose of this article is: (1) identification of the characteristic features of cluster policy concerning industrial clusters in Russia (especially compared to European models); (2) discussion of changes

in cluster policy in Russia and distinguishing its stages; (3) quantitative characteristics of industrial clusters operating in Russia. The spatial range includes the Russian Federation in the administrative division of the first level (entities of the Russian Federation) or the federal districts<sup>3</sup>. The distinguished phases go back to the times of the existence of the Soviet Union, while the statistical data refer mainly to the state at the end of 2017 (for selected data for 2008–2017).

## Literature review

The concept of a cluster was introduced and developed in literature by Porter (1990, 2001). Research was also conducted by Saxenian (1994), Gordon, McCann (2000), Swann (1998), Power (2011), and others. Publishing the concept of clusters coincided with the fall of the communist system in Central and Eastern Europe, which intensified the disintegration processes in these countries, including production processes. It was only the strengthening of market mechanisms and the revival of economies of these countries that resulted in an abundance of publications regarding the appearance of clusters and cluster initiatives. Examples include works by Brodzicki, Kuczevska (2012); Dutkowski (2005); Stryjakiewicz, Dyba (2014). Some authors focused their research on creative and innovative clusters, which corresponded to a popular reflection on the knowledge-based economy. One can mention here research by Kovacs et al. (2011); Szultka (2012); Środa-Murawska, Szymańska

<sup>2</sup> Cluster initiatives are the joint organised efforts of firms, government, educational and research organisations aimed at increasing the growth and competitiveness of a particular cluster (*Karta klasterow Rosii...*).

<sup>3</sup> Entities of the Russian Federation (in other words: federal entities of Russia or entities of the Federation) are constitutional units of the administrative division of Russia. The constitution lists the following entities: republics, countries, regions, cities of federal importance, autonomous regions, autonomous districts. These entities have their own power structures: administration head, parliament, constitutional court, two representatives in the Federation Council (the upper house of the Russian parliament). This division in literature is commonly called the regional division of Russia. The federal districts group the Federation's entities and have no power in the constitution of the Russian Federation. Therefore, they do not constitute the administrative division of the country. They were established by the decree of the President of Russia in May 2000. They are headed by governors elected who report directly to the President.

(2013); Bialic-Davendra et al. (2013, 2014, 2016); Markova (2014). The flow of knowledge within clusters was studied, among others, by Dyba (2016a, 2016b, 2017).

Despite regression of industrial geography in Russia, an increased number of scientific articles on the history of formation and the specificity of the development of clusters and cluster initiatives in the RF regions have been observed in recent years. In addition to publications of a text-book nature (e.g. Selischeva 2016; Gorlov 2013), there have been works by scholars from the Higher School of Economics (HSE) in Moscow (НИУ Высшая Школа Экономики; Philipenko 2003, 2004, 2009; Abashkin 2010; Abashkin et al. 2012, 2013), including experts of the Russian Cluster Observatory of the Institute for Statistical Studies and Economics of Knowledge – Российской кластерной обсерватории Института статистических исследований и экономики знаний НИУ ВШЭ; *Klasternaya polityka...*), researchers from the Location Council of the Manufacturing Forces of the Russian Federation – Совет по размещению производительных сил РФ (Kotilko, Farkov 2017), from the Institute of Economics of the Ural Branch of the Russian Academy of Sciences – Институт Экономики Уральского отделения РАН (Lavrikova et al. 2007; Romanova, Lavrikova 2008), experts from the Industrial and Commercial Chamber of the Russian Federation – Торгово-промышленной палаты Российской Федерации (Podkomitet po razvitiyu...), Research Centre and Science Statistics – Центра Исследований и статистики науки (Gudkov, Kol'cov 2011), Institute of Economics and Organisation of Industrial Production of the Siberian Branch of the Russian Academy of Sciences – Институт экономики и организации промышленного производства Сибирского отделения РАН (Lizunov 2012), as well as scientists from different Russian universities (Buyanova, Dimitrieva 2012; Mantaeva, Kurkudinova 2012; Tarasenko 2013, 2015). Another research is conducted at the Institute of Regional Innovation Systems in St. Petersburg (Институт региональных инновационных систем), which measures the effectiveness of clusters by the value of education and evaluation of their competitiveness (Institut...).

In Russian studies analysing the cluster policy, three priority areas can be distinguished: (1)

theoretical aspects of creating and developing clusters and cluster initiatives; 2) a problem of evaluating efficiency of a cluster and particular economic entities being its part; 3) mechanisms and instruments of the state's support of the cluster entities.

In his works, Kucenko (2012a, 2012b) considers the main directions of the state's cluster policy. He takes up the following issues: a combination of evolutionary and constructive trends in creating clusters, shaping the state's cluster policy, differences and relationships between the cluster policy and the industrial policy, the place and role of the state in the process of activation and development of clusters.

In Mironova and Kardashova's work (2010), mechanisms stimulating cluster creation are analysed. Advantages of organisation of production in clusters and types of cluster policy in developed countries are shown. Characteristics of a modern cluster policy in the Russian Federation and recommendations to implement a cluster approach in the country's economic policy based on foreign experience are analysed.

Tarasenko (2013, 2015) and Ivanova et al. (2014) claim in their works that creating clusters and stimulating their development is one of the most important tasks of modern Russia. They stress that if this task remains unresolved, it will be impossible to shift from the raw-material economy to the knowledge-based one. The authors discuss mechanisms of cluster development, the importance and necessity of compiling clusters development programs and strategies, and they list cluster management tools.

Currently, the most controversial issue in examining cluster initiatives and the specifics of clusters is determining the economic viability of particular entities in clustering conditions (Buyanova, Dimitrieva 2012; Bogachev et al. 2016; Bochkova et al. 2014). According to Tkachenko and Velikanova (2008), the most important factor in increasing the productivity of industrial production in cluster enterprises is an improvement in management, including management of information for industrial clusters. Assessing cluster efficiency through the concept of "cluster power" is also proposed. This is an aggregated rate of cluster participation in the territorial division of labour which characterises the degree of the cluster impact on the socio-economic development

of the region as a whole (Bochkova et al. 2014). Clusters as a form of the development of innovation are one of the aspects of research conducted by Baburin and Zemtsov (2017), and Zemtsov et al. (2016). These authors suggest measuring the potential clustering of Russia's regions, with a view to further development of the innovation of the Russian economy.

In regional studies, comparative works and case studies can be mentioned. Among the former, the research conducted under the supervision of Druzhinin (2017) should be mentioned. They concerned identifying factors, determining the effects of existence and creating models of the functioning of clusters in cross-border areas in the coastal zones of the European part of Russia. Case studies concern individual clusters: their creation, range, functioning, influence, etc. (e.g. Markov, Yagol'nister 2006; Eldarov 2013; Rubstova 2014; Plyaskina et al. 2016).

### Stages of shaping cluster policy in Russia's regions

The question of whether and what tasks the state cluster policy should promote is still debatable. It is necessary to understand what forms of support should be a priority and what criteria should be applied when selecting regional clusters for state support or whether it should target all clusters. Scientific disputes arise as to questions concerning areas of support (creating job, developing existing structures or creating and implementing new technologies).

The Russian practice of creating and developing clusters is primarily based on European experience. This has been reflected in the OECD report "Competitive Regional Clusters: National Policy Approaches" (*Competitive regional clusters...*). The state cluster policy is treated as part of a strategy aimed at increasing the competitiveness of the economy of regions and the whole country. The main method of the state influence is to integrate a cluster approach with an innovation policy. Simultaneously, many countries deliberately create innovative infrastructure designed to support and develop clusters. The state defines regions in which clusters are formed, which in Russia is called a "conductor's model". In other countries, the state provides incentives to support cluster

initiatives (a grant form of support), while regional authorities are entirely responsible for the emerging clusters.

Most Russian authors suggest using both types of activities, both the "conductor's" model and elements of a "liberal" policy of supporting cluster initiatives in the Russian Federation regions. Unfortunately, using European experience without considering the Russian specificity of creating spatial economic structures (industrial ones) is ineffective. Therefore, it is important that particular economies take into account all the nuances of pursuing cluster policy in different countries of the world. In the Russian reality only the "conductor" instruments, or in other words "continental policy" (with an active role of the state), are used. This means that state structures support cluster initiatives organisationally and financially. Increasing the role of regions in the creation of clusters, as is the case in the developed countries which implement the cluster policy in the Anglo-Saxon ("liberal") model, so far has practically failed in Russia. In Russia's regions, there is still a shortage of resources (financial, managerial, labour, etc.) owing to which an independent cluster policy could be conducted.

Experts from the Russian Cluster Observatory think that competitive regional clusters can act as leaders of economic development of Russia's regions, provided that mechanisms for their development are created. One of such mechanisms is the cluster policy, understood as a set of activities aimed at shaping the business environment, developing competition, building infrastructure (as conditions for cluster development) and supporting regional cluster initiatives (*Klasternaya polityka...*).

An effective cluster policy in the regions realises at least some of the modern socio-economic tasks of territorial development. The implementation of investment projects within clusters allows developing infrastructure not only within the cluster itself but also in the region (including production, transport, energy, engineering, innovation, social, and housing infrastructure). Investment within clusters stimulates induced investments and investments in other regional centres.

The positive experience of the functioning of cluster companies allows formulating and promoting the most effective mechanisms of the

Table 1. Stages of shaping cluster policy in Russia.

Name of the period/phase	Years	Main features
Soviet period	until 1991	Shaping Territorial-Production Complexes and energy-production cycles as spatial forms of organising economy
Period of regional cluster initiatives	1991–2006	Creating and developing cluster prototypes in Russia's regions, implemented as part of the regional policy of the Russian Federation entities
Period of clustering of the innovative sphere	2006–2007	Development of clustering as part of special technical and implementation economic zones
Period of state cluster initiatives	2007–2014	Developing a legal framework for clustering, forming technological platforms, active state support for innovation and territorial clusters
Period of activation of regional cluster initiatives	from 2014 until now	Active creation and development of cluster initiatives based on innovation, inter-company links and the development of competitiveness

Source: own study.

public-private partnership. The development of a system of education, in that improving qualifications or retraining workers, as well as the development of small and medium-sized businesses creates an environment of positive scientific and technological collaboration and production co-operation.

The state cluster policy in Russia is about 10 years old. It uses organisational, methodical, and financial support instruments at a federal and a local level (Romanova, Lavrikova 2008). A formalised cluster policy at the federal level began in 2008, but has not been sufficiently popularised until now.

One can distinguish five phases of shaping cluster policy in Russia. The fundamentals of the spatial structure of the economy in Russia were created already during the Soviet period in the form of Territorial-Production Complexes. They were not of a cluster nature, but they were characterised by a spatial concentration of economic development and by some achievements in terms of economic development. However, the infrastructure created then was used to create contemporary clusters. Therefore, this period can be considered as *the first phase in shaping the country's cluster policy* (Table 1)<sup>4</sup>.

<sup>4</sup> The differences between KTP and clusters are of course deeper. Kisieliava et al. (2016) list the following. KTP: 1) are the result of the work of scientists and the regulatory activity of the state in order to develop especially underdeveloped areas; 2) create a uni-

*Phase two – regional initiatives.* The emergence of the first clusters in Russia falls on the second half of the 1980s, when the implementation of market mechanisms to the Soviet economy began. However, the expansion of production cooperation was strongly conditioned by the disintegration of the existing economic links after the collapse of the Soviet Union. Therefore, clusters were formed only in some subjects of the Federation (in the oblasts of Irkutsk, Murmansk, Tomsk, the Komi Republic and some other units).

*Phase three – period of clustering the innovative sphere.* In 2006, the RF government initiated a project to create special technical-implementation economic zones (SEZ). This action can be considered a beginning of clustering the innovation sphere in Russia. The term “cluster” was not used during this period, but the basic principles of organising the created entities fully corresponded to clustering processes. These included

fied technological chain focused on the processing of raw materials to obtain finished products; 3) consist of enterprises that maximise added value; 4) mainly include heavy industry enterprises and are centrally managed. Clusters, on the other hand, are characterised as: 1) the effect of market forces in developed regions; 2) their aim is to reduce transaction costs of enterprises associated in the technological chain (and orientation to the end user); 3) create a network structure, operating both as a part of mutual connections and competition; 4) consist of enterprises of various sizes (including small and medium-sized enterprises) associated voluntarily.

Table 2. Selected indicators of special technical-implementation economic zones of the Russian Federation in 2012 and 2014 (cumulative values).

Unit	Number of jobs		Taxes paid by SSE residents as percentage of taxes collected in the region (%)		Value of investment (million rouble)	
	2012	2014	2012	2014	2012	2014
Saint Petersburg	435	966	0,2	0,1	2337	4225
Moscow	794	1062	0,01	0,01	2162	1832
Moscow Oblast	1036	1684	0,02	0,03	2068	3109
Tomsk Oblast	1085	1474	0,16	0,23	3708	1457
The Republic of Tatarstan	SEZ established in November 2012. No data on the evaluation of efficiency for the given period					

Source: own study based on data of the Ministry of Economic Development of the RF <http://economy.gov.ru/mi-nec/main/>.

innovative activity, a close cooperation between large, medium and small business companies as well as research and development establishments (Dezhina 2012). Such zones appeared on the basis of the already functioning universities – in Moscow, Moscow Oblast, Saint Petersburg and Tomsk Oblast. However, their development at that time was slow, and most of the planned SEZ did not arise yet or were characterised by extremely low efficiency for a few years after their emergence (Table 2).

An analogous situation took place in other projects related to creating clusters – a revival of scientific cities (“наукograd”), already founded in the USSR and creation of a regional support system for innovative small enterprises or technology parks (Dezhina 2012). The main barrier was a failure to adopt appropriate legal solutions for the regulation of the innovation sphere.

In 2009, a project was launched to create an innovative city of Skolkovo (Сколково) in Moscow Oblast, involving financial, managerial, technological and other resources. Basic documents of the project were drawn up and the cluster policy was implemented at the central (federal) level, but this process was extremely slow. Establishing stable relationships between cluster enterprises and their subcontractors, as well as research and education establishments that generate most innovations also failed. The project of an aviation cluster in the city of Zhukovsky (Жуковский) also finished at the planning stage. Similar situations occurred outside the capital oblast. Regional cluster development programmes were adopted in them, and organisational structures for their implementation were created. However, they generally had a surface and ephemeral nature.

*Phase 4 – state cluster initiatives.* In 2007, “A concept of the development of cluster policy in the Russian Federation” (*Koncepciya klasternoy...*) was developed, which was devoted to the importance of the cluster policy for regional development. The concept highlighted the key areas of cluster development support: financing research of cluster structures, defining development objectives and directions, creating knowledge exchange centres, and engaging the concerned organisations in joint actions. It was also necessary to increase the effectiveness of training programmes and to promote research activities, including help to commercialise results. In 2008, a new document was drawn up: “Methodical recommendations for the implementation of cluster policy in the Russian Federation”, which was to blaze the trail for creating innovative industrial clusters on the basis of Special Technical-Implementation Economic Zones and technology parks (*Metodicheskie recommendacii...* 2008a). It defined prerequisites for creating industrial clusters, among others developing large integrated business structures that have already achieved a significant position in the domestic market and making use of the existing cooperation links.

As a consequence of adopting the above documents, in 2008 formation of technology platforms began, although their role in clustering processes was unintelligible even for the cluster participants themselves. The creation and development of technology platforms in Russia was based on European experience. Of the twelve main cluster evaluation parameters, selected on the basis of the world’s best cluster practices INNOVISA (in 2012), the development of four was directly connected with the development of clusters within technology platforms (International

Benchmarking...). Meanwhile, cluster development programmes in Russia do not take into account technology platforms. The priority trends in science, technology and engineering were formulated “top-down” (by presidential decrees and government resolutions), and only then the activity of technology platforms was formulated in consistence with them. “Road maps” of the platforms developed without the state participation proved useless (anyway, they were usually of poor quality; Dezhina 2013). Over the next two years, the document “Methodological recommendations for the implementation of cluster policy in the northern entities of the Russian Federation” was created (*Metodicheskie recommendacii...* 2008b). It anticipated state support for cluster initiatives in regions with harsh natural conditions.

In 2011, the importance of clusters was raised again during work on new development strategies of the country. Two documents were adopted: “An innovative strategy for the development of the Russian Federation until 2020” (*Strategiya...*) and the project “A concept of Russia’s long-term socio-economic development until 2020” (*Koncepciya dolgosrochnogo...*). An entire chapter of the strategy was devoted to innovative clusters. This document sets out the conditions and the directions of the development of clusters in Russia, including thorough state intervention in the clustering processes (with the regulation and control of institutions that ensure the creation and development of clusters), federal subsidy for large cluster ventures and state support guidelines for small businesses.

However, these documents do not contain precise conditions for state aid. Furthermore, the selection criteria for innovative clusters are not clearly defined. Yet, the fact that the so-called “smart specialisation” is currently a basis for the allocation of clusters in European countries has not been taken into account (Platform «Smart Specialisation»...). This means choosing a cluster specialisation at a regional level rather than at a state level, taking into consideration the maximum possible contribution to the economic development of the region in which the cluster is created.

As part of the strategy, in March 2012 the Ministry of Economic Development of the Russian Federation announced the establishment of a list of pilot programmes for the development

of innovative territorial clusters. According to industry specialisation, clusters were created in 12 sectors which were assigned to 6 priority areas of the development of science and technology in the Russian Federation (*Prioritetnye napravleniya...*). In the case of government support, only 25 clusters were selected, but their creation was still slow.

*Phase 5 – participation of regions and states in creating clusters.* In this phase, state support for the development of clusters was initiated (not only for pilot innovation clusters but also for other territorial clusters). In the framework of a programme of the Ministry of Economic Development of Russia for small and medium-sized enterprises, the Centre for Cluster Development has become the fund administrator. This facilitated a revival of regional authorities’ activities to create cluster initiatives. However, the implementation of plans from 2010 was not even halfway through (see details below). By 2016, the Ministry of Economic Development extended the pilot programme to support cluster innovations to 27. This included the Udmurt machine-building cluster, which was developed as part of the defence industry complex (receiving state support since 2015) and a cluster of optic technologies in the city of Perm.

## Regional specificity of creating clusters in Russia

In the first-level administrative division of the Russian Federation there are over 80 subjects (regions) divided into 8 federal districts. In 2008, the creation of over 220 clusters was announced in over 64 regions of Russia. At the same time, creating 62 clusters (27%) was planned in only one of the federal districts – the Volga Federal District. Further 100 clusters were planned in the Central, Northwest and South Federal Districts (within the borders as of 2008). The fewest clusters (14) were planned in the Siberia Federal District (*Metodicheskie recommendacii...* 2008a).

In 2010 year, according to the data of the Subcommittee on the Development of Cluster Technology of the Committee of the Chamber of Commerce and Industry of the Russian Federation, creating 250 clusters in 50 economic sectors was announced, including 70 clusters (28% of the total) related to 3 activities: the

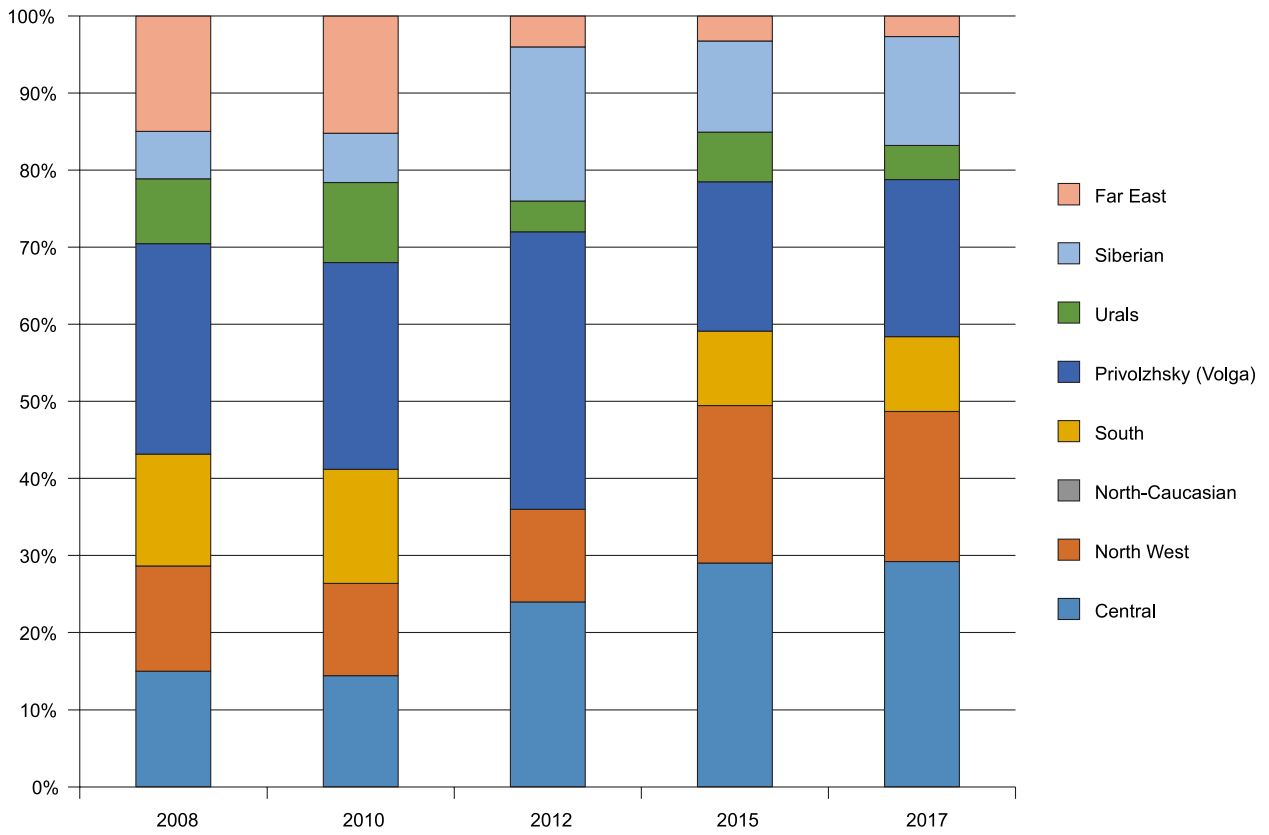


Fig. 1. Spatial distribution of clusters in the federal districts of Russia (2008-2017).  
 Source: own compilation based on: <http://economy.gov.ru/minec/main> and <http://map.cluster.hse.ru/list>.

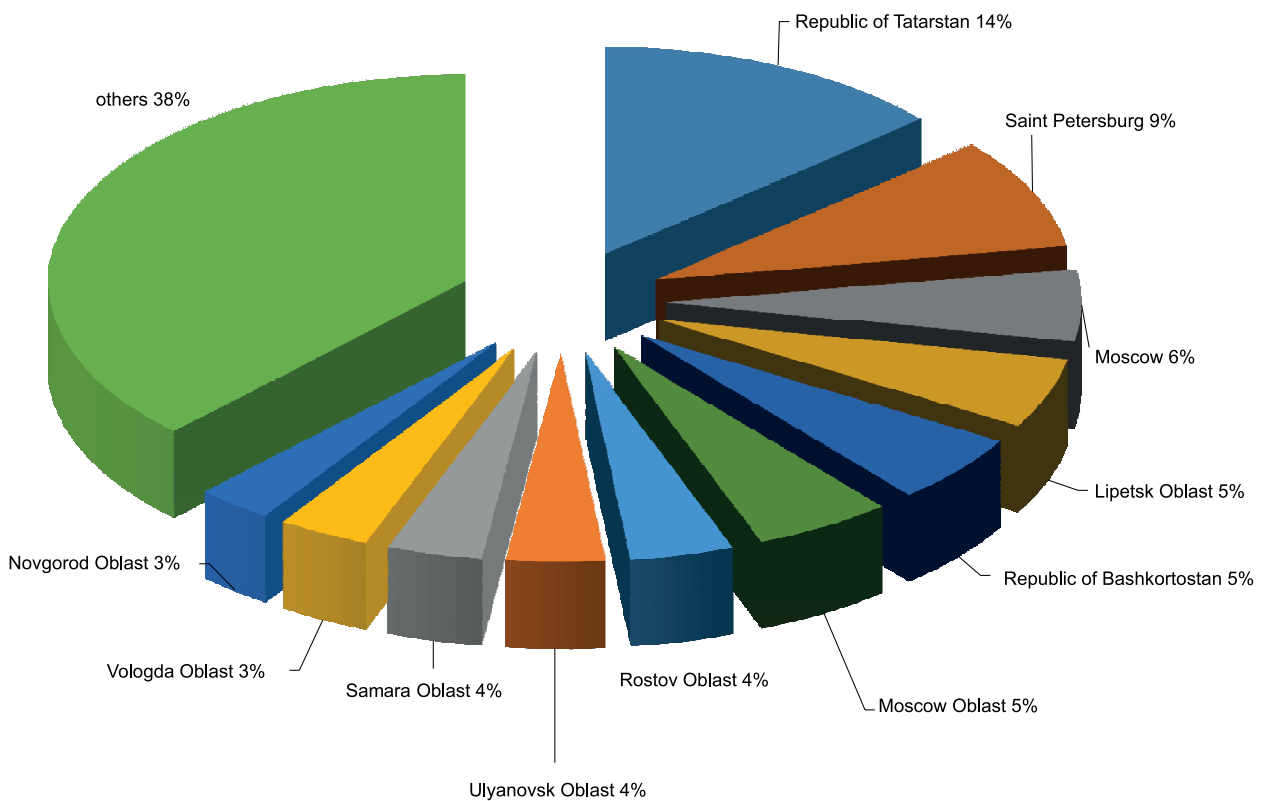


Fig. 2. Number of cluster participants in Russia by regions in 2017 (in %). The total number of participants: 3442.  
 Source: own compilation based on: *Karta klasterov...*



agrarian-industrial complex, building and tourism (Podkomitet po razvitiyu...). However, most of the clusters were never created; the others were made on the basis of existing companies, which were very reluctant to change their business structure because financial support mechanisms had not been developed. The largest number of clusters was planned in the Volga Federal District. However, as mentioned above, in 2012, only 25 clusters were chosen to be given the state support. In the Russian nomenclature, these clusters are called innovation-territorial or, in short, innovative clusters.

At the beginning of 2016, the HSE Cluster Observatory registered 92 functioning clusters located in 40 regions of Russia, in which over one million people were employed. The largest number of clusters was located in the Central Federal District, and then in the Northwest and Volga ones (*Klasternaya politika...*). At the end of 2017, the number of active clusters reached 113, of which 33 operated in the Central Federal District, 23 in Volga and 22 in the Northwest ones (Fig. 1). On the other hand, there were only 3 clusters in the Russian Far East, and none in the North

Caucasus Federal District. In total, clusters functioned in 43 regions. The most were situated in St. Petersburg (10), Rostov Oblast (9), Tatarstan (6), Moscow (5), and Voronezh Oblast (5).

The total number of cluster participants at the beginning of 2018 was 3,442, of which the most (472) formed clusters in Tatarstan (Fig. 2). St. Petersburg, Moscow, Lipetsk Oblast, Bashkortostan and Moscow Oblast took the further places.

In terms of the number of employees, the order was similar (Fig. 3). An increase in shares was noted in Samara Oblast and Arkhangelsk Oblast, which is associated with relatively labour-intensive (compared to other clusters) machine plants: automotive and aerospace industry in the former and shipbuilding in the latter one. The leading regions (Tatarstan, St. Petersburg, Moscow) have had a targeted and consistent stimulating policy aimed at the innovative development of the economy. These regions manifest not only the highest indices of innovation and scientific activity, but also a high level of development of small and medium-sized enterprises, as well as a high level of investment attractiveness of the regions. This is

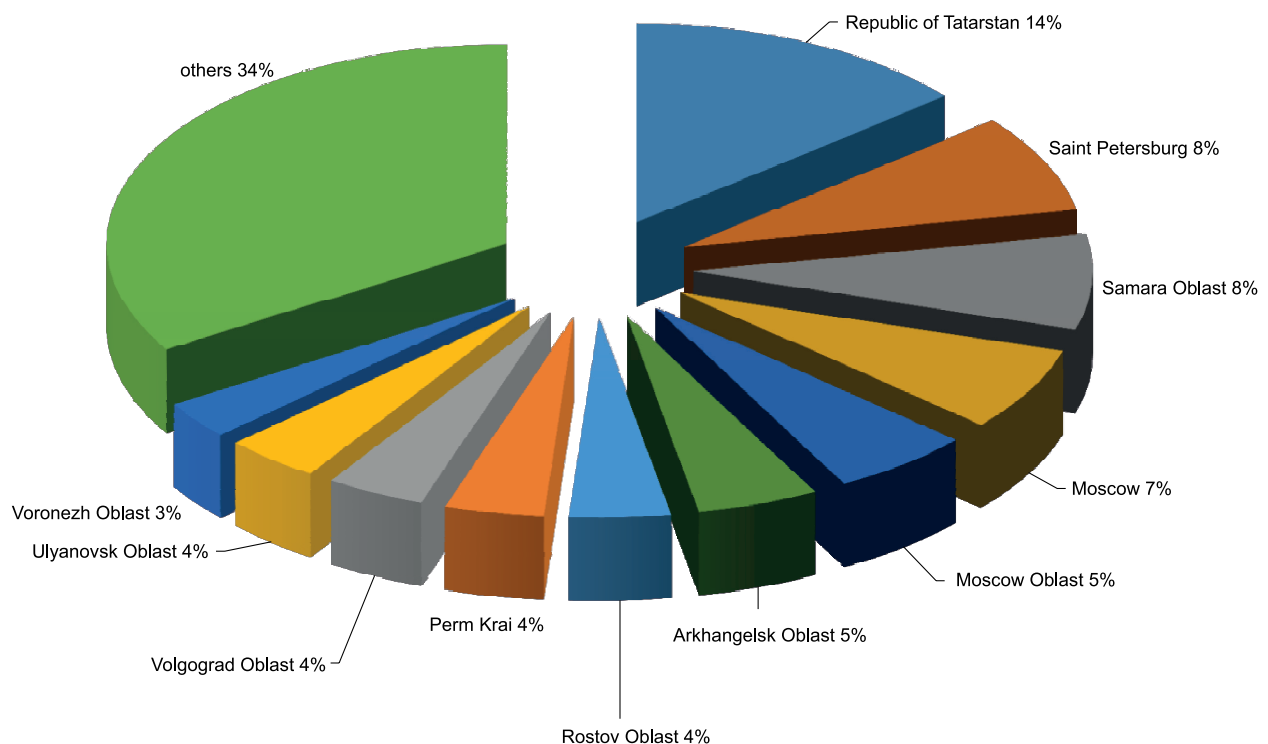


Fig. 3. Employment in clusters in Russia by regions in 2017 (in %). The total number of employees: 1,452,870 people.

Source: own compilation based on: *Karta klasterov...*

Table 3. Selected data for clusters of the high and middle organisational level in the Russian Federation.

Cluster	Placement	Specialisation	Number of participants	Number of employees	Year of starting	Level of organisation	Status
Kamsky innovative territorial and production cluster	The Republic of Tatarstan	Automotive and production of auto components	213	151,561	2012	High	1
Petrochemical territorial cluster	The Republic of Bashkortostan	Chemical production	187	30,497	2012	High	1
Consortium scientific-educational-production cluster "Ulyanovsk-Avia"	Ulyanovsk Oblast	Aircraft building	77	30,028	2009	High	1
Biotechnological innovation territorial cluster of Pushchino	Moscow Oblast	Industrial biotechnologies	68	8,706	2012	Average	1
Development of information technologies cluster	St. Petersburg	Information and communication technologies	66	20,838	1999	High	1 2
Udmurt machine-building cluster	Udmurt Republic	Defense industry	61	36,211	2015	High	1 2
Innovative cluster of information and biopharmaceutical technologies	Novosibirsk Oblast	Information and communication technologies	60	12,869	2013	High	1
Pharmaceutical, biotechnology and biomedicine cluster	Kaluga Oblast	Pharmaceuticals	54	11,259	2012	High	1 2
Nuclear-innovation cluster in Dimitrovgrad	Ulyanovsk Oblast	Nuclear and radiation technology	54	26,470	2010	High	1 2
Innovative territorial cluster "Zelenograd"	Moscow	Microelectronics and instrument making	53	7,772	2013	Average	1
Complex processing of coal and production waste	Kemerovo Oblast	Environmental protection and recycling	46	8,015	2012	Average	1 2
Innovative territorial cluster "Technopolis" New Star	Perm Krai	Space industry	44	34,696	2012	Average	1
Innovative territorial cluster of fibre-optic technologies "Photonics"	Perm Krai	Optics and photonics	34	15,762	2014	Average	1 3
The territorial and branch cluster AGROPOLIS "ALKYAGROBIO-PROM"	The Republic of Tatarstan	Environmental protection and recycling	32	1,025	2014	Average	1
Innovative territorial timber industry cluster "PomorInnovaLes"	Arkhangelsk Oblast	Forestry and woodworking; pulp and paper industry	31	20,110	2014	Average	3
Cluster of information technologies	Vologda Oblast	Information and communication technologies	31	871	2013	Average	2
Moscow cluster of medical technologies "Yuzhny"	Moscow	Medical industry	29	12,182	2015	Average	-

Cluster	Placement	Specialisation	Number of participants	Number of employees	Year of starting	Level of organisation	Status
Energy-efficient lighting technology and intelligent lighting control systems	The Republic of Mordovia	Microelectronics and instrument making	24	9,866	2013	Average	1
Shipbuilding Innovative Territorial Cluster	Arkhangelsk Oblast	Shipbuilding	23	50,417	2012	Average	1 2
Engineering-production cluster "Biomed"	Penza Oblast	Medical industry	15	2,264	2012	Average	2 3
Innovative territorial aerospace cluster	Samara Oblast	Space industry	13	43,257	2012	Average	1
Cluster of medical, pharmaceutical industry, radiation technologies	St. Petersburg	Pharmaceuticals	13	3,626	2011	Average	1 2

The level of organisational development of the cluster (low, average, high) is formed depending on the number of confirmed parameters of the cluster initiative approved by the Ministry of Economic Development of the Russian Federation (share of the maximum number of criteria).

1 - Included in the list of pilot innovative territorial clusters;

2 - Supported by the cluster development centre within the framework of the program of the Ministry of Economic Development of Russia for supporting small and medium-sized enterprises;

3 - Included in the list of industrial clusters, approved by the Ministry of Industry and Trade of Russia.

Source: <http://map.cluster.hse.ru>.

where the first special innovative technical-implementation economic zones of Russia emerged and developed.

Cluster specialisation shows a priority development of high- and intermediate-technology industries. The most numerous are clusters from the following branches: microelectronics, information and communication technologies, pharmaceuticals and the medical industry. In terms of the number of employees working in companies making up the clusters, the production of cars and automotive parts, the production of machinery and equipment, the medical industry, pharmaceuticals, and nuclear and radiation technologies are in the forefront (Fig. 3. *Karta klasterov...*).

Despite the existence of clusters in 43 subjects of the Russian Federation, the implemented cluster policy did not bring the expected results. Both Russian analysts (e.g. Busygina, Filippov 2016) and foreign ones are unanimous here. In the Global Competitiveness Index of the World Economic Forum ranking, based on the "cluster development status" index, Russia has occupied and still ranks below 100th place out of 140 countries surveyed (in 2012–2013 114th place and in 2015–2016 110th one; The Global Competitiveness Report...). At the same time, as of now no positive trend has been observed. Russia has maintained a relatively low position in such categories

as "participation of local companies in the value added chain" (94th place), "cooperation between enterprises and universities in the field of Research and Development" (81st place), "popularisation of staff training in business" (83rd place), or "volume of foreign direct investment and technology transfer" (115th place).

This position has led to a reflection on the efficiency of cluster activities. Such research was conducted by experts from the High School of Economics in Moscow. They concluded that only 8 clusters operating in Russia can be identified as highly organised and effective, and another 14 clusters as intermediated ones (Table 3). It should be noted that the list included both clusters with a large number of entities and jobs and small ones (the values ranged between 13 and 213 entities, and 871 and 151,561 employees). For example, highly evaluated clusters included no Moscow clusters and only one from St. Petersburg.

Almost every cluster which received an average or a high rating used the state aid programs, and as many as 9 of them even two, while only one cluster – Moscow cluster of medical Technologies "Yuzhny" – none. On the one hand, so willingly reaching for the state aid may testify to a relatively effective allocation of public funds, but, on the other hand, possibly of low competitiveness of entities constituting the cluster.

The total amount of state aid for innovative territorial clusters in Russia in 2013–2015 was 460 billion roubles (of which 98 billion from budgets of different levels, including about \$5 billion from the program of the Ministry of Economic Development) and 362 billion roubles from off-budget funds. According to the Ministry of Economic Development of the Russian Federation, approximately 70% of the funds allocated in grants are aimed at the development of the cluster infrastructure. In 2015, the clusters included in the program produced goods worth about 2 trillion roubles (Ministerstvo...). The most successful clusters are the petrochemical cluster in the Republic of Bashkortostan, the pharmaceutical, biotechnology and biomedicine clusters in Kaluga Oblast, the information technology cluster in Novosibirsk Oblast, the aerospace cluster in Samara Oblast.

Today, one of the most important projects is "Development of innovation clusters – the leaders of investment attractiveness of the world level" (Ministerstvo...). Selecting at least five participating regions for this project from the list of innovative clusters is planned. In 2016, six priority areas for the Project's Office were identified, and a separate thematic group was created for each of them.

## Summing up

The cluster policy in the Russian Federation shows its peculiarities. The basics of the infrastructure of most of today's clusters in Russia were established still in the Soviet period, based on Territorial Production Complexes. The TPC also shaped the then economic relations. This past has currently an effect not only on infrastructural issues but also on the form of clusters, as some of them are dominated by big industrial plants.

Clusters have undergone several phases of development in the Russian economy. Each of them was characterised by an active and "conductor's" role of the state. Financial and organisational instruments remain the main tools for the implementation of cluster policy. However, the arising plans are, in most cases, not implemented, or at least not to the expected extent. Lacking or insufficient financial assistance from the state remains the main obstacle. Therefore, the model is

evolving towards engaging regional authorities into the development of clusters.

Strong spatial diversification of clusters in Russia corresponds to the diversity of resources necessary for its creation (accessibility, industrial traditions of the region, strong local economy, high-level research base, etc.). The branch of industry in which the cluster operates, its own regional resources, the autonomy of the regions, financial independence of the regional administration are the favourable factors.

The efficiency and degree of the organisation of clusters as engines of the economic development of Russia's regions is now very low. The main directions of the cluster policy in the Russian Federation regions adopted already in 2008–2010 and the resources allocated to support cluster initiatives have not led to the expected results. In view of the fiasco of the previous cluster policy, the emphasis is now shifted towards innovative cluster projects. However, these actions are based again on the involvement of public funds of the central state authorities (ministries). This suggests that the mechanisms developed by the central planning system have largely survived in modern Russia.

Reflection on cluster policy in Russia leads to the following recommendations. For budgetary reasons, state aid programs are unlikely to increase. Focusing on a smaller number of clusters can be evaluated as appropriate, but it may increase the problems of development of areas not covered by support. For more effective use of funds, competition mechanisms for obtaining state support should be strengthened, and at the same time the criteria for their resolution should be objectivised. The independence of committee members, in particular experts (practitioners and scientists) is particularly important. This is a difficult postulate.

Because the inflow of foreign investments to clusters is limited (due to both economic sanctions and the fact that some of the clusters operate in strategic industries), it is important to strengthen the role of regions in the state's cluster policy. If clusters are to contribute to the socio-economic development of the regions, it is necessary for the regions to play a key role in shaping, and not only implementing, the cluster policy. However, insufficient resources (financial, managerial and human resources) that they have at their disposal remain a problem.

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