

Analysis of the potential for the formation of innovative territorial clusters in the South of Russia

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Abstract — This article concerns the questions of studying of topical issues of creation and formation of innovative clusters. Conditions of creation of innovative technological clusters in the southern regions of Russia are considered.

It is shown the dependence of rates of development of city agglomeration with process of creation of new innovative clusters. It is proved the interrelation of universal trends of development of cluster initiatives with the directions of search of opportunities of their realization in the region. It is formulated the requirement for the organization of collaboration of representatives of the industry research organizations, scientific divisions of higher education institutions, the advanced enterprises of the industry and other interested parties in creation of innovative clusters in the region.

It is noted the need of carrying out the comprehensive marketing analysis of future markets of innovative products. It is given the description and possibilities of using various forms of support of cluster initiatives at the federal and regional levels are shown.

The institutes of development which function in the territory of the Rostov region are presented and it is shown the mechanism of their interaction with the innovative enterprises and the leading higher education institutions of the South of Russia. The prospects of development of innovative projects within realization of the National technological initiative in the Rostov region are disclosed.

The problems interfering formation of new points of growth are revealed. The approaches promoting emergence of centripetal forces for the organization of effective interaction of potential participants of innovative process are formulated.

Keywords – *innovative territorial cluster, factors of innovative activity in the region, innovative development, innovative infrastructure, national technology initiative*

I. INTRODUCTION

Formation of innovative clusters in the south of Russia is considered as one of the major direction of implementation of industrial policy for the next period and will keep relevance in the long term.

Achievement of the global purpose is ensuring competitiveness in the world market seems to us in using of cluster initiatives and creations of innovative territorial clusters, including in the southern regions of the country.

In this regard it is necessary assessment of the perspective directions of creation and development of innovative clusters in the South of Russia.

It is necessary to investigate opportunities and necessary conditions of creation of innovative clusters in the southern regions of the country for this purpose; to reveal the problems interfering emergence of new "points of growth" of innovative clusters in the south of Russia. It will allow to develop

approaches and offers on stimulation of interaction of potential participants of innovative clusters.

II. MATERIALS AND METHODS (MODEL)

Methods of a research included dialectics and analytics, the system analysis, induction and deduction, mathematical modeling in economy, statistics, expert assessment, scenarios, brainstorming, etc.

III. RESULTS AND DISCUSSION

The strategic direction of state policy which is based on innovative development of economy forces us to estimate a problem of introduction of innovations differently. Realization of Strategy of innovative development of the Russian Federation till 2020 practically has to approach a closing stage that, of course, demands the judgment made and definitions is perspective the future. [1]

In this regard the question of formation of innovative clusters in various directions of economic activity becomes even more relevant.

First, it should be noted the fact that not any merging of the enterprises and organizations working in one sphere of economic activity can be qualified as a cluster. Initially nevertheless it is necessary to speak about creation of agglomeration which is a necessary preliminary step in the course of formation of clusters.

Secondly, for definition of strategic objectives of formation of an innovative cluster it is necessary to study universal and national trends that will allow to define "growth points" for successful formation of an innovative cluster. Carrying out scientific search, definition of priorities of applied scientific research, identification of "unoccupied niches" has to precede it.

Thirdly, creation of clusters is a process, rather difficult from all points of view. And if to speak about creation of innovative clusters, then it is even more difficult task for which solution is necessary to have modern advanced scientific and technical and technological base.

Formation of an innovative cluster does not arise from scratch, it is preceded by long collaboration of representatives of the industry research organizations, scientific divisions of higher education institutions, advanced enterprises of the industry before there is clear "What?", "Where?" and "When?" will be able "to shoot" and in what hi-tech sphere the modern innovative cluster can be created.

Fourthly, one of key questions of creation of an innovative cluster, besides described above, is assessment of sales markets of innovative products. Preliminary market researches can give an idea and understanding of the markets of selling of innovative products, of her potential consumers and also of the risks connected with a conclusion of innovative products to the market.

Fifthly, for acceleration of creation and development of an innovative cluster the interest should be shown from outside not only regional governing bodies, but also federal structures.

Without support from public authorities of management creation and functioning of innovative clusters in general is hardly possible. The format of such support demands a variety, including the region has to have the developed innovative infrastructure, administrative support in a part of rendering the organizational and methodical help during creation of an innovative cluster has to be provided, providing tax preferences to the enterprises which are a part of an innovative cluster on rather long (approximately up to five years) period. The positive solution of questions regarding allocation of the land plots, ensuring access to use of environment objects is not less important. These measures will allow to remove the barriers interfering creation and development of innovative clusters. [2]

Several words about terminology. For more exact and clear statement of the questions connected with formation of innovative clusters it would be desirable to formulate more precisely a concept of "an innovative cluster", "an innovative and technological cluster". Besides, formulating definition, it is necessary to consider as well the fact that initially the concept "cluster" and it is considered as a certain territorial merging of the organizations, and, therefore, it is necessary to add the word "regional" to a formulation. Thus, it is necessary to formulate definition in the following context: "regional innovative cluster" or "regional innovative and technological cluster".

Various interpretations of these concepts occur in publications of foreign scientists.

D. Odretch and M. Feldman (1996) give definition of an innovative cluster as "large number of the interconnected organizations promoting introduction of innovations in a certain branch or the sector of economy". [3]

J. Simie and J. Sennet (1999) expand and enter a new concept of an innovative cluster and consider that it "network of the independent industrial and/or serving (service) companies with the high level of cooperation (as a rule, through supply chains), creators and developers of new technologies and a know-how (the universities, research institutes, the engineering companies), binding market institutes (brokers, consultants, the IT companies) and the consumers interacting with each other within a uniform chain of value creation". [4]

I. Bortagerey and S. Tiffin (2000) conducting researches of process of a clustering in the countries of Latin America presented the vision of an innovative cluster as "organizational structure which participants create new products and technologies on the basis of joint industrial production in geographically limited areas which are based on concentration of knowledge, interactive training and joint social values". [5]

In materials of the Report of the European Commission on clustering problems in the countries of the European Union (2006) experts give the following definition of innovative clusters in which emphasize importance "the informal combination of efforts of various organizations (the industrial companies, the research centers, individual entrepreneurs, state bodies, public organizations, higher education institutions, etc.) allowing to carry out a transfer of new

knowledge and technologies, discoveries and inventions, transforming them to the innovations demanded by the market". [6]

In the Reference book on cluster policy (2004) the innovative cluster is defined as "the special type of a cluster having the properties allowing to accelerate process of generation, production and commercialization of innovations". [7]

It is obvious that all authors note as the main distinctive sign of an innovative cluster is existence of the uniform purpose: generation of new knowledge, opening, inventions on the basis of formation of a system of legally independent organizations united by the common strategic objective and the subsequent transformation of new knowledge to innovations with obligatory bringing to the consumer on the terms of commercial use.

It is interesting to analyze the points of view of the Russian scientists on the matter.

Development of the theory of a clustering in modern domestic science goes on the way of a research of the problems characterizing the Russian practice of formation of clusters, and first of all characterizing innovative clusters.

It is possible to agree with opinion of V. L. Inozemtsev who considers that development of technologies goes only with a support on powerful production base which creates demand for technological innovations, giving along with it opportunities carrying out technical tests and their further improvement. [8]

The idea of "new industrialization" or "neoindustrialization" is very actively carried out in researches of S. S. Gubanov who treats neoindustrialization as "a technetronic phase of industrialization and understands it as process of formation of the knowledge-intensive way of production". [9]

It should be noted that as a basis of the concept of neoindustrialization close direct interaction of science and production which result has to be a high-quality transformation of the technological device of the country is accepted.

In the first decade of the 21st century there was a new world trend as a convergence of different branches of science and technologies which result of interaction have to be absolutely new results. Discoveries, as we know, are made on a joint of different sciences. This circumstance allows to gain synergetic effect. The most perspective for such cooperation are nano, bio, information, cognitive and socio-humanistic technologies (NBICS-technologies).

The Russian scientists consider that "a strategic objective of a modern civilization includes technologies in natural resource turnover on the basis of development of the integrated cross-disciplinary science. Integration and interdisciplinary are the defining trend of development of the scientific sphere presently, and in this sense nature similar technologies is a natural stage of natural development of science and technologies: through interdisciplinary to convergence and nature similarity". [10]

In this regard it is actual the formation of clusters of new type – clusters of convergent technologies. Respectively, it is not so obligatory for such clusters the principle of presence of the organizations which are its part in one geographically outlined territory.

It is necessary for clusters of this kind expediently attraction for cooperation of the different scientific and technological organizations, being guided by presence at them of scientific and technological developments of the corresponding profile, their intellectual potential, but not the location. It is quite naturally possible to combine work of research teams in the standard mode with the organization of activity in the mode of remote access.

Certainly, there will be organizational issues, but at the effective management it will be possible to solve them. At an initial stage of activity of clusters of convergent technologies organizational, infrastructure and financial support in a form of the state projects or programs has to play the predominating role.

Over time in process of removal on the market of innovative products corporate business structures as they will be able to interact more actively in the market of innovative products have to take part in development of an innovative cluster of convergent technologies and more successfully commercialize results of activity of participants of an innovative and technological cluster. [11]

Thus, in near prospect innovative clusters of convergent technologies will lose a territorial binding, on the contrary, their orientation will be aimed at expansion of participants due to attraction in a cluster of new research teams, that is the course towards creation of new schools of sciences of exterritorial type will be realized.

According to the Decree of the Russian Prime Minister of 28.08.2012 it was made and subsequently is approved the List of innovative territorial clusters. Originally there were and now 25 innovative clusters successfully function which geographical location was defined according to the location of the leading scientific and production enterprises located mainly in industrial centers.

The grouping of innovative territorial clusters on federal districts is given below (table 1).

Information provided in table 1 demonstrates that initially creation of innovative clusters was not planned at all in the Southern Federal District and North Caucasus Federal District.

What today's prospects in this regard in the south of Russia? What scientific, technical, technological activities are created now and objectively have the further prospects of development, and subsequently will become "growth points" in southern Russian regions?

The research showed that the maximum activity during creation of innovative clusters is observed mainly in the Rostov region where, since 2015, several regional innovative clusters were created at once.

TABLE I. INNOVATIVE TERRITORIAL CLUSTERS (ITC) IN A SECTION OF FEDERAL DISTRICTS [12]

Federal District	Quantitative parameters		Qualitative characteristics	
	Participants in the innovation process	ITC ^c	ITC centers	Industries in ITC
Volga FD	122	9	Nizhny Novgorod, Ulyanovsk, Ufa, Kazan, Perm, Samara, Saransk	Automotive, petrochemistry, lighting, aerospace, nuclear-innovative cluster
Central FD	107	6	Moscow, Dubna, Kaluga, Khimki, Zelenograd, Pushchino	Nuclear physics, nanotechnology, biotechnology, laser, radiation technologies
Siberian FD	102	5	Krasnoyarsk, Novosibirsk, Kemerovo, Tomsk, Barnaul	Biopharmaceuticals, medical equipment, processing of coal and industrial waste
North-western FD	49	3	St. Petersburg, Arkhangelsk	IT-technologies, instrument making, shipbuilding
Ural FD	10	1	Sverdlovsk region	Titanium cluster
Far Eastern FD	6	1	Khabarovsk region	Aircraft, shipbuilding
Total	396	25	x	x

Among them it should be noted such clusters as an innovative and technological cluster "The southern constellation" (the aerospace industry, instrument making, radio electronics, control systems, navigation and communication, new materials); innovative and territorial cluster of sea instrument making "Sea systems" (shipbuilding and marine facilities); Cluster of information and communication technologies, innovative territorial cluster "Don dairy products" (production and processing of dairy products). [13]

Along with the listed above it was created innovative clusters in the Rostov region approximately during the same period the national industrial cluster of agricultural mechanical engineering. Besides in 2015 - 2016 appeared and successfully such clusters as the Volgodonsk industrial cluster of atomic mechanical engineering develop; territorial cluster "Valley of Don" (wine growing and winemaking, science, education, tourism). [13]

In an initial phase of creation and development of clusters there are some more major directions of economic activity, it is an innovative and territorial cluster of machine-tool construction (production of machines and the equipment, including machines, special equipment, the lifting and hydro pneumatic equipment, robotics); an innovative and territorial cluster of "Biotechnology" in Millerovsky district of the Rostov region (deep processing of grain, receiving enzymes and microorganisms for the subsequent use in a chemical industry, health care, production of foodstuff and forages, papers and cellulose, detergents, textiles and also for use in bio-energetic).

It should be noted existence of a number of the objective factors promoting creation of the new direction of a clustering in the Rostov region. It is the youngest on creation time and it

is tourist cluster which united so far only a small amount of the organizations, but having the good prospects of development. Such conclusions can be made due to the analysis of logistic potential of a tourist destination submitted in I. V. Terenina and E. V. Mikhailychenko's work. [14]

Let's note that now two more clusters were a part of the list of cluster initiatives of the Rostov region: territorial cluster of helicopter engineering of the Rostov region and Volgodonsk furniture cluster of the Rostov region.

Certainly, not all from the clusters called above are innovative, but the fact that the regional industrial policy is headed for creation of conditions for intra-branch interaction of the enterprises on the basis of formation of industrial clusters, shows positive moods and favorable prospects in the Rostov region.

In the neighboring regions formation of innovative clusters much less active, only there are three regions where such clusters are created.

In the Volgograd region two clusters are created: an innovative territorial cluster on production of modern construction materials and high-clean chemical productions to a basis of Svetloyarsky and Narimanovsky fields of chloride magnesium and a chemical and pharmaceutical cluster (the medical industry).

There is a cluster "An aquaculture and fishery" in the Astrakhan region (agriculture and fishery).

It is created the interregional cluster of Pharmdolina (pharmaceutics) in Krasnodar region together with the enterprises of Moscow and the Moscow region in 2017. Other regions of the South of Russia has not shown a cluster initiative yet.

The reasons of weak activity regarding creation of territorial clusters, and furthermore innovative clusters are rather powerful and demand special consideration.

The most important, in our opinion, is the institutional factor. One of the reasons of insufficient development of clusters is the backwardness of innovative infrastructure. From all kinds of infrastructure facilities the centers of collective use and business incubators are most presented. In regions of the South of Russia it was created 12 regional, 13 high school, one infrastructure and one more private business incubator, but at the same time there are no business incubators at all in three regions as the Astrakhan region, Kalmykia and Karachay-Cherkessia. The regional centers of engineering are presented only in six subjects: The Rostov, Volgograd, Astrakhan regions, Krasnodar and Stavropol regions and the Republic of Dagestan, they are absent in other regions. There is also insufficient number of science and technology parks, regional co-workings, centers of a transfer of technologies, centers of prototyping and industrial design, centers of certification and standardization.

Institutes of development have to give support in the most various forms to the oriented focused enterprises.

At the federal level various structures are created performing functions of institutes of development, for example: FEB-Innovation fund, Russian Venture Company, Fund of assistance to development of small forms of the enterprises in the scientific and technical sphere, Fund of development of the industry, Internet Initiatives Development Fund, the Russian fund of technological development, the Russian bank of support of small and average business and others.

Institutes of development have the specifics which allow them to carry out the activity directed to rendering full assistance to innovatively focused business community. They should not substitute for the actions private business during implementation of commercially attractive projects, they can help with the search of the enterprises of the industry, transport, agriculture and other spheres of economy needing realization of new technical and technological developments, to promote establishing contacts with interested parties.

It is possible to call as striking example of effective interaction of all interested parties the Strategic session held 19.03.2019 in Rostov-on-Don on development of the National Technological Initiative (NTI) in the Rostov region in which representatives of the leading higher education institutions of the South of Russia – South Federal University, Don State Technical University, South Russian State Technical University "NPI", Russian State Economic University "RINH", ANO Agency of Strategic Initiatives of Promotion of New Projects (ASI), JSC Russian Venture Company, NP ITC Intekh-Don, ANO Agency of innovations of the Rostov region took part with active support of the Government of the Rostov region.

Within the Strategic session the NTI regional standard was submitted, the most interesting practices of other territorial subjects of the federation regarding creation of conditions for development of the NTI projects are discussed, the existing calls are formulated and the prospects of development of projects in logic of NTI and the Net-markets are planned. There were open lectures within separate sections, in particular, in the Energy Net directions – New power, Tech Net – the advanced production technologies, Aero Net – the distributed systems of unmanned aerial vehicles, Education Net – educational technologies, Food Net – food and agro biotechnologies, Fashion Net – the global market of fashion on the basis of automation of sewing production. [15]

It is important to note that institutes of development should not enter the competition to private financial institutions and also under no circumstances they should not subsidize unprofitable projects. The main thing for institutes of development is to become a peculiar catalyst of the private investments directed to priority sectors and branches of economy. The analysis of innovative infrastructure of the region proves existence of a disproportion in all groups of infrastructure facilities that creates obstacles for systematic development of the innovative sphere in the southern regions of the country.

IV. CONCLUSION

1. The available innovative infrastructure can be used for development of the small innovative enterprises as directly in the region of stay, and in the neighboring regions for the purpose of a raising of level of information availability to potentially innovative small innovative enterprises. It can be the services provided in the conditions of remote access in a format of videoconferences, webinars, forums, etc., and for this purpose it is necessary to debug organizational issues of access to information resources.

2. Higher education institutions (especially basic higher education institutions of a technical profile) can undertake a role of the leading organizers of innovative activity in the macro region, give not only information support, but also create interregional associations, coaching centers and the centers of subcontracting which are not, by the way, at all in the macro region. Creation of the scientific and educational platform for interaction of scientists (high school science), researchers (industry scientific research institutes, SPC and other similar structures), practices (the small innovative enterprises) for "cultivation" of new shots in all fields of science, the equipment, technologies has to become result of it.

3. It is also necessary to strengthen a role of federal institutes of development in the territory of subjects of the South of Russia for assistance in the solution of problems of innovative development, including conditions of financial support of regions, considering their potential individual opportunities of growth of innovative activity.

Innovative potential in subjects of the South of Russia is available, but its distribution is extraordinary unevenly therefore it is necessary to combine efforts for the solution of common problems at the level of the macro region for what it is necessary to look for any available "common ground" of interests of certain regions.

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