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COMPARISON OF RUSSIAN INNOVATIVE CLUSTERS WITH FOREIGN ONES

Rvacheva Aleksandra Stanislavovna (a)*, Sangadzhieva Elena Vladimirovna (b),
Lapina Marina Sergeevna (c), Pavlova Aisa Arslanovna (d)
*Corresponding author

(a) Kalmyk State University named after B.B. Gorodovikov, 11, Pushkin Street, Elista, Russia, al.rvacheva@gmail.com
(b) Kalmyk State University named after B.B. Gorodovikov, 11, Pushkin Street, Elista, Russia, sangel96@mail.ru
(c) Volgograd State University, University Prospect, 100A, Volgograd, Russia, mary222@mail.ru
(d) Kalmyk State University named after B.B. Gorodovikov, 11, Pushkin Street, Elista, Russia, aisa.pavlova99@mail.ru

Abstract

Russia implements 12 national projects and 25 innovation clusters have been formed for the successful implementation of these projects. The article provides the innovative clusters development overview in the advanced countries of the world, to compare the United States, China, the European Union and the Russian Federation. The innovative clusters classification, formation and investment features are introducing in this article. Foreign experience should help Russia to organize and establish an effective work of such clusters. Russian innovations are designed to become an inexhaustible growth source. Innovative development way is relevant for companies and organizations of any industry and scale. The United States with its Silicon Valley that was created a few decades ago, has the leading position here. China is moving in this direction too, they try to repeat the United States success and become an advanced innovative power in the coming years. It is possible to transform existing industrial clusters into innovative ones, trying to attract thousands of compatriots to China that have educated at leading American and European universities, including in Silicon Valley, organize own universities at the world level, attract thousands of private small and medium-sized companies to cooperate in innovation clusters and ensure public-private partnership and co-financing. The article relevance is due to the innovative technologies' development importance in Russia.

Keywords: Innovative clusters, research and development, digital economy, innovation.

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1. Introduction

The most important of the modern period is China's economic growth. In the same time the USA has the trouble of it because they do not have such an important position in the world.

The competition between the USA, China and European Community is mostly in the technological sphere. The way to a successful competition requires the growth of goods and services production, the economic growth, changing the standard of living, based on the innovations. The countries' development will be defined by the science achievements in different spheres such as digital technology, robotization, artificial intelligence, big data, automatization, additional technology, internet of things etc.

2. Problem Statement

Innovation clusters are a powerful modern technologies development tool through a complex theoretical and scientific developments combination in the diversified new goods and services production in a small geographical region. Economic impact is possible if one concentrates to efforts in backward industries.

3. Research Questions

Michael Porter has defined the term "cluster" – the groups of interconnected companies, service providers and organizations that are associated to this business compete and at the same time cooperate (Porter, 2005).

4. Purpose of the Study

The purpose of creating innovative associations is to create innovative technologies and solutions, which provides the improvement of products and services.

Cluster's strategy depends of the government and private companies' initiative:

- Horizontal involves multiple industries;
- Vertical is a chain of interconnected companies in step-by-step production;
- Technological means that one technology is used in several industries;
- Focus to the one company;
- Geographic concentrates in the region or extends to the interregional level.

This article provides the innovation clusters in some countries and the analysis of its experience.

5. Research Methods

The first innovative cluster in the world is situated in the USA, California, and it is called Silicon Valley. The USA has now around 20 clusters like that and every expert thinks that Silicon Valley is the leader of the high technology in the USA. Silicon Valley takes one third part of all the USA's venture capital investments.

The territory of this cluster has the high density of high technology companies that develop and produce hardware, software, mobile devices and the other products of IT. This cluster has more than two

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million employees. The general factors of Silicon Valley origin are the Stanford University, the cities with distance driving less than an hour and financing sources for new companies.

The residents of Silicon Valley are about 7 thousand companies. The part of Silicon Valley companies that have at least one immigrant founder/co-founder was 52 % from 1995 to 2005, this indicator fell to 44 % in October 2012. It was a “brain drain” from Silicon Valley (Toor, 2013).

Other major innovation clusters in the United States are:

- Seattle, Thecoma and Olympia from Washington – these are the clusters of aerospace engineering and information technology;
- Minneapolis from Minnesota, Jacksonville from Florida – these clusters are of medical equipment;
- Pittsburgh, Akron and Cleveland from Ohio and Pennsylvania – clean energy technology clusters;
- Kansas City from Kansas – this is the cluster of biotechnology and modern chemistry;
- Boston from Massachusetts – this is the cluster of biotechnology;
- Austin, Dallas from Texas – these clusters are of semiconductors.

The USA has the Committee of the creating clusters support. The special labour is a very important factor of the impact cluster functioning, so companies pay attention on the special education. The Detroit is the automotive industry cluster which formed around three giants of the automotive industry such as “General Motors”, “Ford” and “Chrysler”. Detroit is also famed by his car show that impacts innovative automotive cluster of the USA (Sallet & Paisley, 2009). The nuclear sphere of the USA is controlling by the Ministry of energy that initiated the creation of an innovation center at the national laboratory in Oakridge from Tennessee. This center has around dozen general research organizations of the USA.

The nature of clusters development in the USA is descripted by the dynamics of Silicon Valley development (Bilenko & Feldman, 2017). There were many changes from 2014 to 2017 in Silicon Valley:

- The draft product became cheaper and faster to production;
- All the spheres have got much more new projects;
- So-called mobilizers that are accelerating the new products and services emergence that help to evaluate the product or service interest hypothesis of the market at each creation and implementation stage, have increased hundreds of times just for three years.

The USA suppose that the enablers, mobilizers, hypothesis testing, products prototyping, business processes modelling are the most important national economics.

European Community has released “The manifest of clustering in the EU countries” that allows them to raise the competitiveness of some countries and to improve the situation of the EU in the world.

Germany has the federal cluster programs such as “Bioregion” that stimulating the cooperation of local companies and organization purposing the innovative processes acceleration. Germany develops the high-tech production and the scientific organizations has the key role. The industrial clusters get the financing from the federal and local sources.

Germany has 3 of 7 world clusters of high technologies that are in Hamburg, Munich, and Dresden. German clusters are the leaders in high-tech and innovative systems creating.

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Cluster innovation developments are oriented for such spheres as chemistry, engineering and automotive industry.

BMW due to automotive industry clusters has the technical characteristics of the engines produced by BMW are advanced, and this is confirmed taking the first places in various automotive rankings.

Munich is famous by the biotechnology cluster. Innovative companies' development due to the Hamburg cluster that takes the second place in telecom and multimedia developments. Dresden cluster's participants are the technology center and the companies that produce the microchips and cameras.

The Newport area in Great Britain is famed as the electronic cluster. The cluster includes major foreign companies from Japan and the USA. Wales' economics is developed in automotive producing, electronics, IT developments and telecommunications. The cluster is oriented to realize three key programs:

- Professional development;
- Interaction of industrial companies with universities;
- Increasing the competitiveness of small and medium-sized companies.

Cambridge has the innovative cluster that has more than 1500 companies and around 40 thousand employees. The companies produce the equipment for research such as measuring technique, printing devices and software.

Oxford has the successful technologic cluster that is financing by several dozen venture capital companies that are coordinated by Isis Inc that provides the Oxford University scientific developments integration.

France has more than 90 clusters. They specialize on pharmaceuticals, cosmetics and foodstuff production. Cosmetic Valley is the cluster that includes around 600 companies and it is the cosmetics leader in the whole world.

Italy has more than 200 clusters. They specialize on consumer goods and food production.

Danish, Finnish and Norwegian industry are completely clusterized. Denmark has the clusters in agriculture.

There is the clusters creation around the world, and it does not make any sense to compare countries by the quantity because they have different classification. The most important is that the clusters take the leading in the world.

China is the general competitor of the USA in the world economics. China creates and supports the innovative clusters that are formed out the industrial clusters. The main Chinese trend nowadays is the industrial to innovative clusters transformation.

Industrial clusters have high production results and take the important role in region industrial development. This stage China's economics has a task to transform traditional industrial clusters into innovative that should have the specific features as:

- Innovative clusters produce not only competitive but the brand-new products.
- Innovative clusters are designed to accumulate various companies and organizations the scientific and production potential to create a single innovative products chain.

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- Innovative clusters purpose is not only to create a product chain based on traditional relations and resources, but also to join the product creation global network based on the new technological achievements' application.
- Industrial clusters are characterized by a profile orientation with a simple organizational structure, while the unifying thing in the innovation cluster has a comfortable innovative climate with the participants cooperation forms variety.
- Innovative cluster is industries wide range impact main point in the surrounding region.

China's scientists suppose that China has the "French" industrial clusters organization concept based on business partnership and the government has the manage role. China's government invested 141 billion dollars for scientific research in 2010. The result of that is China becomes the leader in the world's rating by the registered patents and scientific publications.

The part of newly developed products in the Gross Industrial Product volume in China was 9.94 % in 2010. The high-tech sphere was 20.30 % in 2010. One of the Chinese clusters features is they often become around the foreign production. Chinese are taking all the innovative technologies abroad and make the analogue of these products. China is moving the productive clusters from the south to the north of the country because the northern labour is cheaper for them now. REGNUM agency tells that China's investments volume in common is 1.75 trillion yuan that equals more than 270 billion dollars. That is the China's State's statistical office data for February 13, 2018. The spending on research and development intensity was 2.12 % and that is 0.01 % higher than previous year. So, China continues to hold the second place in the world in that indicator after the USA.

This agency also tells that China doubled the research financing in the fundamental sciences sphere for last five years from 41.1 billion yuan (6.5 billion dollars) in 2011 to 82 billion yuan in 2016. Government financing is 90 % of the common fundamental research financing. This indicator in the developed countries is around 50 %. According to the government plans, China must come into the top of the most innovatively developed countries in the world. The mixed economy transforms state-owned companies into joint-stock companies, public-private partnerships improve, individual and private companies create and develop.

In China more than 100 million of individual and private companies were in the middle of 2018 and composed 95 % economic entities market. They provided stable employment and earnings for more than 350 million people. The private sector provides more than 60 % of GDP, about 50 % of tax revenues to the state budget, more than 70 % of innovative products. The part of that is in total of employed population exceeded 44 % (Novoselova, 2019). China builds an innovative economics, creates world-class advanced innovation centres in Beijing and Shanghai. There were established 5 national and 48 provincial production centres in 2018 that have formed a high-tech production system in priority sectors such as aviation, nuclear energy, quantum communications etc. China hopes on talent people with Chinese origin who was previously studied abroad. China created the special business incubators for them. The investments dynamics in infrastructure and services more than three times ahead the investment in industry and construction. Investments in environmental protection, utilities, infrastructure, and high-tech manufacturing industries reflect exceptionally high impact rates.

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American monopoly is being displaced by China's economics. China is going to catch up the USA in the innovative technologies sphere in 2020-2025. It seems that this process will be longer but that is possible. This problem's solution could be the establishing a large-scale reproduction of high-quality specialists in China, scientific staff, research labs, institutes and universities. China has all of it, but it must work and lead to new world achievements, so it is going to take a time.

Japan has a success in high-tech production such as television, audio, video and photo equipment, in electronic components such as microchips and memory chips. Japan produced the first car in the world based on hybrid engine that drives on biofuel.

India has around 100 clusters. They specialize on computer technologies. There are around 70 billion dollars money circulation in IT sphere in India. India tries to repeat the success of the USA's Silicon Valley. India's government gives the companies tax exemption for five years, or for ten years if the company involves in techno-park. This exemption works for any company in India, the company's size or ownership's form doesn't matter.

Russia started to implement clusters with a delay in compare with other countries. Russian cluster policy has started from 2005. First clusters have appeared in 2006. The main implementation clusters problem is that Russia has a weak producing. More specific problems in forming clusters are:

- No market evaluation, no scale of market, no territorial or corporative market structure;
- Actions inconsistency for government authority of different Federation subjects.
- Ignoring the competition need between suppliers and the coop importance between consumers and suppliers.

Nowadays every region in Russia tries to create a cluster on its territory. Clusters also create the techno-parks and it is often the intermediate stage of cluster forming. Russia has more than 110 clusters that unite more than 3 thousand organizations and provide around 1.3 million jobs. Cluster policy realizes in Russia supporting by two departments: Economic development Ministry and Industry and trade Ministry. They support cluster initiatives, implementing consulting and organizing services including marketing research; they organize educational, communicational and exhibition events; the develop business plans and strategy documents etc.

Russia has a concept of a long-time social-economic development until 2030. The innovative clusters subsidization program was launched in 2012. 13 clusters received financing in volume 1.3 billion rubles in 2013. 25 clusters received financing in volume 2.5 billion rubles in 2014.

Federal grants are adding by regional which size depends on region budget. Created clusters are developing now and new clusters are creating.

Major innovation clusters in the Russian Federation are:

- Obninsk from Central Federal Region – there is the cluster of pharmaceuticals, biotech and biomedicine;
- Khimki from Central Federal Region – there is the "Phys-tech XXI" cluster;
- Dubna from Central Federal Region – there is the biotech innovative territorial nuclear-physical and nanotechnology cluster;
- Troitsk from Central Federal Region – there is the "New materials, laser and radiation technology" cluster.

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Russian cluster observatory was created in 2012 in the Statistics Research and Knowledge Economy Institute of National Research University "Economics High School".

There is created an Association of high and new technologies zones "Silky way". The first meeting of this Association was in July 5, 2016. The founders of Association "Silky way" were 21 high-tech zones from China and 14 organizations from Russian Federation, Belarus Republic, Armenia, Georgia and Ukraine.

The general purpose of Association founding was increasing the scientific-technical and industrial coop between organizations of countries and regions, that are involved in "Silky way" project, cooperative resources using and assistance to the international cooperation between its participants and technologies transfer organization.

There are the spheres that received the government support:

- IT and electronics;
- Spaceships and shipbuilding production;
- Biotechnologies and pharmaceuticals;
- Petrochemistry;
- Nuclear sphere;
- New materials sphere;

The "Russian Federation Digital Economy" program was officially approved in July 2017. This program was developed supporting by the World Bank and was designed to provide an accelerated digital social-economic development until 2024. This program was accepted with a budget around 1.8 billion dollars till 2025 to avoid the existing disadvantages that are preventing the country to become one of digital economy leaders. The Russian government approved the "road maps" for all priority areas from the program in 2018 and invested 3040.4 million rubbles to implement it. The implementation of the EAEU Digital agenda that was accepted in 2017 has also become a priority in Russia in 2018.

The World Bank team in cooperation with the Institute of the information society, the Russian Federation government analytical center and other Russian organizations has developed a methodology to evaluate the development of digital economy level for two years from December 2016 that uses a set of indicators to evaluate the current state of development of the digital economy.

The world becomes more digital and digital platforms become an important tool to cross-sectoral transform because they increase the digital ecosystem efficiency, promote high-speed and reliable communication, support the process of cooperative products and services creation by organizations from different countries and time zones. The use of solutions of the class "government as a platform" allows organizing the cooperative wide-range services creation in the participating of all economic subjects. The use of digital platforms in so-called "digital factories" revolutionizes industrial production (Borovkova, 2018). Trading platforms based on digital platforms transform the services market and agriculture. Educational digital platforms make it possible to provide services to all ages and social groups students. In several segments of the domestic market Russian digital platforms dominate despite competition from global giants. Some Russian companies have become world leaders. Russia must pay attention at promoting this digital transformation model in various sectors of the economy.

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Russia has received best practice of the world and has made some progress in developing national broadband infrastructure. The mobile communication is high, the quality of e-government services grows, and digital technologies are being introduced in education, health, culture and social services (Karapetyan, 2016). Barriers remain at the interdepartmental level, in the sphere of transformation of internal processes of public administration.

At the same time, Russian business generally is behind in the digital technologies using, that is especially often observed in traditional economy sectors. Russia needs to use digital tools to strengthen the key industries competitiveness. The existing initiatives using the road map “TechNet”, a Single digital industrial space “4.0 RU” in a single strategy development would make the early industrial development goals achievement.

Revolutionary changes in Russia are being made in agriculture due to digital technologies. Russian agriculture has experienced significant growth and has become the leader of Russian exports, including since some large Russian agribusiness began to stimulate the advanced digital technologies introduction to agricultural practice. E-Commerce, digital markets and digital platforms in the country are growing fast. Russian digital financial services providers have reached the world level.

One of the negative factors in Russia is that historically closed society and the innovative culture weakness, that implies respect to entrepreneurs and risks encouragement, have led to stagnation in this area. Venture capital investment has ceased to grow. It is necessary to strengthen coordination between the various instruments of policy implementation and to ensure the innovative products demand creating from state-owned companies. It is important to provide business environment predictability and the Russian startups’ ecosystem internationalization.

Russia ranked quite high 28th place among 130 countries in the human capital index of the world economic forum for 2016. High places in international rankings on human capital development reflect Russia's advantages in this area that preserved from USSR.

The Program for International Student Assessment ratings in the spheres of reading, science and mathematics are still high for today. But the specialists training in the digital competencies sphere is insufficient and that’s why there are not enough qualified graduates in the digital economy sphere. Most of educational programs are not updated and do not provide for key competencies development in the digital transformation sphere.

The situation in Russia has the problems associated with the business environment. Russia was ranked 35 in the business index in World Bank for 2018. It was 53 in 2016 and 112 in 2013. However, some key challenges must be solved. For example, a relatively high tax rate discourages business innovation. Russia ranked 101 in the global competitiveness index for 2017–2018 in taxation, as the tax rate was at 47.4 %. It was 44 % in the USA, 30.9 % in the UK and 21 % in Canada.

The access to new technologies is still limited, rights protection for intellectual property is not correct, corruption level is still high and judicial independence is low.

Russia is among the world leaders in the information security sphere and is ranking 10 in the International telecommunication Union Global cybersecurity index for 2017. However, two of three Russian companies believe that the number of cybercrimes has increased by 75 % for last three years.

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According to the evaluation results of the digitalization level in Russia that was conducted by McKinsey – the leading positions are taking by IT, Educational and Financial spheres. However, Russia is behind the world leaders in key sectors of production such as mining, manufacturing, transport sector, agriculture.

6. Findings

This review allows drawing useful conclusion for practical purposes. Foreign experience could help Russian Federation to organize and establish an effective clusters work. The United States has the leading position with its Silicon Valley that was created many decades ago.

The innovative technologies development depends on university activity that studies of highly qualified personnel and conducts research and engineering work that funded by the state and large corporations with grants. In addition to universities in the United States there are national laboratories and research and educational center as the Rand Inc that was founded in 1948 in Santa Monica, California. Funding for the Rand Inc is diversified and the support from the USA budget includes financial investments from private donors, universities, the medical industry and other sources (Springer, 2017). The total annual income of this corporation exceeds 250 million dollars where works more than 30 Nobel laureates. Much Rand Inc research is strictly classified because it is devoted to the country security. Research topics are diverse, it is about the design of aircraft, missiles, satellites, information technology, programming, creating the artificial intelligence. There are around 1700 employees in this company.

The United States attracts people from many different countries around the world that has created the term "brain drain". Silicon Valley has a wonderful climate, ecology, and the salary is significantly higher than the national average. It is the good opportunity for students to get a good education and after graduating from University they could get an interesting job. There are professors-immigrants from Russia who couldn’t find conditions for realization their abilities in their motherland. They also have a lot of students from China.

China tries to do the same as the USA for today. China tries to become an advanced innovative power in the coming years. China’s tasks are:

- Attracting the highly qualified scientific and engineering workers from abroad.
- Facilitating the return to the country of thousands of Chinese educated at leading American and European universities, including in Silicon Valley.

Setting own universities at the world level. Attracting thousands of private small and medium-sized companies to cooperate in innovation clusters.

Ensuring public-private partnership and co-financing. Much attention is paid to the environment and this is a good example for Russia.

7. Conclusion

The cluster can develop from the industrial cluster into an innovative one. However, it is a danger of degeneration of the innovation cluster into an industrial one. When new ideas and scientific discoveries are implemented in technology and production, it makes enough profit for company, there is a danger of

weakening the investor's interest in innovative research, and the new product has its own lifecycle. If there is no innovative product to this period, the production can stagnate, collapse or even bankrupt. Venture capital is insufficient in Russia. It is impossible to develop innovation without venture capital and it is associated with great risks. Not only the state but large manufacturers should participate in innovation clusters, investing in the development of their products.

Another danger in Russia is bureaucratization, that prevent to develop small and medium-sized business, that could be complicit in the innovation clusters development. The return of our talented compatriots from abroad is stuck with low salaries in science, instability of funding for individual projects, insufficient labs equipment. There are problems with the quality of education in Russia.

The general conclusion is that Russia should strengthen and expand its own base for innovative economic development using international experience and attracting qualified personnel and capital from around the world.

References

Bilenko, P., & Feldman, M. (2017, September 25). *Silicon Valley: What has changed for three years?* Retrieved from http://www.nanonewsnet.ru/news/2017/kremnievaya-dolina-chto-izmenilos-za-tri-goda

Borovkova, A., Kazakova, G., Eldyaeva, D., & Kichikova, N. (2018). *Digital innovations and business management features. Regional problems of economic transformation.* Retrieved from https://cyberleninka.ru/article/n/tsifrovye-innovatsii-i-osobennosti-upravleniya-biznesom

Karapetyan, O. V. (2016). Russian innovative clusters growth problems in the modern stage of Russian economic development. *Actual human. and natural sci. probl., 5−2*, 60−63.

Novoselova, L. (2019). China: prosperity for all. *Busin. and Exhibitions, 1*(97), 30−33.

Porter, M. (2005). Competition. Moscow: Williams.

Sallet, J., & Paisley, E. (Ed.) (2009). Innovation Clusters Create Competitive Communities. *Huff Post Social News, September 21.*

Springer P. J. (2017). RAND Corporation. *Encyclopedia of Cyber Warfare*. Santa Barbara: ABC-CLIO, LLC.

Toor, A. *Can Obama's immigration reform stop Silicon Valley's brain drain?* Retrieved from https://www.theverge.com/2013/1/30/3932056/obama-startup-visa-immigration-reform-congress