

Innovations as a factor of state's improved performance in the World Economic System

Innovaciones como factor de desempeño estatal en el sistema económico mundial

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ABSTRACT:

National economy sustainable development requires using state's innovative potential. Innovations are an instrument of state's economic security, a trigger for improving macroeconomic indicators and an international competitiveness improvement factor. There is a need to revise the existing approaches to innovative mechanism formation for state's economic development. State programs stimulating the creation of new technologies are being considered as the key tools of innovation support. World economy innovative development is based on national innovation systems of all countries, including developed and emerging ones. Sectoral innovation priorities are being shifted. In the innovative aspect of economic development, a special place belongs to the rural component, since hunger and poverty problems are of global matter. National innovation policies of the BRICS countries, which role in creating and distributing high-tech products is prominent, are becoming more and more coordinated.

Key words: innovation activity, international competitiveness, top technologies, sectoral priorities, rural sector.

RESUMEN:

El desarrollo sostenible de la economía nacional requiere el uso del potencial innovador del estado. Las innovaciones son un instrumento de seguridad económica del estado, un detonante para mejorar los indicadores macroeconómicos y un factor de mejora de la competitividad internacional. Es necesario revisar los enfoques existentes para la formación innovadora del mecanismo para el desarrollo económico del estado. Los programas estatales que estimulan la creación de nuevas tecnologías están siendo considerados como las herramientas clave del apoyo a la innovación. El desarrollo innovador de la economía mundial se basa en los sistemas nacionales de innovación de todos los países, incluidos los desarrollados y los emergentes. Se están desplazando las prioridades sectoriales de innovación. En el aspecto innovador del desarrollo económico, un lugar especial pertenece al componente rural, ya que los problemas de hambre y pobreza son de importancia global. Las políticas nacionales de innovación de los países BRICS, cuyo papel en la creación y distribución de productos de alta tecnología es prominente, están cada vez más coordinadas.

Palabras clave: actividad de innovación,

1. Introduction

Despite the fact that transition from the central planning to a market economy still has a certain impact on the structure of the world economy, the current stage of world economy development is characterized by the increased economic instability (Tang and Tan, 2013; Galindo and Méndez, 2014; Jorgenson, Gollop and Fraumeni, 2016). Innovations are one of the most important factors determining economic growth. Innovation is becoming a key factor of economy efficiency and competitiveness in modern conditions. Currently, innovation is a cause of the about 80-90% gain in the gross domestic product (GDP) in the most developed countries. Accelerating innovation processes contribute to production R&D intensity, which means significant financial investments in R&D. The scope of innovations is very extensive for enterprises (Lewis, 2013; Lyasnikov et al., 2014; McCombie and Thirlwall, 2016). An effective investment system makes it possible to ensure a stable development of the innovation sphere. Increasing innovative potential and innovations will intensify the process of entering into the global market for national companies producing science-intensive products. High-tech sphere development improves the international competitiveness of state's economy, namely – the ability of national economy to achieve sustainable high rates of economic growth by implementing a successful innovation policy (Communication from the Commission to the European Parliament, 2010; Terskaya, 2016; Gorodnikova et al., 2017). The state's role in the innovation sphere is based on the understanding that introducing high-tech equipment and top technologies into manufacture process is of great importance for improving national product competitiveness. The state's share in the world innovation exports is an indicator of economy innovativeness, as it demonstrates state's ability to introduce R&D results into real turnover (Pogodina, Terskaya and Chuvakhina, 2017).

Our hypothesis is that state's economic activity efficiency can be increased by forming an innovative economy. World economy globalization comes together with increased competition in innovative markets. Market power will ensure the state's dominant/monopoly position in the world economic system. Hence, the growth of expenditures for research, including developed and emerging ones, is not surprising in most countries.

Theoretical basis of the research involves: annual "Global Innovation Index" reports providing the results of the World Intellectual Property Organization (WIPO) research conducted together with the Cornell University and INSEAD, the French business school; proceedings of the Sustainable Development Program until 2030 adopted by the UN in 2015; proceedings of the Lisbon Strategy and Europe-2020 Strategy; as well as the concepts of innovative development of particular countries.

Research methods are based on general and special methods of cognition, on innovation activity research dialectics, on the empirical approach towards identifying the specific development features of national innovation systems, on the theory and practice analysis.

2. Results

The current stage of world economy development is characterized by the rates of economic growth increasing due to non-financial production factors and international competitiveness of states. In the 21st century, state's innovative development strategy as a research subject is of great importance for the process of studying economic science and business entity's performance. State's intellectual potential is one of the most important components of economy innovative development. It is determined by such major components as education, R&D status, as well as information and communication technologies. In the context of constantly developing innovations running through the system of world economic relations, improving national innovation systems (NIS) is becoming of high priority for all states.

Global experience in forming NIS makes it possible to allocate two major models. In the first case, export specialization is its backbone in the context of weak domestic demand; in the second one – domestic demand and exports are stabilizing factors. The second model is typical for the most developed countries and is a reflection of the innovative development ideology based on the national economic system modernization through the private companies' engineering capacity growth, expanding scope of universities and research laboratories' participation in research. State's (private enterprise's/company's/organization's) participation in innovation activities will be effective if there are long-term forecasts for scientific-technological and innovation activities. Innovation's expediency depends on the correct choice of the innovation, its implementation time and scope with the least social losses, as well as on the mechanisms stimulating innovation activity and financial resources investment directions.

Despite the obvious differences in the level of economic development between the states, their governments understand that the lack of an effective NIS that allows ensuring a stable economic growth makes it especially urgent to think about moving to a new innovative phase of society economic development. The governments have to find ways to increase the innovative potential of national economy. Hence, state's crucial role in creating environment for business entities to perform innovative activity is no surprise.

In fact, Ivan Tikhonovich Pososhkov was the first scientist to express the idea of innovations back in 1724. He thought that destroying "poverty" requires a lot of effort in different areas of life. He placed emphasis on creating environment for innovation, argued about the importance of raising "solid concept inventors", so that many "inventors" would appear (Pososhkov, 1911). Benefit-oriented innovation contributes to additional income growth. J. Schumpeter is commonly known as a founder of innovation theories. In 1912, he published "The Theory of Economic Development" (Schumpeter, 1982) introducing distinctions between the concept of economic growth ensured by quantitative factors and the concept of development based primarily on innovation. According to Israel Meir Kirzner, innovator is a "living" element in the market mechanism. The innovator has a special ability to perceive information and to find favorable opportunities for money making (Kirzner, 2001).

In the context of relatively high uncertainty of commercial success for any innovative project (financial costs are high and the private manufacturing sector is not oriented on the existing (not long-range) supply-demand ratio), only the State as a major investor can ensure the implementation of innovative projects based on the interests of economic development. The State finances the most expensive and priority scientific developments. Thus, the State stimulates innovative business activity by creating favorable environment for investing in high-tech projects through preferential financial and tax mechanisms.

According to *Soumitra Dutta*, the founding Dean of the Cornell SC Johnson College of Business, States should place great focus on building national research capacity for successful competition (Global Innovation Index 2016).

Francis Gurry, the Director General of WIPO, notes that innovation is a "locomotive" of economic growth, but it requires very significant investment and, above all, sparked human creativity (Global Innovation Index 2016).

WIPO research draws special attention to the relationship between innovations and the rural sector. Thus, Innovations Feeding the World was the major topic of report of the Innovation Index 2017. According to Bruno Lanven, the Executive Director of Global Indices at INSEAD, there is a need in "smart agriculture" that will stimulate the introduction of new business models minimizing the burden on land, energy and other natural resources [5]. Innovations are tools used to develop food systems combining food production, distribution and consumption. According to Barry Jaruzelski, the leading practitioner in technology and innovation strategy for Strategy&, the process of introducing agricultural innovations that increase production productivity has to be accelerated due to the threat of a global food crisis (Global Innovation Index 2017). According to *Kundhavi Kadiresan* the FAO Regional Representative for Asia-Parafic, BRICS countries, which actions are consider as "role models" for developing countries,

can play a leading role in the fight against hunger and poverty (Trade and agriculture issues in the focus of BRICS attention).

The purpose of this research is to substantiate the need in developing state's innovation potential, effectively using innovative technologies that enhance international competitiveness, and creating environment for entering new markets.

In recent years, there has been a trend towards a slowdown in spending on R&D in comparison with the pre-crisis period, when the annual growth in research expenses was 6-7% on average. Currently, global figures do not exceed 4%. According to the Global Innovation Index 2017 Report, the first three leading positions are occupied by small European countries – Switzerland, Sweden and the Netherlands. In terms of average R&D expenditure per capita, these countries are ahead of Germany, France and Italy. Switzerland, Sweden and Netherlands, as well as Denmark (6th place) and Finland (8th place), have adopted the concept of NIS and consider it as the major component of the science and technology development policy (Global Innovation Index 2017). There have been created state funds supporting science and technology development in order to finance innovations. National science parks of the Nordic countries are designed according to the best world standards. Universities providing scientific personnel form their base.

Table 1
Global Rating by Innovation Activity Index (The Global Innovation Index)

<i>Rating</i>	<i>State</i>	<i>Index</i>
1	Switzerland	67.69
2	Sweden	63.82
3	Netherlands	63.36
4	United States of America	61.40
5	United Kingdom	60.89
6	Denmark	58.70
7	Singapore	58.69
8	Finland	58.49
9	Germany	58.39
10	Ireland	58.13
45	Russian Federation	38.76

The United States and the United Kingdom rank fourth and fifth. The US government encourages the science alliance creation in order to stimulate the innovation activity: the State and private US companies, American universities and federal research laboratories. Intellectual property commercialization is one of the major sources of university income.

In the US, small firms that have received, according to the adopted Small Business Innovation Research (SBIR) program, the right to own intellectual property created with their involvement are often attracted to the process of testing new technologies in live action. According to the SBIR program, innovative companies having fewer than 500 people have the right to receive grants. Grant size cannot exceed USD 850 thousand. The State regulates innovation activity based on the tendering procedure for manufacturing new equipment and creating technologies. State order executors receive privileges for purchasing necessary machinery, equipment and materials, as well as the possibility of using them freely (Grants for small business in the United States under the SBIR / STTR program).

In the UK, public financing comes down to a "double support" system. This means, that

university's research is funded with block grants that can be spent according to existing priorities and development programs. Secondly, Department of Innovation and universities provide research board with financial resources used for financing research on a project basis. This creates an environment for competition between the projects (Chuvakhina, 2014).

In Germany, which is in the top ten countries by innovation activity (9th), regional authorities are in charge of choosing innovation research policy priorities. In particular, they are responsible for providing tax incentives for research. The same situation is typical for France and other continental European countries. Their authorities finance innovation projects implemented by universities and colleges. Innovation activity and the growing competitiveness of European countries is the major goal of the European Union, which is lagging behind the United States in the field of innovative technologies. This goal was set in the Lisbon Strategy back in 2000 (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of Regions, 2010).

According to the EU strategy, clustering is one of the key tools for achieving greater competitiveness. The cluster approach is based on introducing new management technology that allows improving competitiveness of particular industries, regions, and the State in general. Currently, Europe has formed a multi-country European cluster of new technologies or the so-called innovation corridor from the Silicon Highland in Ireland through the London Triangle and Paris to Northern Italy, with branches to Northern Europe. Lack of coordination between the national innovation policies and a single pan-EU policy hinders the possibility of obtaining positive results with the joint efforts of all European states. At the same time, the concept of innovation-driven growth dominates in the Europe-2020 Development Strategy (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of Regions, 2010).

Nanotechnologies are the priority of an innovation-driven growth program. The large-scale dissemination of results from their application is expected by 2020, according to the most optimistic scenario. There is an opinion that the nanotechnology market will significantly exceed the size ICT and biotechnology markets (Nanotechnology Funding: Corporations Grab the Reins, Lux Research, 2011).

Asia-Pacific countries are leaders when it comes to nanotechnology sales. Singapore is the absolute leader (7th position). This is followed by the South Korea (11) and Japan (14) (Global Innovation Index 2017). Europe is an underdog compared these countries. Russia lags behind the world leaders in terms of nanotechnology commercialization. At the same time, Russia is second only to the United States when it comes to nanotechnology investments. The lack of financing between scientific developments and their commercialization is also a bottleneck.

China's market power is noticeably strengthening. Its place in the innovative development rating is growing ever higher. Thus, according to the Global Innovation Index 2017 Report, China rank 22nd in terms of innovation activity (this is three point higher in comparison with 2016) (Global Innovation Index 2017). Foreign technologies played a leading role in Chinese innovation system development, since Chinese companies have "jumped" over several technological steps and significantly approached the European and American level in a short time. Currently, Chinese authorities encourage national companies to develop "local innovations", including through joint work with foreign partners. According to the State Scientific and Technological Development Program for 2006-2020, China is called upon to make a serious "leap" in the innovative development. Particular attention is paid to providing tax benefits to enterprises interested in innovation activity.

High-tech market becomes global and covers all sectors of the economy. The majority of emerging countries consider innovation activity stimulation as an effective means to activate the sources of agricultural and food production growth. Thus, Brazil annually increases the amount of investments in the innovative development in agribusiness. In 2013, Brazilian Government established the Brazilian Agency for Industrial Research and Innovation (Embrapii) and launched the INOVA EMPESA program to stimulate/finance R&D/innovation in the private

sector, including agribusiness. In Brazil, grain production is being improved not only by natural resources and favorable climatic conditions, but also through the introduction of new technologies. The Brazilian Agriculture Research Corporation called Embrapa provides Brazilian farmers with the equipment and technologies necessary for dynamic agricultural production development (he Global Innovation Index 2017. Innovation Feeding the World). Brazil has initiated a discussion on the possibilities of financing innovation in agriculture within the BRICS countries at the Meeting of BRICS Ministers of Agriculture held in China in June 2017. It was stated that Brazil, Russia, India, China and South Africa produce one third of the world's total grain. BRICS countries have a sufficiently developed research base in the rural sector. Thus, they are able to participate in solving the international food security problem. According to the UN, there are about 795 million people in the world (one in nine of planet's inhabitants), who are starving. BRICS countries recognize that innovations must be actively implemented in the agricultural production in order to eradicate hunger. This idea was reflected in a declaration adopted by the Ministers of Agriculture. This act has consolidated the desire of the parties to cooperate in the field of innovations on a multilateral basis. The New BRICS Development Bank is to fund the innovation projects, as was noted at the BRICS Leaders' Summit held in China in September 2017 (BRICS Leaders Stress Economic, Development Cooperation at Xiamen Summit).

As for Russia, greater financing of innovation is extremely important, as private capital involvement in innovation is passive, large Russian companies are not interested in developing new technologies, budgetary funds are not enough to support high-tech production. These reasons largely explain the low share of Russia (0.3%) in the global high-tech exports. The experience accumulated by Russian companies in the field of innovative technologies requires system, situational and strategic approaches.

In 2017, Russia dropped two points and ranked 45th out of 127 in terms of innovation activity (Global Innovation Index 2017) due to the weak positions of Russian universities in global ratings, reduced number of quoted scientific papers and filed patent applications.

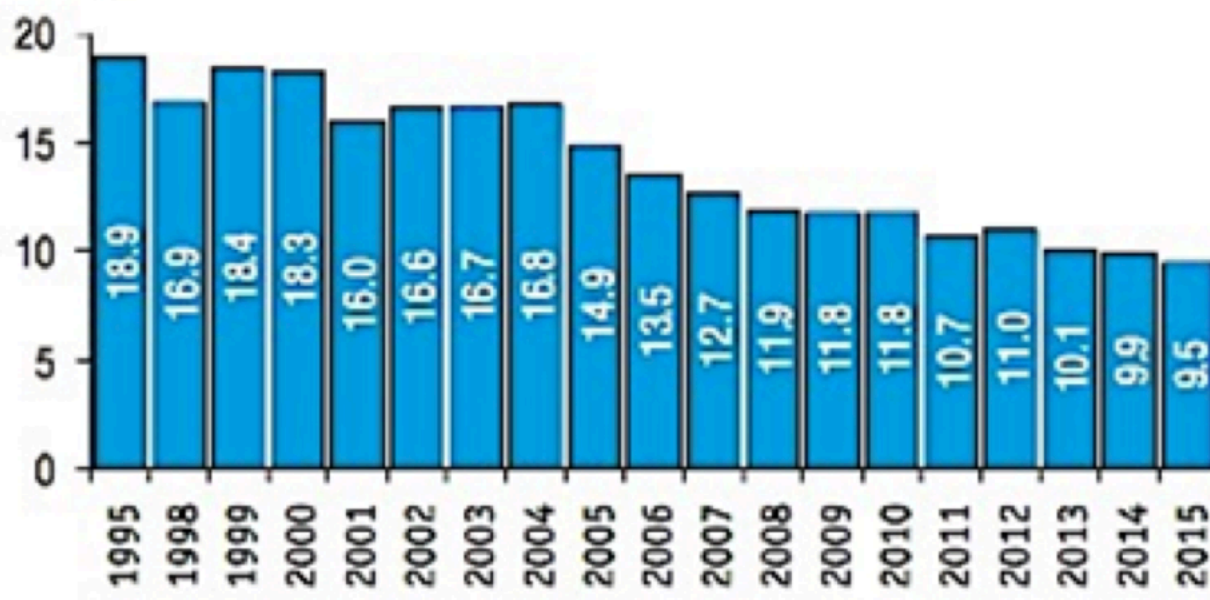
Table 2
Barriers for innovation in Russia (Terskaya, 2016).

<i>Institutional barriers</i>	<i>Socio-cultural barriers</i>
Bureaucracy and corruption	People's mentality
Imperfect legislation	Historical conditions, socio-political climate
Problems in Education and Science	Passive leaders, low initiative
Russian industry status, its raw materials orientation	Low level of entrepreneurial culture, weak management
Unfavorable investment climate	Society does not gauge successful entrepreneurs positively
Basically, medium-sized and large businesses are not involved in the innovation processes	Poor culture of teamwork on innovation projects

Bottlenecks of Russia's innovation activity involve the lack of real competition in the national market, uncertainty in whether the application of innovation research results is timely. Figure 1 shows the share of organizations purchasing new technologies in Russia.

Figure.1
The share of organizations purchasing new technologies in the total number of organizations implementing technological innovations (Gorodnikova et al., 2017)

Percentages



Russia's orientation towards borrowing ready-made top technologies was the main reason why its transition to own breakthrough innovations was slow (Imitation innovation: Russia lags behind even developing countries).

State support of innovative development should have the following priorities: expanded reproduction of knowledge as the major element of innovative economic performance; support of competition in the innovation sphere; information support; stimulation of investments; innovation and industrial policy; intellectual property protection (Pogodina, Terskaya and Chuvakhina, 2017).

3. Discussion

Currently, overcoming the uneven NIS development is important for the effective world economy development. In this regard, BRICS attitude towards ensuring the openness of NISs and creating environment for high-tech competitive products is currently important. The goal of the BRICS policy is to form the foundations of innovative development that would significantly reduce the gap in the field of innovation between developed and emerging countries.

Such an approach marks the beginning of a new stage in the innovative development ideology, in rethinking of the place and role of emerging countries in the world economic system. Innovation activity development creates environment for strengthening global competition in high-tech markets, where the US and the EU countries are still leaders due to a high share of manufacturing industry in GDP and a significant amount of funds allocated to finance top technological developments. According to these indicators, BRICS countries are lagging behind the world leaders. However, high availability of natural resources creates an opportunity for overcoming the backlog.

BRICS countries have to accumulate funds to finance production focused on technologically competitive "new" products. In this regard, it is important to evaluate and monitor the innovation project performance. If one implements an innovation project, he/she (or any entity) should be focused on its practical application and consuming.

Availability of natural resources demonstrates the competitive capabilities of BRICS countries in using innovations in agricultural production. Thus, BRICS countries have to create a basic system for information exchange within the issue of rural sector development, develop a food security strategy in order to ensure the access to food among the poorest segments of the population, and take measures to reduce the negative impact of climate change on food security.

4. Conclusion

Transition to innovative development is the most important challenge for all states, and first of

all, for emerging countries, where innovation activity development is held back by a deficit of investment resources, financial risks, low competitiveness of processing industries, undeveloped innovation infrastructure. Technological modernization requires a list of strategic priorities for R&D to be financed with the allocated state budget resources.

In emerging countries, attention should be paid to innovations in the rural sector, since the solution to the food security problem becomes a top priority in the light of population growth.

Small and medium-sized enterprises can become active participants of innovation activity. Innovation projects could be successfully tested at these enterprises. However, in the context of high risks in implementing innovations, it is difficult for small and medium-sized enterprises to take on the role of a driving force of innovation in emerging countries, as it is in developed ones.

As for Russia, solving problems associated with innovative economy development both at the national and regional levels is of great importance. Regional innovation policy is a set of established goals and priorities for scientific and innovation activity in the region, ways and means to achieve them through the interaction of regional authorities. Regional innovation policy is focused on improving macroeconomic indicators of the region through the effective use of innovative capacity. Regional and municipal authorities should enhance their coordination roles in implementing the innovation policy.

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