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Science and Technology as the Main Factor of National Economy Competitiveness in Terms of Globalization

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Abstract. The geopolitical situation in the modern world has a significant impact on the processes of globalization. We cannot but recognize that the dynamically changing conditions of the modern world community directly affect the economic, political, social and cultural spheres of individual states. Various events of world or national scale, change of regimes and governments, religious disagreements and wars, territorial conflicts and confrontations, crises in power structures, even the characteristic behavior of public personalities– all this imposes their peculiarities on the vector of development of the economy of the country. This is an objectively existing attribute of globalization, manifested as a phenomenon of gigantic world "melting pot". However, the tendency of fading of inter-ethnic and interstate borders, which has always been characteristic of globalization processes is seriously resisted from the part of some countries, regions or politicians. The phenomena of unification and identification derive everywhere, intersecting or going parallel to each other. That is, on the one hand, there is an increase in the openness of the world economy, the merging of cultural and social spheres, on the other hand, there is a course on localization, which approves the national uniqueness of countries. This trend is reinforced by the uneven distribution of economic resources in a wide range of factors: natural, physical, geographic, social, historical, ethnic and others. Consequently, diversification of the economic structure of a number of countries predetermines their place in the world ranking. In such circumstances, increasing the competitiveness of the national economy in any state is put in a number of priority tasks, which contribute to the strengthening of positions in the world economy and ensuring the necessary level of economic security.
The methodology of this research is based on the analysis of common scientific approaches to modern socio-economic problems. In particular, the widely adapted method of descriptions of processes with the use of historical comparisons and generalizations by means of dialectical-materialistic analysis. In the course of the research various variants of combinations of means of scientific cognition were used, namely analysis, synthesis, comparison, systematization, classification and others. Thus, the presentation of the authors ' point of view is based on confirmation of the existing theory of principles of systematic approach to the study of processes and phenomena in modern global economic life. Empirical Base is based on official statistics, facts of periodicals and results of personal researches of authors.

1. Introduction

There is no doubt that one of the most effective ways of realization of growth strategy is the development of technologies, permanent updating and renovation of scientific and technical base. The country's powerful scientific and technological potential acts as a shield resisting to negative interventions

from the outside, undermining the state's authoritative status in the world the rating. The scientific sector, among other things, is the only possible way of leaving the raw material dependence of the industry, leading the national economy into the trap of extensive development.

Moreover, the development and implementation of modern technologies allows the state to get rid of the heavy burden of dependence on imports of investment goods, without which it is sometimes impossible to carry out production processes in leading industries.

In other words, a strong science and technology base seems to be the most important factor of economic, political and social strengthening of the State in the long-term. The origins of technical and technological development should be sought in fundamental science, which need a great amount of investments. In this case, it is primarily a matter of public investment because of their long-term and highly risky nature.

State support should be provided at all levels, starting with schooling and ending with research centers and production complexes. This systemic, inclusive approach can produce good results in the future. Thus, the main object of financial investments is seen, first of all, in human capital, which is of exceptional value in terms of increasing the competitiveness of the national economy and strengthening the political and social power State.

The majority of experts in the field of macroeconomic analysis consider the system of the world economy, classifying countries on groups, based on the criterion of income per capita, accordingly with low incomes, average and high [3,4]. Based on this principle, three groups of countries can be singled out: (1) industrialized countries with strong market economies; (2) Developing countries in Asia, Africa, Latin America and Oceania; (3) countries in transition (Eastern Europe, Russia).

In the writings of some other specialists [13,16] it is possible to reveal the conception of the world economy model in the form of a complex of separate systems, combined by geographical and historical principle. Each system possesses a strong centre of concentration of high technologies, scientific discoveries, a powerful military-industrial complex. Within the framework of this system, different processes of cooperation and competition are constantly taking place. This well-known territorial division into the North American, Western European and Asia-Pacific bloc, in our view, can be represented like the solar system, where the role of the sun as a source of light and energy radiation will be transferred to the industrially developed countries, while the rest of the states will serve as planets and satellites that receive and use the innovative ideas emanating from the center.

Thus, it can be noted that the concentration of the newest technologies, born in the advanced countries, in certain volumes is relayed to the rest of the model. The uneven distribution of the flow of new technologies and scientific ideas and the different possibilities of their adaptive use and transformation determine the existing differentiation in the level of income per capita in different countries.

It is obvious that science and technology is the backbone of economic, political, social and military power of the state. From the economic point of view, the scientific, technological and innovation component is a prerequisite for the competitiveness of the national economy and ensuring its economic security. Thus, it is necessary, to raise own general level of innovative development, starting from existing developments, on the one hand, and, on the other hand, to develop and adapt the available foreign technologies, building the trajectory of international cooperation, while following the needs of the population in priority.

2. Impact of the level of scientific and technological development on the competitiveness of the national economy

The world economic system is constantly undergoing qualitative changes, and this, not least, is caused by the rapid development of a group of countries united by the abbreviation BRICS (Brazil, Russia, India, China, South Africa).

First the term BRICS was voiced by the chief economist of Goldman Sachs Jim O'Neill in 2001. It is widely recognized that the BRICS countries, as the most powerful global economic integration entity, are the most active representatives of the group of developing countries of the world, using their own resources for the prospective economic development.

In the opinion of international experts, the strengthening of BRICS role will be a kind of driver of future world economic growth as a result of development of real sector, reinforcement of financial stability and social stability [20].

This is confirmed by the following data [11]:

• Now, Brazil, Russia, India, China and South Africa are home to 43% of the world's population. The BRICS countries are located in all parts of the globe, accounting for 30% of the territories and 45% of the world's total labour force.

• BRICS countries possess impressive volumes of mineral resources. Russia is the largest exporter of oil and gas, India exports iron ore, diamonds and gold. In China are concentrated huge reserves of coal, copper, aluminum, manganese. Brazil is rich in iron and manganese ore, tungsten, gold and on an equal footing with Russia occupies a leading position in the reserves of fresh water, as well as forest land.

• BRICS economies are structurally diversified and mutually reinforcing. Energy power of Russia is supported by the intensity of manufacturing industry and development of innovations of China, the resource potential of Brazil and cheap labor from India. At last the general stability is guaranteed by impressive "gold" stock of South Africa.

• BRICS are the most actively developing countries in the world. According to the official calculations of experts, the BRICS countries in 2018 had GDP on purchasing power parity of $44 trillion, which is $4 trillion more than that of G7. Data of BRICS trade turnover with African countries are very indicative. Today it is $300 bln.

It should be noted that the BRICS countries have significant differences in the level of economic development by leading macroeconomic indicators. According to the bulletin on current trends of the world economy [6], China, in terms of population comparable to India, produces GDP by PPP, more than 2.5 times (23.2 trillion dollars and 9.5 trillion, respectively, in 2017).

The total variation of GDP per capita PPP in current prices of 2017 in the BRICS is 3.9 times. The values of the the indicator for China, Brazil and South Africa are close: 16.7, 15.6 and 13.5 thousand dollars per capita accordingly. Russia's GDP by PPP per capita is almost twice that of these countries (27.8 thousand dollars), and India is two times behind them (7.2 thousand int. $/person). In this case, the maximum social inequality is noted in South Africa.

The world recession of 2008 – 2009 certainly touched the economies of BRICS. So, China and India have experienced the crisis with a slowdown, but without a deep fall in macroeconomic indicators, returning to the pre-crisis growth rate of GDP in 2010. The most significant decline in GDP among BRICS countries in 2008-2009 was observed in Russia after a relatively high rate of growth in the early 2000s.

As a whole, for 2000 – 2017 years Russia managed to increase the GDP almost in 1.8 times. The similar dynamics was observed in the economy of Brazil, which is mainly focused on export of products of extractive industry and agrarian sector. Both countries showed negative dynamics in 2015 – 2016. The world crisis negatively affected the economy of South Africa: in 2000 – 2007 the country's GDP grew by an average of 4.3% per year, but after the global financial crisis the average growth rate slowed to 1.9%, which is largely due to the decline in export prices for coal [11].

There is no doubt that the key problem of Russia's lagging behind the leaders of the G7 countries lies in the area of commodity dependence, which is, among other things, the cause of low labor productivity. It is obvious that the main indicators will be incomparably higher in high-tech areas prevailing in the economies of highly developed countries compared to similar data in the extractive sector of the economy.

Analysts of S&P Global Ratings have published a study, which allows to see how real the Russian economy will be freed from commodity dependence [14]. According to the analytical data, "in the last two years the dependence of domestic economic and financial conditions on fluctuations in oil prices has decreased", and "the exchange rate relationship with the world oil prices seems to have broken".

Thus, from April to September 2018 the oil of the Urals brand rose by 20%, and the ruble depreciated by 13%, the increase of oil prices for the last year on the average by 30% did not affect the accel-

eration of GDP growth. However, more recently, 20% increase in oil quotations caused an increase in domestic demand for 8–9%, a significant increase in imports in the range of 10 to 24% and a noticeable strengthening of the ruble.

The fall of the world oil prices, certainly accompanied by the outflow of foreign capital and the mandatory fall of Russian ruble. All this testified to the chronically neglected "Dutch disease", implying a high degree of resource dependence and structural industrial deformation of the economy.

However, the year 2018 brought hope for recovery. It is noteworthy that most of the year oil prices grew and the exchange rate fell. According to analysts, international sanctions have played a role. As a result, the economy formed a surplus of the federal budget.

Despite the weakening of dependence on the influence of commodity conditions on the state of macroeconomic indicators, the share of oil and gas production occupies about 20%, in the structure OF GDP and makes 45% of federal budget revenues and almost 60% of exports of goods (exports of metals provide more than 10%). This has a negative impact on the sovereign rating (now it is at the level of BBB +). In order to achieve a higher rating (categories A and AA), a country with a pronounced commodity dependence may, on the example of Kuwait and Saudi Arabia, increase the liquid assets of the government, which account for almost 100% of GDP, while the RF has only 10% [14].

The more effective way to improve the competitiveness of non-oil sectors, is to stimulate export diversification and develop new technologies. According to analysts of S&P, "this will require consistent reforms aimed at improving the business environment and improving the quality of regulation, as well as solving the problems associated with low levels of competition and innovation."

The general image of geopolitical changes leads to the idea of the continued need for structural changes in Russian economy. It is necessary to provide the urgent transfer of accents from the extensive model of development to the intensive way, meaning the introduction of new technologies and increase of efficiency of scientific and production activity.

This implies the increased attention to the competitiveness of research not only from the part of private investors, but also by the development of extensive government programs. The share of State participation should be much more with the comparison to the private sector's investment due to its long-term nature and high risk. However, there are various levers of influence on the business, stimulating investment activity in the scientific and technical sector, connected, first of all, with weakening of tax burden and placement of big state orders.

Meanwhile, it should be emphasized that the creation of new technologies alone cannot improve the innovative background. New quality environment should be set in order apply and embed innovation in the production process. In this case, it becomes obvious that the smart system cannot increase the efficiency of production and industry itself without the competent staff, appropriately trained and able to creatively exploit the innovation.

The development of the science and technology sector is the only possible way to increase the competitiveness of the national economy. There is a need to consolidate public and private sector action to create and activate new technologies. First, it will weaken economic and political dependence on other countries and volatility in commodity markets; secondly, it will shift the emphasis of development from the extractive production towards high-tech industries, which, by the way, implies efficient and economical use of resources; thirdly, it will contribute to create a favorable climate for continuous improvement of the quality of human capital, which is the foundation of the nation's well-being.

However, all this does not mean a policy of absolute import substitution, which became very popular among some representatives of public administration. The complete rejection of import of investment and consumer goods is a way to isolation, which contradicts common sense and ideas of mutually advantageous cooperation in the field of foreign economic relations.

The use of foreign technologies helps to save time and money for research and development, allows to raise domestic production to a qualitatively new level in a short time and activates all domestic scientific and production systems. At the same time, purchase of the newest imported equipment is possible only at presence of the own staff of professionals with the corresponding specialization, ready

to competently exploit borrowed technologies and to adjust them under local conditions and market inquiries.

It is necessary to understand that foreign technologies themselves are not just a way to increase productivity and reduce costs. It is a kind of injection, activating scientific and technical life on the scale of national economy and triggering a chain reaction of new knowledge of scientific developments. Technology is essentially a concentration of scientific information, which gets real embodiment in various spheres of life. The ccorrect application of imported knowledge, their creative rethinking works not only on production efficiency, but also paves the way for new inventions, develops scientific and technical potential at regional and national levels. Therefore, the blind transfer of foreign technologies without adaptation and processing will be a pointless waste of time and money.

The current stage of development of the scientific and technical development is completely subordinated to achievements in the field of research. Traditionally, in developed countries, the cost of science is more than 2% of GDP and 10 to 20% of total expenditure in the largest multinational corporations. In the area of science, technology, economics and education there is a large-scale state regulation [10].

In this case, it is necessary to mention the known concept of Foresight [9], which appeared in the 1970s of the last century in the developed countries. Its prevalence in the 1990s was due to the changed conditions of development, the globalization of the economy and science, the rise of international competition in high-tech markets, limited budgetary resources, the need to accelerate the network of economic sectors, etc.

In general terms of Foresight tasks are reduced to long-term forecasting, prospective estimation of technologies, anticipation of future tendencies of development of economy and society and development of strategies for achievement of the constructed model of the future. Its main entities are business communities, representatives of science, statesmen and social workers. Foresight projects are carried out at all levels, from international to intra-corporate.

Over time, the concept has been revised and finalized several times. Initially, the British version implied a focus on the technological aspect, which included a methodology for assessing the prospects of scientific and technological achievements. Further the projects became more and more focused on the market mechanism. Finally, the concept is now increasingly in line with socio-economic objectives. This proves the already voiced idea, that the social factor associated with the quality of human capital is prior in relation to the purely technological component. The actuality of Foresight only increases with time. This can be explained by the following prerequisites:

- Openness of the economy;
- Globalization and localization processes;
- Unpredictability of the general geopolitical situation;
- Rapid development of high technologies;
- Multy-faceted digitization processes;
- High level of scientific and technical competencies.

Foresight has a wide range of forecasting techniques, such as expert discussions, extrapolation methods, modeling and scenario planning methods, balance method, normative method, and program-target method.

Today, in Russia, Forsythe is mainly correlated with the processes of systematic creation of new directions of strategic research and technological achievements, which, in the long term, can seriously affect economic and social development. The main focus is on building a development vector in the field of advanced technology developments for the next 10-20 years; strengthening cooperation between business and the state in creating competitive innovations; implementation of activities that allow the use of new opportunities to improve the quality of products and quality of life, economic growth and international competitiveness of the country. In general, Foresight helps to direct science to solve national problems, that makes possible to deal with a broad research paradigm, which principles can have a significant impact on the position of the scientific sector in Russia.

The concept of Foresight assumes that the advent of the "desirable scenario" of the future largely depends on the actions taken today, so the choice of the direction of development is accompanied by the development of measures to ensure an optimal trajectory of innovation. The central component includes the perspectives of science and technology development. As a rule, these questions become the focus of attention not only of scientists, but also politicians, businessmen, practitioners from different sectors of the economy. As a result of these discussions, new ideas are emerging about improving the mechanisms of researches, education and industry, which ultimately leads to greater competitiveness of the country, industry or region. In addition, such a "look ahead" enhances the improving of management culture and therefore strengthens the position of science, technology and innovation policy.

The projects are aimed not only at obtaining and disseminating new knowledge in the form of reports and recommendations, they ensure the development of informal relations between the subjects of the process, the creation of a single model of behavior. In some projects, it is possible to see the formation of horizontal structures in which scientists, entrepreneurs, government officials and specialists from related fields can discuss and jointly solve common problems. As a rule, projects are carried out quite regularly, sometimes on the basis of a repeating scheme, in other cases, the research is carried out as a series of interrelated actions aimed at solving complex problems and forming of coordinated cooperation on long-term prospects.

The paramount importance of Foresight is due to the complex approach as opposed to the traditional forecasts of analysts, as those forecasts are usually focused on a narrow circle of experts and in most cases are related to predictions of probable scenarios. Foresight means an assessment of the possible prospects of innovative development related to progress in science and technology, focusing on the aspect of development and application of practical measures for the implementation of the chosen strategy.

At the same time, it should be recognized that today in Russia there are not enough systematic actions to describe the horizons of technology development, to assess the consequences of their impact on the economy and society, based on forecasts of possible development scenarios. At the moment there is not completely developed mechanism of formation of scientific and technological priorities, linked with socio-economic and social aspects. Therefore, Foresight can become a necessary tool that will help to identify the most significant tasks for the entire system of decision-making and implementation of public policy. It should be stressed once again that the main difference of Foresight-projects is that they touch not only the definition of possible options for the future, presume active formation of its most preferable scenarios. And because the future we form today (passively or actively), the choice of the most preferable scenarios should be supported by adequate measures that will ensure the most favorable direction of development.

No doubt, one stimulation of innovation is not enough to translate the economy into an intensive development path. It is important to use innovative products effectively. In this case, the first requirement is to increase the competitiveness of domestic developments, because economic measures of the protectionist policy of the state is clearly not enough. In addition, artificial protection of domestic producers from foreign competition, contributes to growing backwardness in terms of creating new technologies. The second task concerns the speed of implementation of research and development [12]. In this regard, there is a need for a special institution or a company that, with the direct participation of developers will carry out scientific, technical and legal expertise, market research, financial and economic calculations and solve organizational issues of the implementation of investment projects related to the introduction of high technology.

The basis of innovation activity in Russia are science cities, municipal units having high scientific and technical potential with the city-forming scientific and production complex. The status of science cities is enshrined in article 1 of the Federal law "on the status of the science city of the Russian Federation" of April 7, 1999 [12]. Science city is a modern version of the old Soviet system of closed-regime scientific towns. Since 1991, scientists have begun to develop a concept of public policy aimed at preserving and developing scientific towns. At the same time the public movement "Union of de-

velopment of science towns" was created, within which the organizational and legal forms of town-forming complexes were determined. The first science city in Russia was the city of Obninsk (Kaluga region), which was awarded the official status of Science city by the decree of the President of the Russian Federation № 821 of May 6, 2000. Currently, the Russian Federation's science cities include 73 urban and rural settlements located throughout the country, one third of which are located on the territory of the Moscow region. The vast majority of science cities are multispecialized complexes, whose activities are dispersed across a wide range of scientific areas, including space and nuclear research, instrumentation, electronics, energy, biotechnology and others. Most of them are focused on the challenges of aviation and space, while the centers specializing in electronics, robotics and biology are not numerous. This imbalance negatively affects the level of domestic developments as a whole. The example of "Skolkovo", an extremely ambitious and expensive analogue of Silicon Valley, whose projects are seldom effectively introduced into production, and 90% of newly established companies operate no more than 3-4 years [18].

All of the above leads to the conclusion that the main problems lie not only in the field of low competitiveness of research and development in our country, but also in the very small specific weight of their introduction into production and business, and therefore the priority task is to comprehensively change the quality of educational, scientific and managerial culture.

The long-term development of science and technology cannot be achieved only through quantitative factors such as the volume of investments, the increase in the number of educational institutions and specialists. The intensive variant of development assumes improvement of quality of knowledge which can be used in the process of production due to realization of a considerable quantity of scientific researches of various content, introduction of new technologies in the respective industries. The productive force of society is applied research, which promotes the production of scientific ideas.

The beginning of the new millennium was marked by serious achievements of science and technology, transformations of the foundations of world civilization. But at this stage, the effectiveness of research becomes a determining factor for the sustainable development of any country, increasing its competitiveness in the world. The availability of advanced technologies is a major competitive advantage and a critical aspect of the geopolitical balance of power. Leadership in competition can be achieved only on the basis of a powerful scientific and technical base, accumulated in the course of the latest scientific achievements, combining the experience of scientists, the effectiveness of the organization and management of fundamental research and experimental development.

Thus, the position of the domestic economy depends to a large extent on the efforts of the State and society aimed at preserving the rich scientific traditions of the past and building a new advanced system that ensures a continuous flow of scientific ideas and their direction on the way to increase the efficiency of production and welfare of the population. So, the innovative economy can be characterized by the following characteristics:

- High level of development of education and science;
- Quality of life;
- High level of economic freedom;
- Fight against bureaucracy and corruption of officials;
- Protection of intellectual property;
- Efficiency of use of physical and financial capital.

3. Conclusion

The immediate task of research work is to create new products that will determine the production activities of the company, industry and the country in the future. Global scientific activity is the basis and necessary requirement of qualitative growth of economy, the key to prosperity of society. The field of research works is correlated with the production activity in the future, so it needs a special strategy, the correctness of which can be evaluated only after the introduction and creation of the product.

Thus, there is a clear link between science in a broad sense, as a sphere of research aimed at acquiring new knowledge about nature, society and a multilevel system that includes scientists with their experience and abilities; scientific institutions; experimental and laboratory equipment; research methods; conceptual and categorical apparatus; scientific information system, as well as the results of scientific production.

Science and production are forming one cycle, covering all processes from the idea formation to its realization in the new product. That is why the transition to an innovative way of development, comprising all stages of transformation of the advanced idea into the existing and successfully working technology, is the most important condition for growth of national income, strengthening of economic security and political independence and improving the welfare of population.

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