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THE INNOVATION PARADIGM OF NEW INDUSTRIALIZATION IN THE CONDITIONS OF THE INTEGRATED WORLD ECONOMIC WAY

The article underlines the importance of the concept of Techno-Economic Paradigm that describes a stage in the development of the world economy associated with the relevant technology revolution. The author identifies a particular aspect in the formation of modern techno-economic paradigm associated with the emergence of new concepts that define the priority of common values. She hypothesizes that, amid the emergence of elements of the fourth industrial revolution (the so-called "Industry 4.0"), it is appropriate to consider the innovative development paradigm as the essential basis of the new industrialization, which precedes this revolution. The new industrialization is examined as a process that contributes to the achievement of global technological parity between Russia and the countries that are technological leaders. In this context, the article emphasizes the most significant ideas, such as viewing the new industrialization as a process of continuous innovation and dissemination of breakthrough technology, computerization of manufacturing, robotization, the Internet of Things, interdisciplinary nature of high technology, ecology of technology, intellectualization of potential of all employed in the industrial manufacturing, and other. The author analyzes the strategies related to the development of innovative activity in Russia. She emphasizes that the indicators describing this activity do not allow to consider Russia as a country with the developed innovation economy. The article identifies the opportunities for increasing the innovation activity in Russia associated with the elaboration of private sector priorities in the main vital areas coordinated with the state priorities for social development, elaboration of an integrated strategy for scientific and technological, institutional and industrial development of Russia, creation of a scientific monitoring system that would allow to make timely adjustments in the necessary control actions. The author emphasizes the dominant nature of the institutional environment, which predetermines the success of socio-economic and innovative development of the Russian economy. She shows that the emergence of a new integrated world economic structure takes place in the context of increasing importance of innovative development paradigm, successful implementation of which is determined by the balance of inclusive and extractive economic and political institutions.

Keywords: innovation, new industrialization, techno-economic paradigm, innovation paradigm, Industry 4.0, strategy, human potential, ecology of technology, world economic structure, inclusive and extractive institutions

Introduction

The defining trend for both the global and national economic development is the increasing role of innovation processes that form the basis of new industrialization and central core of the strategic economic policies in most countries of the developed world. Today's world is characterized by continuously increasing the flow of innovation that leads to dramatic changes in all areas of activity. There is a growing general intellectualization of manufacturing to make it more environment-friendly, personalized, and able to provide the consumers with desired products of preferred quality.

The comprehensive innovation scientific and technological problems are resolved with increasing role of interdisciplinary research, the interpenetration of the results obtained in fundamental and applied sciences, and with the focus of strategic management shifting towards proactive responses to difficult situations. Unfortunately, the current situation in Russia associated with the resource-oriented development strategy has not contributed to the emergence of innovative development paradigm of the national economy as its defining vector. The elaboration of a new approach to the formation of the economic development strategy for Russia associated with the implementation of policy aimed at large-scale structural transformation increases the urgency and relevance of research in the area of innovative and technological development of the Russian economy.

In this context, it seems productive to use the concept of paradigm, or a form for the organization of scientific knowledge, as a model for defining the problem of innovative development of the economy. The most popular interpretations of this concept are civilization, industrial, techno-economic, and innovation paradigms. Within this article, we may note the preference for the concepts of "techno-economic paradigm" and "innovation paradigm." The growing importance of the latter is largely due

to the development of Industry 4.0 and technological challenges that represent the greatest threat to Russia.

From Techno-Economic to Innovation Paradigm of Development

The concept of techno-economic paradigm is associated primarily with the works of C. Perez [1, P. 31]. Her definition of this concept as a "new set of guiding principles that become generally accepted for the next phase of development" was further elaborated in a number of studies made by Russian and foreign authors. The signs that define the emergence of a new techno-economic paradigm constitute the so-called "key factor," i.e., the main element of the system for not only technological, but also administrative innovations. A particular aspect of the key factor is its ability to penetrate into other sectors of the economy, which allows to reduce the relative cost of production, transform labor and capital used in the real economy. Other characteristics of the new techno-economic paradigm include the improvement in the quality of labor, new forms in the organization of production, changes in the structure of investments and their higher share in the new infrastructure, which creates conditions for the active growth of industries based on using the key factor.

The emerging techno-economic paradigm leads to the higher alignment of production and economic relations with all their characteristic phenomena in terms of technology, organization, and management methods, etc. Dynamic distribution of new interrelated technologies and organizational principles, new industries and infrastructures underlie any techno-economic paradigm. The development of techno-economic paradigm leads to the emergence of alternative, more efficient sources of economic growth that determine the long-term development trend and lead to increased productivity across the production system (Fig.).

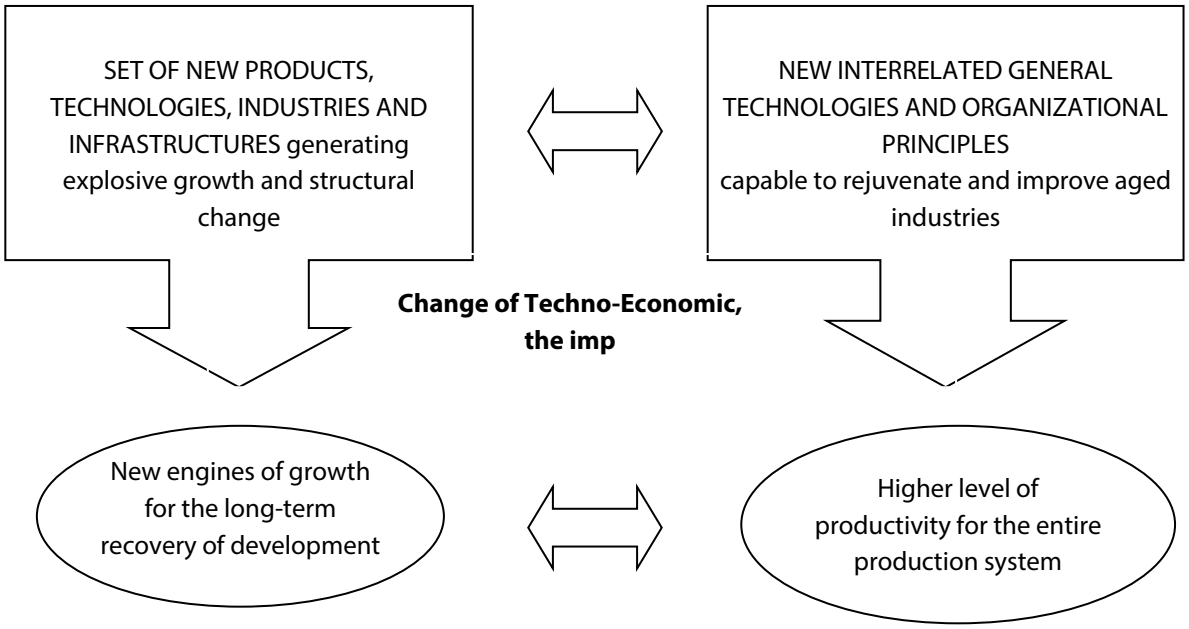

Fig. *Conditions and results of the change of techno-economic paradigms [1, P. 31]*

The systematization of studies in the area of wave-like development suggests that the basis for the emergence of any techno-economic paradigm is the revolutionary technological change that leads to inter-sectoral economic restructuring, and modified structural proportions within individual sectors. However, it should be emphasized again that the success of these processes can be achieved only through appropriate institutional transformation. The importance of this factor is determined by the fact that full use of the potential inherent to the relevant new techno-economic paradigm can be ensured only with the creation of an adequate social and institutional infrastructure.

The initial stages in the formation of a new techno-economic paradigm are characterized by a mismatch between the emergence of new economic sectors and the existing infrastructure and traditional industries. This exacerbates the misalignment between techno-economic and socio-institutional spheres. There are internal contradictions in the economic system between the new and old technology. The process of creating conditions and restoring the alignment in order to take full

advantage of new opportunities is fairly long not only in terms of technological support but also in terms of many emerging social problems.

As noted above, the defining moment in the emergence of techno-economic paradigm is the advent of new innovative achievements that define the relevant revolution. With regard to industrial revolutions, it may be noted that the basic technology of the first industrial revolution was the steam engine; for the second revolution, it was the internal combustion engine that combines heat and electric processes. The basic provisions of the third industrial revolution are associated with the creation of qualitatively new power generation and distribution systems based on information and communication technology, individualization of production, creation of a system for organization of production, which not only addresses the technological and institutional problems, but also makes relevant such problem as the improvement in the quality of life [2]. Currently, the world is at the final stage of the third revolution and early formation of the fourth industrial revolution, sometimes referred to as "Industry 4.0."

The fourth industrial revolution can be described as a stage of accelerated development of information technology, when the internet is actively penetrating in all economic spheres, there is accelerated "digitalization" of all processes, active development of ecosystem of the Internet of Things, artificial intelligence technology, additive technology, robotics, increasing dominance of alternative energy, etc. [3, P. 19]. In the course of this revolution, the innovative development of computer, information and Internet technology will be the highest stage in the development of information technology in general. Among the distinctive principles that give new quality to the emerging economy, we can note the predominance of integrated platforms and ecosystems of projects and services in the market, programming of the various objects development as a business development model, dominance of end-to-end processes from initial stages associated with the order, design and production, to sales and service of finished products, vertical and horizontal connectivity of all business processes and businesses.

A significant place in "Industry 4.0" is held by the Internet of Things (IoT), i.e., the inclusion of surrounding objects in the global cyberspace. The largest segment of the Internet of Things is the so-called "Industrial Internet." By Q3 2016, the world had about 640 public IoT projects in the corporate sector, including 141 projects in the area of Industrial Internet [4, P. 17].

The Russian IoT market is developing quite rapidly, but it is far behind one of developed countries. According to the analysts, in the coming years, the Russian IoT market will grow by more than 20 % annually and, by 2020, it will reach $9 billion.[1] The main areas for application of the Internet of Things technology in Russia are manufacturing, power industry and transportation, which accounts for more than half of all IoT expenditure. A draft roadmap for The Development of Technology in the Area of the Internet of Things emphasizes the need to elaborate uniform requirements for the Industrial Internet of Things.

It seems appropriate to assume that the fourth industrial revolution, which generates a new set of principles in the technological, social, environmental, institutional areas, pre-determines the formation of new techno-economic paradigm, the innovative principles of which are initiated by this revolution. It will differ from all previous paradigms by the emergence of new concepts related to the formation of humanitarian and technological space, along with the priority of common values. The priority of common values is the central idea in the concepts of transformative investing, the so-called "impact investing," and inclusive development, the main ideas of which are detailed in a number of papers[2] [5–7]. The analysis of trends and development areas of the impact investing and inclusive development presented in these papers allowed to reach a conclusion on the identity of these processes. In our opinion, the possibility of convergence between these conceptual approaches and their integration into the defining elements of socio-economic system is a fundamental characteristic of the emerging modern techno-economic paradigm. But its defining feature is formed by innovative solutions in all areas of human activity, which allows to interpret this paradigm as innovative.

[1] Predmetnyy intrnet. In Russian [The internet of things]. (2016). Ekspert [Expert], 48(1009), 80–82. (in Russian).

[2] Dmitry Medvedev vyvel formulu inklyuzivnogo razvitiya ekonomiki Aziatsko-Tikhookeanskogo regiona. In Ruusian [Dmitry Medvedev came up with the formula for inclusive economic development of the Asia-Pacific region]. Retrieved from: http://bujet.ru/article/126201.php (date of access: 1/14/2017).

New Industrialization Based on Innovative Solutions is the Essence of Modern Techno-Economic Paradigm

The failure of policy aimed at reducing the role of manufacturing in the economy was demonstrated in almost all countries. Among the European countries, the greatest decline in the share of manufacturing in GDP was in France, the UK, and Greece, where such share stood at about 8–9 %; in the USA, the similar figure was 11 % in 2013. Manufacturing largely determines the competitiveness of the economies in developed countries, as it generates about 80 % of exports. Ignoring the fact, that it is physical manufacturing which ensures traditional employment in the industrial enterprises, creates demand for innovation, highly skilled labor, focuses the bulk of private investment in R&D, lead to a sharp decline in the share of the real economy.

The decline in the share of manufacturing sector in Western economies led to a number of negative problems, which determined the appearance of documents justifying the inevitability of industrial revival on a new technological basis. The European Commission issued a special communication For a European Industrial Renaissance (2014), where it emphasized the need for urgent measures to re-industrialize the European economy[3]. Among all European countries, only Germany maintained a proper level of manufacturing (about 25 % of GDP), which may have been one of the factors explaining the initial emergence of the Industry 4.0 concept in Germany.

A steady trend towards the decline of the share of manufacturing in the Russian GDP determined the massive de-industrialization of its economy and the fact that it is increasingly lagging behind the advanced countries. This trend can be radically changed only with the active development of new industrialization. We may note a number of ideas that are the most important in this context. First of all, it is appropriate to consider the propagation of innovative breakthrough technology, during the formation of new industrial sectors and modernization of traditional industries, as the main substance of the industrialization [8, 9]. This technology contributes to the qualitative renewal in not only the production processes, but also in the methods of their organization and engagement of labor into the production.

The potential of new industrialization ensures permanent innovative technological and institutional renewal of the real economy, which allows to consider the new industrialization as a process of continuous innovation. The already mentioned processes of "digitalization" of production, robotization, microprocessor revolution are some of the defining attributes of new industrialization. Its main tool comes in the form of the nanotechnology, biotechnology, information technology, and cognitive science (NBIC) that are interdisciplinary in their nature. These technologies, the interpenetration of which is called "NBIC convergence," build the high-tech sector of the economy. These very technologies, along with a large-scale "digitalization" form the central element of the new techno-economic paradigm. At the same time, the increasing role of human factor in all processes of the new industrialization makes relevant the issue of developing socio-humanitarian (S) technologies and convergence of humanitarian and natural scientific knowledge [10, P. 87–88], which has got the name of NBICS technologies.

In the context of new industrialization, the determining role is played by the development of intellectual potential of all those employed in the industrial production, and not only in the high-tech sector of the economy, which accounts for 1–2 % of employed population, while the share of those working in the entire manufacturing sector stands at 20 %. In addition, a significantly greater role is played not only by venture companies, but also by so-called "industry companies," major players in the global markets. These companies manage a variety of resources, control a significant part of the network interactions between the participants of technology chains, which ensures them a priority in the creation of new markets. Russian integrated entities have significantly fewer economic resources. It may be noted that, in Russia, on the eve of 2008 crisis, the largest domestic companies lagged behind their foreign peers in terms of sales, in particular, in metallurgy by 19 times, in chemical industry by 20 times, in automotive industry by 44 times and in the food industry by 40 times [11, P. 10].

New industrialization is also characterized by the deepened development of the network-based organization of production in the real economy. In addition to marketing networks where the backbone resource is provided by the brand, marketing, sales, and technical and marketing networks where the additional backbone resource is provided by R&D, there are emerging cooperative manufacturing

[3] For European Industrial Renaissance. Brussels, 22/1/2014. Retrieved from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0014&from=EN (date of access: 11/17/2016).

networks where the development of information and communication technology allows to transform the intellectual capital into a backbone resource [12].

With the undisputed importance of the technology factor in the new industrialization, one of its defining moments is not just the achievement of economic growth but the guaranteed quality of such growth, which has no negative social and environmental effects. This allows to develop the "green" economy, which requires a reorientation of engineering and technological systems towards environment-friendly models, modernization of existing production-based "nature-like" technologies. The development of this approach formed the basis for the ecology of technology, a new scientific area elaborated in the works of academician V.V. Ivanov [13, 14]. As can be seen from the above, all processes of the new industrialization are based on innovative solutions in diverse areas.

Innovative Activity in Russia

In Russia, active development of strategic documents began in the first decade of the 21st century. 2005 marked the adoption of the Main Areas of the Policy of the Russian Federation in the Field of Developing the Innovation System until 2010. The main purpose of this document was the creation of economic conditions for introducing competitive products to the global market. In 2006, the Strategy for Development of Science and Innovation in the Russian Federation until 2015 was elaborated, which was aimed at creating the national innovation system that, in its basic parameters, would be in line with the innovative systems of developed countries. But the target figures set in these documents were achieved by about 40 %, while for some of them there was even a negative dynamics. Another strategic document was the Strategy of Innovative Development of the Russian Federation until 2020 prepared in 2011. It stated the facts related to the growth of federal spending on fundamental research along with significant work to create the main elements of development institutions. However, the actual development of innovative activity indicates that the targets set in this Strategy are unreachable.

Based on the analyzed indicators of innovative activity in developed countries, academician S. Glazyev identified critical limits for the values of indicators in this area. The values of these indicators allowed to divide the countries into innovative states and those that are just seeking to achieve the critical values. Russia was among the countries that do not belong to the states with developed innovative economy (see Table below).

Table

Estimates describing the innovativeness and competitiveness of the Russian economy [15, P. 361]

Indicator	Critical limit	Actual state as of 2013	Lag of Russian economic indicators behind the critical values
Share of actively innovative enterprises (%)	50	10.1	5 times
Share of manufacturing sector products in exports (%)	50	46.6	1.07 times
Shipped innovative products (% of all industrial output)	15–20	8.9	1.07–2.2 times
Share of new products in the total volume of engineering industry products (%)	7	2.6	2.7 times
Research spending (% of GDP)	3	1.5	2 times
Loss of minerals in the production process (% of total output)	3–8	10–65	3.3–8.1 times
Share of Russian high-tech products in the global market (%)	3	0.3	10 times
Share of intellectual property in the business value (%)	25	10	2.5 times
Share of public spending on the environment in GDP (%)	5	0.8	6.3 times

This table does not require additional comments. We can only note that, in 2014, the situation became even worse. In that year, the total R&D expenditures, including both private and public investments, amounted to 1.13 % of GDP, while in 2015, this figure was 1.19 % (although according to the May 2012 Presidential Decree, these expenditures should have reached 1.77 % in 2015, and according to the targets set in the Strategy 2020, the figure should have been 3.0 %). The situation is similar with the share of industrial enterprises engaged in technological innovation which, by 2020, should be 40–50 %, but in 2014 reached only 9.9 %. It may be noted that the share of innovative products in the total output was 8.7 % instead of 20–30 % expected by 2020.

Translation

Strategy for Scientific and Technological Development of the Russian Federation until 2035

In 2016, on the instructions of the Ministry of Education of the Russian Federation, the Center for Strategic Research Foundation drafted a Strategy for Scientific and Technological Development of the Russian Federation until 2035[4]. It clearly stated the goals and objectives, proposed scenarios of scientific and technological development, mechanisms for selecting the priority areas, and outlined potential risks in implementing the Strategy. A particular aspect of the Strategy is the identification of three stages in the development of science and technology in the Russian Federation after 1991. The first of them was the stage of the crisis optimization and adaptation of the science and technology sector to the market economy (1991–2001). The second stage was the stage of generating the long-term priorities for the development of science, technology, and innovation (2002–2006). This period was marked by the formation of the state development budget, increased financial support for innovation, creation of new facilities for innovative infrastructure. The third stage (2007—present) is associated with the transition to the development of science, technology, and innovation as an essential tool for the innovative development of Russia.

The key characteristic of the contemporary development of R&D sector around the world noted in the Strategy is a whole set of fundamentally new areas, which was the basis for the introduction of such term as the "Science 2.0" in the documents of some developed countries. The essence of this term, that reflects the differences between the contemporary organization and methodology of research and the studies that were typical of the traditional science, are the "digitalization" and intellectualization of research activities, development of large scientific networks, propagation of "open science" that implies the availability of results to a wide range of people, establishment of scientific infrastructure in the form of software platforms for presenting the results of research, and other. In fact, the programs to support the modern research methods and changes required to organize "Science 2.0" have not been implemented in Russia by now.

The Strategy for Scientific and Technological Development of the Russian Federation until 2035 rightly noted the growing importance of science as a productive force in the contemporary world. However, the so-called translational science, which is being developed all over the world and connects the R&D with the direct use of their results in the industrial activity to reduce the period of knowledge transfer into the market products, remains underdeveloped in Russia.

We can also note a number of shortcomings in the Strategy. First of all, it lacks a deep analysis of causes, which prevented the achievement of the goals set in the previous strategies. There is also no description of Russia's future as a basis for identifying its national interests and, as a result, generating such a strategy, which would be aimed at the implementation of these interests. According to V. Fortov, academician of RAS, the idea of implementing a mega program, which is mentioned in the Strategy and implies the unification of academic, university, and corporate research programs, as well as the defense industry programs, is counter-productive. Combining all the funds allocated for scientific research within this mega program, i.e., creating an overly centralized organization for the entire science, is not a viable model[5]. This view appears to be absolutely convincing. The successful development of fundamental research requires to create a separate competitive program with the participation of all scientists in Russia.

It is known that Russia experiences a significant increase of investments in new R&D, as well as in the development of innovative infrastructure. However, this has not led to significant results in the formation of innovation economy in Russia, and failed to launch the mechanism of its innovative renewal, which did not ensure the effective integration of Russian scientific and technological potential into the production chains of high-tech products. The activity in the R&D is not transformed into the results in the form of registered inventions. It is known that the innovative potential of any state can be partly described by the number of patents granted annually. While China grants 1,300,000 patents every year, the USA grants 500,000 patents, the USSR was granting 300,000 patents, today's Russia

[4] Proekt strategii nauchno-tekhnologicheskogo razvitiya Rossiyskoy Federatsii do 2035 goda ot 5 maya 2016 g. In Russian [Draft Strategy for Scientific and Technological Development of the Russian Federation until 2035; May 5, 2016]. Retrieved from: http://sntr-rf.ru/upload/iblock/4c6/%D0%A1%D0%9D%D0%A2%D0%A0%2005.05.2016_%D1%80%D0%B5%D0%B4%D0%B0%D0%BA%D1%86%D0%B8%D1%8F%2022.pdf (date of access: 12/01/2016).

[5] Zasedanie Soveta pri Prezidente RF po nauke i obrazovaniyu 23 noyabrya 2016 goda. In Russian [The meeting of the Presidential Council for Science and Education on November 23, 2016]. Retrieved from: http://kremlin.ru/events/councils/by-council/6/53313 (date of access: 12/8/2016).

grants 29,000 patents a year [16, P. 19]. The number of multifunction robots installed each year per 10,000 workers in South Korea is 478, in Japan it is 314; and in China 36. While the average global figure is 66 robots per 10,000 workers; in Russia it is just 2[6]. The investments in intangible assets in Russia are 3–10 times lower than those in the leading countries. In recent years, the funds spent on the import of technology exceed by about three times the amount generated by the exports of technocratic, and the share of exported high-tech products in the total volume of exported products is only 6 %.

Opportunities for Increasing the Innovative Activity in Russia. As noted above, the implementation of innovation policy in Russia has not lead to expected results. The government initiative aimed at forcing the state corporations to innovate also have not brought positive results. It appears that one of the major opportunities to change the existing situation is to elaborate a unified system of priorities for Russia, which should clearly align private priorities in the key areas of vital activities with national priorities of social development. The integrated strategy, that would allow to set such priorities, must include a joint strategy for scientific and technological, industrial and institutional development of Russia. It is extremely important to create a national system of scientific monitoring, which would allow to timely adjust the required control actions in an extremely unstable environment.

A great positive significance may be the latest initiatives in the area of institutional development of the innovative segment in the economy. In particular, this includes the establishment of the Project Office under the Executive Office of the Government of the Russian Federation. This institutional entity coordinates the work of innovation units across Russia in order to avoid duplication of their powers, and it should address the challenges of the transition to change management. In terms of innovative activity, the good prospects are associated with the Agency for Technological Development aimed at facilitating the technology transfer. But for successful transfer of technology from science to manufacturing it is advisable to establish modern research organizations in Russia that can quickly adapt to dynamic international R&D markets. The above Strategy proposed to build a comprehensive social institution "Science—Technology—Innovation" to produce the scientific knowledge and create innovative technology designs on its basis.

Systemic solutions for defining the key technologies based on major global trends are being developed within the National Technology Initiative, which is a program of measures for building new markets and creating conditions of global technological leadership by 2035. The need to build new global markets based on the network principle, is substantiated in detail in the National Technology Initiative. Its particular aspect is to plan the work based on the future outcome by going from the so-called "preferred reality" to the present.

A new institutional structure, such as the Russian Export Center, can play a positive role in the development of innovative economy. It may become one of the key development institutions. A single center for coordination and support of exports should be created on the basis of the Russian Export Center by 2017. It will participate in supporting no less than $30 billion worth of Russian exports by 2018 and no less than $40 billion by the end of 2025. This means that about 7.5 thousand exporters by the end of 2018, and no less than 12 thousand exporters by the end of 2025 will receive support from the Russian Export Center[7]. To make the Center successful, it is important not only to expand the financial support to exporters and develop the regulatory environment, but also to create the regional infrastructure of the Russian Export Center and scale up its presence in priority countries.

Various institutional initiatives, the importance of which is obvious, cannot overcome the depressing state of such key factors of innovative development, as the labor, capital, investment and factor productivity of the Russian economy. According to participants of the Gaidar Forum, this situation, as well as the main challenge faced by Russia, are associated with the inefficiency of public administration. The participants of the forum assessed the importance of this challenge even higher than the role of challenges posed by the technological backwardness of Russia and its isolation from

[6] A. Kudrin. Ustoychivyy ekonomicheskiy rost: model dlya Rossii. In Russian [Sustainable Economic Growth: a Model for Russia (Speech at the Gaidar Forum on 01/13/2017)]. Retrieved from: https://akudrin.ru/news/ustoychivyy-ekonomicheskiy-rost-model-dlya-rossii-vystuplenie-na-gaydarovskom-forume-13–01–2016 (date of access: 1/14/2017).

[7] Zasedanie Soveta pri Prezidente RF po strategicheskomu razvitiyu i prioritetnym proektam, 25 noyabrya 2016 goda.In Russian [The meeting of the Presidential Council for Strategic Development and Priority Projects, November 25, 2016]. Retrieved from: http://kremlin.ru/events/president/news/53333 (access date: 12/5/2016).

external markets (30 %, 26 %, and 19 % of all respondents, respectively)[8]. And all this despite the fact that, according to even military experts attending the Forum, technological challenges are currently threatening Russia far more than geopolitical or military problems. Moreover, given the unacceptably low level of public trust in such institutions as the government, the parliament, and the police (at the level of 1530 %), it becomes evident that there is the need to improve public trust not only as an important condition for innovative development, but also as a significant reserve for implementing a new development model in Russia.

With the emergence of Industry 4.0, the state itself has to become more technologically advanced. In accordance with the experience of some developed countries, it is necessary to create a system for the formation of public services based on emerging information technology with the possibility of providing them outside the government authorities, i.e., with the possibility of developing outsourcing in the area of public administration. The accelerated "digitalization" and introduction of new governance models will contribute to the emergence of the state as a platform. We can note the relevance of building the platforms not only at the state level, but also at the level of emerging new business models of the enterprise [17].

For all the importance of various aspects related to the innovative development of the Russian economy, it is necessary to keep in mind that innovation is not a universal tool that can be successfully implemented anytime and anywhere. Innovation is the most successful in the countries where its very emergence is linked not so much to the established specific socio-economic environment, but to the system of institutions defining the image of the country. The most important in this system are political institutions.

Innovative Paradigm of New Integrated World Economic Structure

The dominant nature of institutional environment, which predetermines the success of socio-economic and innovative development of the national economy, is emphasized in the studies of many authors. A special place among them is held by Why Nations Fail: The Origins of Power, Prosperity, and Poverty, one of the most significant contemporary economic works [18]. Its authors, Daron Acemoglu and James A. Robinson analyzed the development of nations around the world over the past 10,000 years and came to the conclusion that the quality and dynamics of economic growth, welfare of citizens in any country are determined by the nature of their economic and political institutions. This book introduced new scientific concepts such as inclusive and extractive economic and political institutions. The studies of the above authors suggest that sustainable economic growth is largely dependent on the dominance of either inclusive, or extractive political and economic institutions [18].

When comparing these institutions, Daron Acemoglu and James A. Robinson came to the conclusion that extractive economic institutions allow a small group of citizens to manage the economy of the nation for their own benefit. These institutions allow the alienation of property in favor of narrow groups, they supported by extractive political institutions that ensure control of vested interests over the economy. In contrast to this type of institutions, inclusive economic institutions allow a significantly greater number of citizens to participate in the lucrative economic activities. In this case, the inviolability of property is guaranteed, while its alienation is not allowed. The success of these institutions is supported by inclusive political institutions that do not create opportunities for small groups of citizens to regulate the development of national economy for their purposes.

Daron Acemoglu and James A. Robinson emphasized that both types of institutions simultaneously exist in any state, and the economic growth of a nation is possible both with inclusive and extractive institutions, but the dynamics of this growth varies significantly. The states with inclusive institutions are capable of long-term sustainable growth, which is beneficial for most people, as it improves their quality of life and reduces poverty. In the context of extractive institutions, the economic growth is also possible, although it is often short-lived and, most importantly, does not allow to achieve a substantial improvement of wellbeing for the majority of the people, which creates increased risks due to potential social tensions.

The current situation can be characterized by the processes of global geopolitical transformation. Developing the theory of secular cycles of accumulation [19] academician S. Glazyev substantiated the

[8] A. Kudrin. Ustoychivyy ekonomicheskiy rost. Model dlya Rossii. Vystuplenie na Gaydarovskom forume 13.01.2017. In Russian [Sustainable Economic Growth: A Model for Russia. Speech at the Gaidar Forum on 01/13/2017]. Retrieved from: https://akudrin.ru/news/ustoychivyy-ekonomicheskiy-rost-model-dlya-rossii-vystuplenie-na-gaydarovskom-forume-13–01–2016 (access date: 1/14/2017).

inevitability of replacement of the so-called "American" cycle of accumulation as the basis of imperial world economic structure by the Asian cycle of accumulation, which forms a new world economic structure. The formation of the new world economic structure is based on another civilizational framework and, according to P. Sorokin, it may be called "integrated" [20].

According to S. Glazyev, the common values in the traditions of countries that form the core of Asian cycle ("pioneers" in the formation of the integrated world economic structure) are respect for national sovereignties, focus of institutions regulating the economy on long-term investments in the development of productive forces, pursuit of cooperation and elaboration of common strategic principles for innovative development with the unconditional preservation of national diversity of the countries. Specific features of the integrated world economic structure are the combination of government regulation and market self-organization institutions with the preservation of not only free enterprise, but also of the state control over the main parameters of economic reproduction, priority of public interests over private interests with personal responsibility of citizens for compliance with the law and fulfillment of their duties, organization of necessary R&D financing, modern education and training by the state while the entrepreneurs implement innovations and invest in new technology. All this should allow to change the ideology of international cooperation towards a shift from liberal globalization paradigm in the interests of private capital in the leading countries to the paradigm of sustainable development in the interests of all mankind [15, P. 223].

Obviously, Russia will not be able to form the core of this new integrated world economic structure, but it can become one of the equal participants in its formation. For the emerging core of the new structure, Russia remains an attractive partner, especially in connection with the remaining scientific and technical potential of the country, which determines the opportunities of innovative economic development, highly developed defense industry, diverse wealth of natural resources. In addition, Russia is one of the few countries, which have the experience in global leadership. A significant factor is also the attractiveness of the Russian culture, spiritual values in line with the contemporary paradigm of techno-economic development, which can be viewed as the basis of emerging integrated world economic structure.

It appears that, in the emerging integrated world economic structure, the predominant role will be played by the economic and political institutions of inclusive development, because these institutions allow to achieve the harmonization of social and personal relations with the unconditional principle of behavior that stipulates the conformity of individual behavior with the requirements of public welfare. It can be assumed that the benefits of inclusive development were the initial foundation for the concepts that are relatively new for the world economy, such as the impact investment and inclusive development, which became the defining characteristics of contemporary techno-economic paradigm. This allows to propose the following relationship of these notions: industrial revolution—contemporary techno-economic paradigm—new industrialization—new integrated world economic structure—innovative paradigm of world economic structure.

A particular aspect of the contemporary world, which describes the innovative paradigm of world economic structure is the growing impact of technology on the qualitative change in the human environment with a real threat that the biological space will be substituted by the technological one. This fact was the basis for the emergence of such new scientific area as the "ecology of technology" [14]. Its objective is to identify the problems in the interaction of humans and their biosphere with the technological space. The characteristics of such interaction determined the need for adjustments in the contemporary innovation paradigm which, according to V.V. Ivanov may be formulated as follows: "building a global humanitarian and technological space as a factor of improving the quality of life" [2, P. 4].

This statement fully deserves support, because it clearly defines the final goal of scientific achievements in the area of innovative development as associated with the improvement in the quality of life, which is recognized as an indisputable priority by the entire international scientific community. It is obvious that the real final subject of the innovative economy is not the new technology, products, and markets, but something, for which all this is created and used in economic practice, that is, the priority is the humans, conditions of their life, and their comfortable existence in a particular society. In our opinion, there is also no alternative to achieving the above goal not simply on the basis of developing the innovative high-tech economy, but on the basis of building a technological space, the defining characteristics of which are its humanitarian component and global nature.

Translation

The development of the aforementioned new scientific area known as the "ecology of technology" correlates with the European ideology of eco-industrial development [21], which establishes significantly higher qualification requirements for all participants in the scientific and industrial processes. One of the key areas of this ideology is the design of innovative technologies that allow to make the transition to "low-carbon" development and abandon the use of coal, one of the most powerful environmental pollutants [22].

An important role in addressing the environmental issues on the basis of innovation must be played by the Paris Agreement, which will come into effect in 2020. The agreement was ratified by 111 countries, which account for 77 % of global emissions. But Russia has not ratified this agreement, even though it declared on the UN Climate Conference in Marrakech that it did not fully abandon the "climate agenda." Energy efficiency and fuel economy still remain the key elements of the Russian environmental policy. In the case of implementing all carbon control measures, the emissions in the Russian Federation by 2050 will possibly not exceed 60–62 % of their 1990 level[9].

The innovative paradigm of the new integrated world economic structure is built amid the fundamental change in the requirements to the human potential, which among other things determines the need for transformation of the education system. The main trends in this area are related to the massification of higher education (in Europe and North America about 80 % of young people enroll into the higher education institutions), with the increasingly higher requirements to the workers as "creators of the ideas of scientific and technological development," which makes relevant the problem of comprehensive human development . Russia faces the increasing importance of addressing the problem of building new competencies, developing the lifelong education system for people of all ages. Another increasingly significant issue is the task of improving labor mobility, building specific areas of high technology, where skilled labor resources can be concentrated.

The defining role in addressing this problem is played by strategic priorities formulated by the countries as the key priorities for their national economies. For example, among the developed countries the number one priority is to improve the health care system and develop new drugs. In the US, the first priority is to increase the brain activity. According to the experts, within 10–15 years these countries will create new health care systems, which will allow to restructure the economy and incorporate the "silver age economy" into its productive part. The Strategy of Scientific and Technological Development of the Russian Federation until 2035 also mentions the need to create a new quality of life for the elderly and address the problem of active longevity.

Conclusion

As can be seen from the above, the desire to achieve a technological parity with the developed countries, radical transformations in the national education system, emergence of humanitarian and technological space are objective factors that contribute to incorporating Russia into the innovative paradigm of emerging new world economic structure. This structure will possibly weaken the currently existing harsh dictate exercised by the group of leading countries on the admission of specific developing countries to highly profitable global markets. The importance of this problem and convincing arguments on free markets that exist only for participants admitted to such markets [23, 24] provide an additional argument for the need to build a new world economic structure. Its successful formation is stipulated by the need for coordinated development of both economic and political inclusive institutions. In the current conditions, the political organization of economic space, particularly in Russia, becomes one of the essential factors for innovative development and new industrialization [25, P. 29].

The effective use of fundamental sources of Russian national wealth, creation of incentives for the development of Russian economy with successful resolution of accumulated socio-economic and political problems will allow Russia to develop successfully within the innovative paradigm of the emerging new integrated world economic structure.

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Translation