# INDUSTRIAL POLICY

DOI: 10.15838/esc.2020.6.72.8
UDC 338.8, LBC 65.30


## Problems of the State Industrial Policy Formation within Economic Digitalization*

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**Abstract.** Upcoming stage of the Russian economy formation is related to breakthrough toward new technologies that provide accelerated and advanced development of the country. In this situation, organizational and structural changes that meet the growth requirements of the economy and its foundation – industrial base – act as priorities of the socio-economic development. Newly emerging industrial policy, aimed at the deep structural modernization of the production sector of the Russian economy as the main object of this policy and digital transformation, is especially important in this context. The purpose of this work is to study problems of the formation of the industrial policy within scientific and technological changes and economic digitalization, as well as to substantiate areas of the state regulation concerning the industrial sector of the Russian Federation. We sum up theoretical and methodological basics of the industrial policy formation, review theoretical foundations of the industrialization essence and technological changes within economic digitalization, conduct the analysis of the state, trends, and problems of scientific and technological development of the Russian Federation's industrial sector, assess the readiness of the industrial sector to digital transformation, define priorities of the Russian Federation's industrial policy aimed at economic intensification and socio-economic development of the country. The scientific novelty of the study consists of the expansion of methodological approaches to ensuring the growth of the Russian economy and increasing its competitiveness within the new industrialization based on the formation of industrial policy in accordance with scientific and technological changes and economic digitalization.

**Key words:** industrial policy, new industrialization, digitalization of the economy, economic growth, state, trends, areas of development.

* The reported article is supported by the grant of the President of the Russian Federation (MK-3098.2019.6).
**For citation:** Uskov V.S. Problems of the state industrial policy formation within economic digitalization. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 134–151. DOI: 10.15838/esc.2020.6.72.8

**Introduction**

Socio-economic development in the Russian Federation, as in any state, is defined by the impact of many factors. Among them, there are so-called "great challenges"[1] that are dictated by external global circumstances, and they can be called a consequence of internal processes.

External factors include, fist of all, the introduction of western countries' sectoral sanctions in 2014, which impacted several areas of the Russian economy, the decline of global oil prices in 2015, which deepened the systematic economic crisis, and the slowdown of global economy growth rates in general.

Internal factors, which restrict the economic growth and the country's socio-economic development, include the dependence of national economy on energy exports. The mining and refining sector provides more than 60% of all export revenues and more than a third of the balanced financial result in the economy. The ratio of hydrocarbon exports to the GDP grows. In one year, it increased by 0.5 p.p.: from 12% in 2016 to 12.5% in 2017. As a result, the Russian economy stagnates[2]. In the 1999–2008 period, Russia's GDP had an average annual growth of 6.9%. However, the Russian economy has barely shown any increase in the last 10 years. The Ministry of Economic Development does not expect significant economic growth in the coming years, predicting a 1.3% increase of the GDP in 2019, 1.7% in 2020, and just over 3% in subsequent years. If the current trends continue, Russia will not be able to rise to the fifth position by 2024, i.e. to fulfill the task defined in May Presidential Decree no. 204, which is one of the main targets for the upcoming political cycle. A negative impact is provided by a low level of productivity, a critical deterioration of the equipment (according to Rosstat, the "leaders" according to depreciation of fixed assets are industry, healthcare, transport, and communication areas; in these industries, depreciation of fixed assets exceeds 50%), low share of high-tech, knowledge-intensive industries, which are able to generate value added (less than 9% of Russian organizations carry out innovative activities; technological innovations – only 9.5% of organizations; R&D and technological innovations costs are extremely small). In such conditions, it is difficult to ensure the growth of production and labor productivity, the competitiveness of products and the economy as a whole. All of this makes Russia's further underdevelopment in terms of promising technologies, in comparison with advanced countries, real.

Thus, the export-raw material model of the Russian economy has exhausted itself, and it should give way to the neo-industrial model, which can form a priority need for the active introduction of innovative mechanisms of the economic growth and the development of breakthrough scientific and technological areas of economic development. It is possible to achieve this by purposeful development of material production, increasing the part of the industrial component and stimulating the high-tech manufacturing industry. At the same time, the most important tool for the transition to the neo-industrial development model is a scientifically based industrial policy aimed at modernizing the industry and mastering the production of high-tech science-intensive products.

The purpose of our work is to study the problems of the industrial policy formation in the context of scientific and technological

[1] "Great challenges" are a set of problems and opportunities, the response to which is recognized by society and the government as the main development task for a given period of time.

[2] Dependence of the Russian economy and budget on oil. Available at: http:// stolypin.institute/wp-content/uploads/2018/02/issledovanie-syrevaya-zavisimost-2018.01.30-2.pdf

changes and digitalization of the economy, including the justification of the areas of state regulation of the industrial sector of the Russian Federation.

The following objectives are aimed at achieving this purpose:

1) to summarize the theoretical and methodological foundations of the industrial policy formation;

2) to study the theoretical foundations of the industrialization's essence and technological changes within economic digitalization;

3) to analyze the state, trends, and problems of scientific and technological development of the industrial sector of the Russian Federation;

4) to assess the readiness for the industrial sector development of a region within economic digitalization;

5) to determine the areas of the government regulation in the industrial sector of the Russian Federation within scientific and technological changes and digitalization of the economy.

**Materials and research methods**

The theoretical and methodological basis of the study consists of the works of domestic and foreign scientists-economists in the field of scientific, technological, and innovative development of the economy, public administration, formation and implementation of the industrial policy.

The research is based on the analysis of the Russian industrial sector in the context of economic development with an emphasis on digitalization and informatization of production as a technological platform for economic growth in the Russian Federation.

In addition, a questionnaire survey of heads of enterprises of the industrial sector of the Vologda Oblast was conducted, during which we obtained estimates of the level of scientific and technical development of the industrial sector of a region's economy, its readiness for the introduction of digital technologies in the context of the Fourth Industrial Revolution. The sample includes 50 respondents. The Vologda Oblast acts as an object of sociological research due to the fact that it is a typical entity of the Russian Federation with negative trends in the production sector, as well as in the level of its innovation and technological effectiveness, natural for industrially developed regions.

The usage of these methods allowed a more reasonable approach to proposals for adjusting the state industrial policy of the Russian Federation within scientific and technological changes and digitalization of the economy, as well as improving the mechanisms for its implementation.

The study contributes to the implementation of tasks set in the Presidential Order "On National Goals and Strategic Objectives of the Russian Federation through to 2024", namely: the creation of a highly efficient export-oriented sector in the basic sectors of the economy (manufacturing industry mainly), the development of the economy based on modern technologies, and its provision with highly qualified personnel.

**Theoretical aspects of the research**

Issues of the industrial policy in Russia are in the focus of not only state authorities and business but also scientific community and civil society institutions. This interest is largely caused by low growth rates of the Russian economy, which were the result of serious structural economic imbalances, which significantly complicated the consequences of the systemic crisis. A possible way to overcome the crisis is the new industrialization policy, which requires a combination of an active role of the government and market mechanisms in the implementation of industrial policy.

A critical analysis of the works of Russian scientists [1; 2] on the problems of industrial policy formation suggests that its content, forms, and methods are determined by many factors, the most important of which are the stage of society's development, the level of the

country's socio-economic development, the mentality of the population, the institutional environment, the economy's structural proportions, etc. Much depends on the system of public administration. In a planned economy, the role of a government in managing production processes is very significant. In market conditions, its role is mainly reduced to supporting the industry, creating conditions (regime) of the most favorable conditions for national producers of industrial products.

The concept of industrial policy began to form in the 19th century – in the industrialization era. The subject of the industrial policy was a government. Technical and technological means of the production sector were considered main tools for solving the most important socio-political problems.

In developed countries, industrial policy formed in the 19th century, and it was interpreted as a policy to support certain important economic sectors. In the USA, for example, it was called "industrial policy in the agricultural sector" or "industrial policy in the tourism business", etc.

Modern interpretations of industrial policy are somewhat different. According to O. Graham, it should be seen as official strategic actions declared by a government in order to stimulate the development of industries and change the structure of industry [3]. Another researcher suggests that industrial policy should be understood as a government policy aimed at supporting certain specific types of activities and contributing to structural changes[3].

The Russian Federation has developed a specific understanding of industrial policy. This concept was initially introduced in 1993 in relation to the adoption of the industrial policy concept in the military-industrial complex. Unlike "industrial policy", it was interpreted as "government policy in the field of industry", "government support for industry", "industrial development policy", etc. This understanding of industrial policy also has good reasons, because industry is a system-forming sector of the domestic economy.

We emphasize that, in Russia, the Federal Law on industrial policy was adopted only in 2014. After the default of 1998, regional state authorities formed their own concepts of the industrial development, taking into account the characteristics of specific territories, but there was no such document at the country level (*Tab. 1*).

This, of course, impacted the quality. According to Doctor of Sciences (Economics) O. A. Romanova, these documents were not based on general principles, did not have a common goal, did not agree with the federal priorities, and did not contain agreed mechanisms for the industrial policy implementation [4].

In the scientific community, there are various assessments of the stages of the RF industrial policy development. Generalization of scientific publications on this topic [4; 5; 6] allowed us to identify the following stages of the formation and development of industrial policy in Russia (*Tab. 2*).

Special attention should be paid to the post-2012 period, when leading Russian scientists and economists (S.Yu. Glaz'ev, S.S. Gubanov, E.B. Lenchuk, O.A. Romanova, A.I. Tatarkin, etc.) proclaimed the new industrialization as the main goal of Russia's industrial policy. In our opinion, this is justified. Only the creation of new sectors, innovative upgrade of traditional industries, creation of jobs for new and modernized sites, the formation of competitive structurally balanced economy will allow Russia to become a world leader and successfully solve the tasks of the country's socio-economic development.

[3] Rodrik D. *Industrial Policy for the Twenty-First Century.* Harvard University, 2004. Available at: http://www.hks.harvard.edu/fs/drodrik/Research%20papers/UNIDOSep.pdf

Table 1. Concepts of regional industrial policy of the Russian Federation after the default of 1998

| Region | Essence of industrial policy |
|---|---|
| Republic of Yakutia | Focus on start-up capital, creation of a start-up investment fund based on concessions for the development of mineral deposits, attraction of foreign capital |
| Republic of Tatarstan | The strategy of growth points. Significant support for the real economic sector; in industry, primary attention was paid to the electric power industry, oil, chemical and petrochemical fields, and light industry |
| Vologda Oblast | Policy oriented toward the "Severstal" plant, revenues of which generated more than 80% of the regional budget. After 1996 – development of the investment legislation focused on the integrated development of the economy |
| Novgorod Oblast | Strategy for stimulating the development of the real sector of the economy. Creation of the conditions for investment in the real economy without identifying priority areas |
| Yamalo-Nenets AO, Krasnoyarsk Krai | Orientation strategy toward the external (regional) monopoly – "Gazprom" («Krasnoyarsk aluminium plant") |
| Samara, Nizhny Novgorod, Sakhalin, Kamchatka oblasts, Krasnodar and Primorsky krais, Republic of Adygea | Strategy of single-industry development (for regions with developed ferrous, non-ferrous metallurgy, mechanical engineering) |

Source: Tatevosyan G.M., Sedova S.V., Pisareva O.M., Toreev V.B. *Coordination of the Federal Center's Policy and Entities of the Federation*. Moscow: CEMI RAS, 2006. 55 p.; Egorov E.G. *Main Provisions of the Regional Economy's Modernization Concept. "Yakutia – 21st Century"*. Yakutsk, 1996. 33 p.; Tatarkin A.I., Romanova O.A. Industrial policy: genesis, regional features and legislative support. *Economy of Region*, 2014, no. 2, pp. 9–21.

Table 2. Stages of the industrial policy development in Russia

| Period | Content of industrial policy | Results of implementation |
|---|---|---|
| 1989–1991 | Lack of industrial policy, because the market is seen as a panacea for all ills | Degradation of the technological and industrial structure of production |
| 1992–1993 | Selective support for priority industries | Lack of positive dynamics in the development of knowledge-intensive industries, search for rent due to special relations between business and the state |
| 1994–1998 | Support for commercially effective projects (4:1 financing principle) | Lack of positive structural changes, technological progress |
| 1998– 2000 | The best industrial policy is its absence | Preservation of the existing industrial structure |
| 2001–2005 | Soft (horizontal) industrial policy that implements universal methods of support within the framework of a liberal model of economic development | Some improvement of conditions for the development of low-tech industries, reduced competitiveness and destruction of the development potential of high-tech industries |
| 2006–2008 | Complementing a soft industrial policy with selective measures of state support for priority activities. Formation of the national industrial policy. Beginning of the transition to a competitive industrial policy | Increasing the innovation potential, focusing on the development of high-tech industries, implementing national projects |
| 2009–2011 | Stimulating domestic demand; equalizing competitive conditions for the extractive and processing industries. Anti-crisis modernization and economic diversification | Structural modernization of the domestic economy with the advanced development of high-tech industries, increasing the prestige of labor in the branches of material production |
| 2012 – now | New industrialization | Creation of new economic sectors, innovative renewal of traditional industries, creation of high-productivity jobs at new and modernized facilities, formation of a competitive structurally balanced economy |

Source: Romanova O.A. Conditions and factors of structural modernization of the regional industrial system. *Economy of Region*, 2011, no. 2, pp. 40–48; Smirnov E. Innovative vector of industrial policy of the European Union. *The World Economics*, 2007, no. 2, pp. 54–59; Tatevosyan G.M., Sedova S.V., Pisareva O.M., Toreev V.B. *Coordination of the Federal Center's Policy and Entities of the Federation*. Moscow: CEMI RAS, 2006. 55 p.

It should be said that the founder of the new industrialization (neoindustrialization) theory in the Russian Federation is S.S. Gubanov, who considers neoindustrialization as "a historically natural process of the productive forces development, which unfolds after the completion of the first phase of industrialization – electrification. It represents the second industrialization phase, i.e. automation and computerization of the production apparatus"[4].

We would like to note that the theoretical basis of the new industrialization was formed according to several theoretical views.

Thus, the classic of the economic theory A. Smith considered industry a process of manufacturing machines that allow "one person to do the work of many" [7], which corresponds to the classical understanding of industry as a way of replacing labor-intensive production with machine-intensive [8].

It is quite common to understand industrialization as a predominant development of the manufacturing industry, which contributes to noticeable structural economic changes. Therefore, it is often considered being very close to the industrial revolution[5].

The scientific justification of the industrial development path of Russia was given by the Russian scientist D.I. Mendeleev on the basis of the generalization of foreign and domestic experience. Thus, he made a significant contribution to the formation of the economic theory of industrialization[6].

The need to industrialize the socialist economy emerged from the Marxist theory. In the works of K. Marx, there was the interdependence between the development level of "productive forces" – used technologies first of all – and production relations in the production process[7]. A great influence on the formation of scientific conceptual approaches to industrialization by Russian scientists was also exerted by the discussions that unfolded in the 1920s regarding the choice of areas for socio-economic transformations[8]. In general, for a long time, there was a dominating opinion in the Soviet economy that industrialization is the development of mostly heavy industry[9].

The second scientific platform for studying the new industrialization – the theory of industrial society – emerged under the influence of the Technological Revolution (TR) in the 1950s–1960s. As part of the issues of industrialization, scientists put forward a number of theories, principles, laws and justified the stages and prospects of industrial development[10]. Walt Rostow's theory of the economic growth stages[11], Raymond Aron's theory of a unified industrial society [9], John Galbraith's new industrial society [10], Daniel Bell's theory of a post-industrial society [11], and others [12–14] played a fundamental role in the development of the theoretical framework within this scientific platform. Information is recognized as the most important resource of a post-industrial society [15–17]. In recent decades, this has been facilitated by a rapid spread of computer technologies and the Internet [18]. The fundamental characteristics of the new economy are the technological shift and structural transformations [8].

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[4] Gubanov S.S. New industrialization in the definition of the professor. *Internet portal of "The Economist" journal.* Available at: http://www.economist.com.ru/neoindustrial.htm

[5] Brodel F. *Material Civilization, Economy, and Capitalism, 15–18th Century*. Moscow, 1992. Vol. 3. P. 607.

[6] Mendeleev D.I. *To the Knowledge of Russia*. Moscow, 2002. Pp. 385–386, 430.

[7] Marx K., Engels F. *Selected Works.* 2nd edition. Vol. 4. 447 p.

[8] Erlich A. *The Soviet Industrialization Debate, 1927–1928.* Moscow, 2010.

[9] *The Great Soviet Encyclopedia.* 2nd edition. Vol. 40. P. 168.

[10] *The Social Science Encyclopedia. 1985. P. 386; The Encyclopedia of Sociology.* New and Updated. 1981. Pp. 135–136.

[11] Rostow W. *The Stages of Economic Growth: A Non-Communist Manifesto*. Cambridge University Press, 1960. 173 p.

In the modern information space, quite a lot is said about the formation of a "post-industrial society". Supporters of liberal views, regarding the prospects for the development of society and the economy, actively support the this direction of Russia's development.

However, first, material production continues to play an important role in the information economy, although it cannot be denied that its share in the GDP decreases. The production of material goods is still the only basis for satisfying the primary needs of a human and physical existence of society.

Second, in modern economic science and economic practice, there is a common opinion that material production loses its prevailing position in social reproduction (according to Marxist theory), the first position today is occupied by the service sector. However, this is primarily caused by accepted methodology for measuring these areas, which affects our perception of these proportions. The modern system of national accounting is based on a different methodological approach, highlighting the types of economic activity on the basis of the division of the economy into three sectors proposed by the English economist Colin Clark in the book "Conditions of Economic Progress" (1940): primary – agriculture and mining; secondary – manufacturing; tertiary – services[12].

Three, without a modern developed industry, including machine tools, electronics, and other high-tech industries, it is almost impossible to meet globalization challenges.

Four, many leading scientists speak about the importance of industry in the modern global economy. For example, G.B. Kleiner notes that "in the economy of many countries, industry acts as a "flywheel", the rotation of which ensures the stability of the functioning of the country's economy as a whole" [19]. A.A. Porokhovsky, considering the role of manufacturing in the economy of industrialized countries (primarily the USA), said: "Manufacturing remains the foundation of the economic independence of any country, and it determines the level of its competitiveness in the world" [20]. Norwegian economist Erik S. Reinert argued that the growth of the economy, the wealth of the country and its inhabitants directly depend on the development of the national economy of the manufacturing industry and "advanced" (high-tech) services, which are characterized by increasing returns [21].

Thus, the review of studies allows us to conclude that the industrial sector plays a very significant role in the economy and determines its growth rate, competitiveness and independence of the country. In this regard, in the context of the transition to the fourth industrial revolution, the formation of a national industrial policy is considered a measure aimed at a gradual change of the industrial production structure in accordance with selected national goals and priorities, which is an extremely relevant task. A strategically important priority of such policy of the Russian Federation should be the new industrialization aimed at creating new sectors based on the automation of production and the common usage of digitalization of processes and the modernization of existing production on an innovative basis.

**Main research results**

The theme of the rise of material production and manufacturing in its structure is important for the Russian economy. It is particularly important for the industrial entities of the NWFD, primarily the Vologda region. As a result of the "shock therapy" of the 1990s and free trade, the manufacturing industry of the region, as well as the country as a whole, was nearly destroyed. Large-scale privatization led to the destruction of production and

[12] Popov A.I. *Economic Theory: Book for Universities.* 4th edition. Saint Petersburg: Piter. 2006. P. 174.

technological cooperation ties, which resulted in a drop in the volume and efficiency of production and investments. As a result, Russia's GDP reached its 1990 level only in 2005. Price liberalization, on the one hand, made it possible to overcome the commodity deficit, and on the other – caused an increase in inflation, which destroyed economic mechanisms, devalued the working capital of enterprises[13].

The greatest decline in industrial production was observed in the mid-1990s and 2009. It is clearly visible in the dynamics of the industrial production index of the Russian Federation and the Vologda Oblast (*Fig. 1; Tab. 3*).

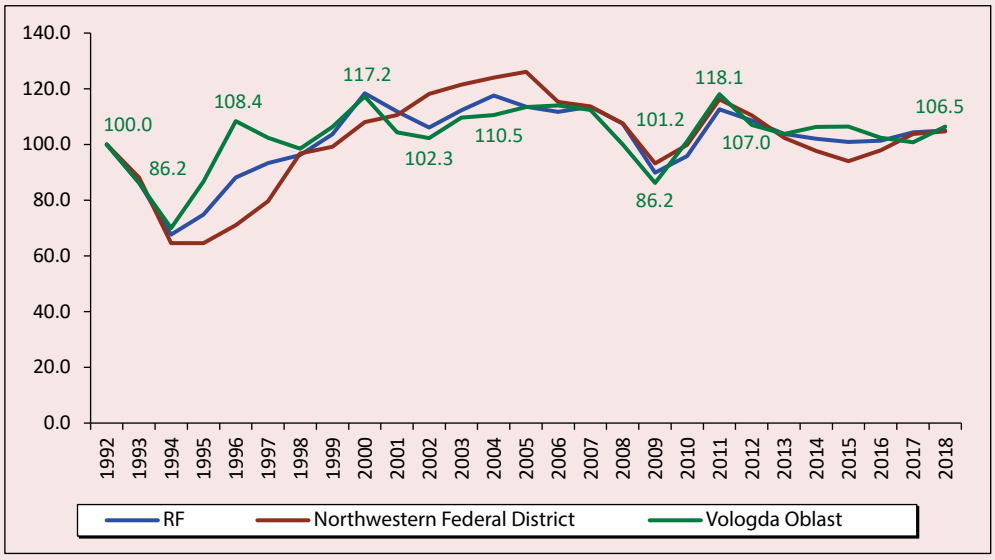
In general, during the studied period, the industrial production index slightly exceeded the 1992 level. At the same time, in industries such as ferrous metallurgy, mechanical engineering and metalworking, and the forest

Table 3. Indices of industrial production of the Vologda oblast by type of economic activity, 1990 – 100%

| | 1992 | | 2000 | | 2005 | | 2010 | | 2016 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Vologda Obl. | RF | Vologda Obl. | RF | Vologda Obl. | RF | Vologda Obl. | RF | Vologda Obl. | RF |
| Ferrous metallurgy | 90.0 | 82.3 | 80.9 | 66.8 | 112.4 | 87.5 | 118.6 | 92.2 | 95.4 | 95.0 |
| Chemical industry | 72.0 | 79.0 | 111.5 | 69.7 | 117.1 | 81.9 | 114.8 | 91.2 | 116.7 | 122.8 |
| Mechanical engineering and metalworking | 95.5 | 84.4 | 109.3 | 32.3 | 150.6 | 44.9 | 150.5 | 48.7 | 107.4 | 45.7 |
| Electroenergetics | – | 79.8 | 414.8 | 45.2 | 325.4 | 116.1 | 132.0 | 111.5 | 106.4 | 119.2 |
| Forestry, woodworking | 102.0 | 78.7 | 73.3 | 37.4 | 129.7 | 48.5 | 117.3 | 47.3 | 109.8 | 50.9 |
| Food industry | 78.0 | 80.0 | 65.5 | 54.6 | 116.5 | 75.2 | 117.5 | 91.4 | 105.5 | 106.4 |

Source: *Russia in Figures. 2018: Stat. Coll.* Rosstat. Moscow, 2018. 522 p.; *Statistical Yearbook of the Vologda Oblast.* 2017: Stat. Coll. Vologdastat. Vologda, 2018. 389 p.; *Industry in the Vologda Oblast. Results for 1990–1999: Analitical Collection.* Vologda, 2001. 44 p.

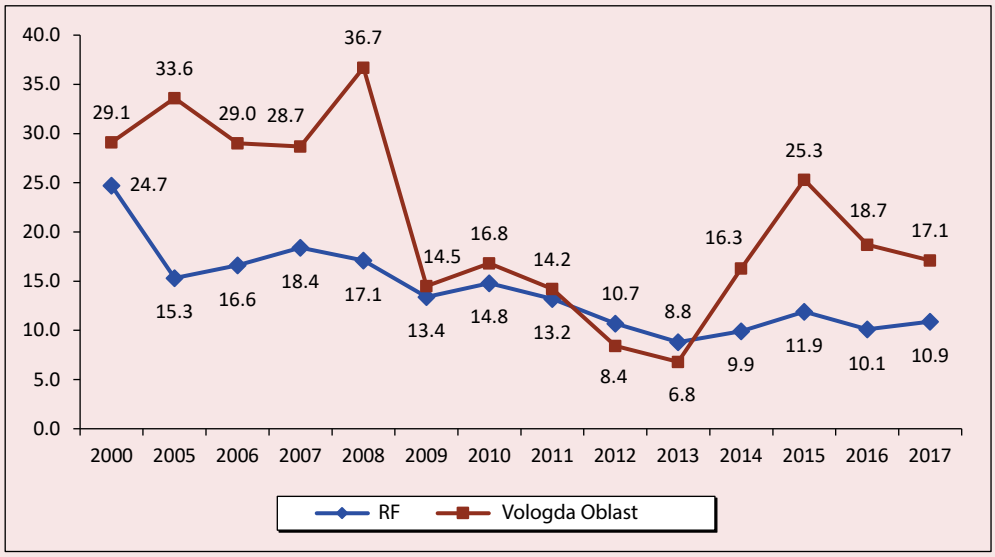
Figure 1. Industrial production index, 1992 – 100%




Source: Industrial production. Available at: https://www.gks.ru/enterprise_industrial

[13] *Analyzing the Past, Thinking about the Future: Monograph*. Under the scientific supervision of Doct. of Sci. (Econ.), Professor V.A.Ilyin. Vologda: ISEDT RAS, 2015. 336 p.

Figure 2. Profitability of production of industrial enterprises of the Russian Federation and the Vologda Oblast in 2000–2017, %




Source: Rosstat data.

industry, the industrial production index has significantly decreased, and it currently does not exceed the 1990 level.

However, the profitability of industrial enterprises' products significantly decreased – by more than two times in the period from 2000 to 2017 (*Fig. 2*).

The decline of industrial production led to changes in the structure of the economy (*Tab. 4*). In the Vologda Oblast, trade and repair services developed at a faster pace than other economic activities. Despite the fact that the share of manufacturing industries in the GVA of the region exceeds 30%, it significantly decreased (from 46 to 38%) in the 2005–2017 period. In the Russian Federation, the share of manufacturing industries in the GVA also decreased during the studied period, it was 17% in 2017.

Over the years of reforms, the structure of the regional economy has significantly transformed. The share of high-tech industries has significantly decreased. Currently, the largest share in the structure of industry is occupied by ferrous metallurgy and chemical industry, whose enterprises are largely focused on the external market and export of products of lower production stages. A similar situation is recorded in the whole country – there is a primitivization of production.

At the same time, the dynamics of the industrial production index of the CIS and Baltic countries, which, like Russia, are experiencing a transformational period, allows us to conclude that their trajectories have clearly divided into two clusters for a quarter of a century. The three republics took the lead. Among them, Uzbekistan is the leader, which has achieved a 5 times growth compared to the 1990 level. The growth rates of the industry of Turkmenistan and Belarus are slightly lower. The remaining states are at or below the pre-reform level. The industrial sector of Russia grew slightly during the reform period, amounting to 105% compared to 1990[14] (*Fig. 3*).

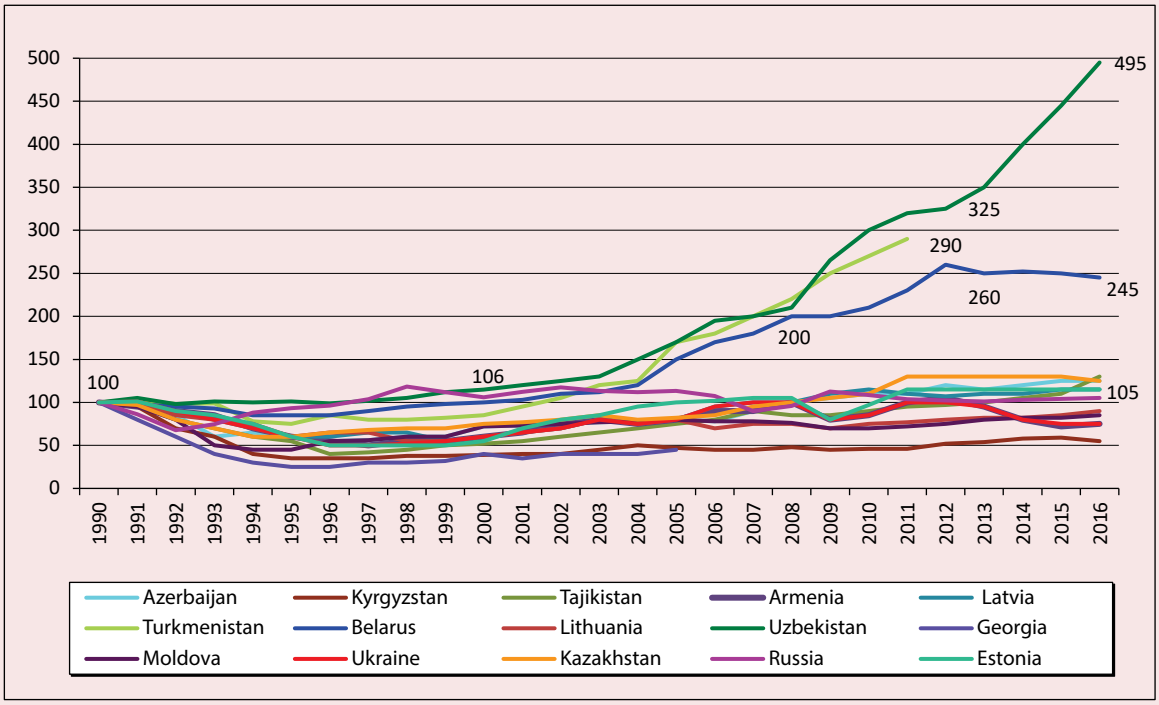
[14] Gundarov I. Sociohumanistic effect. Liberal and eurasian economic models – experience of a 25-year comparison. Available at: http://www.ng.ru/nauka/2019-11-12/11_7724_effect.html

Table 4. Structure of the economy of the Russian Federation and the Vologda Oblast by the share of economic activities in gross value added, %

| | Vologda Oblast | | | Russian Federation | | |
|---|---|---|---|---|---|---|
| | 2005 | 2010 | 2017 | 2005 | 2010 | 2017 |
| Agriculture, forestry, hunting, fishing, and fish farming | 7.5 | 5.8 | 4.1 | 5.2 | 4.3 | 4.6 |
| Mining operations | 0.0 | 0.0 | 0.0 | 12.8 | 10.4 | 12.1 |
| Manufacturing industries | 46.6 | 38.1 | 38.1 | 18.5 | 17.7 | 17.4 |
| Provision of electricity, gas, and steam; air conditioning | 3.5 | 4.7 | 3.1 | 3.8 | 4.5 | 3.3 |
| Construction | 10.3 | 7.9 | 7.1 | 5.7 | 6.9 | 6.2 |
| Wholesale and retail trade; repair of motor vehicles, and motorcycles | 6.6 | 8.5 | 12.8 | 21.8 | 19.4 | 16.7 |
| Transportation and storage | 11.9 | 14.3 | 12.7 | 10.6 | 10.5 | 8.0 |
| Activities of hotels and catering establishments | 0.5 | 0.7 | 0.6 | 0.9 | 1.0 | 1.0 |
| Financial and insurance activities | 0.5 | 0.4 | 0.3 | 1.1 | 0.6 | 0.5 |
| Real estate operations | 3.9 | 5.1 | 2.9 | 9.0 | 11.4 | 6.5 |
| Education | 2.2 | 2.9 | 2.2 | 2.8 | 3.0 | 3.0 |
| Activities in the field of health and social services | 3.3 | 4.2 | 3.6 | 3.1 | 3.7 | 3.9 |
| Other activities* | 3.2 | 7.4 | 12.5 | 3.2 | 7.4 | 12.5 |

* Other activities include: information and communication activities; professional, scientific, and technical activities; administrative activities and related additional services; public administration and military security; social security; activities in the field of culture, sports, leisure, and entertainment; activities of households as employers; undifferentiated activities of private households for the production of goods and services for their own consumption.
Source: Rosstat data.

Figure 3. Dynamics of the industrial production index in the CIS and Baltic countries, 1990 – 100 %




Source: Gundarov I. Sociohumanistic effect. Liberal and eurasian economic models – experience of a 25-year comparison. Available at: http://www.ng.ru/nauka/2019-11-12/11_7724_effect.html

One of the possible ways to solve these problems, as well as a way of responding to the challenges, is seen in the new industrialization of the Russian economy. However, a serious obstacle to the development of industry and high-tech industries, based on information technologies, is the low share of domestic expenditures on information and communication technologies in the gross domestic product of the country.

The analysis shows that, in the period from 2010 to 2017, this indicator did not change significantly (1.1% of GDP), while the costs of organizations for information and communication technologies constantly increased. The growth rate of these costs corresponded to the GDP growth rate (*Tab. 5*).

In developed economies, the main motivation for the deployment of new industrial and technological policies was the need to overcome the slowdown in labor productivity growth. This problem is also relevant for the Russian Federation. Over the 2003–2016 period, labor productivity in Russia practically did not increase (*Tab. 6*); in half of the industries presented in the table, it decreased in 2016 in comparison with 2003. Therefore, for the full realization of the potential of the national economy of Russia, the task of ensuring sustainable growth in the level of labor productivity has not lost its relevance.

Technological modernization of production facilities is seen as one of the main reserves of its solution, based on the commissioning of new equipment, modernization of existing equipment, introduction of integrated automation, etc. The absolute majority of the surveyed managers of Russian industrial enterprises (84%) consider an increase in the technical level of production to be a key internal condition for increasing labor productivity[15]. However,

Table 5. Information and communication technology expenditures in GDP for the period from 2010 to 2017

| Indicato | 2010 | 2012 | 2014 | 2015 | 2016 | 2017 | 2010–2017, % |
|---|---|---|---|---|---|---|---|
| Cost of ICT, bil. rub. | 516 | 843 | 1175 | 1153 | 1249 | 1012 | 196.1 |
| GDP, bil. rub. | 46309 | 68164 | 79199 | 83387 | 86010 | 92000 | 198.7 |
| Cost of ICT in GDP, % | 1.11 | 1.24 | 1.48 | 1.38 | 1.45 | 1.10 | -0.01 |
| Source: *Regions of Russia. Socio-Economic Indicators. 2003–2018*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/ publications /catalog/doc_1138623506156 | | | | | | | |

Table 6. Labor productivity index for the main sectors of the economy of Russia, 2003–2016, 2003 – 100%

| Branch of the economy | 2003 | 2010 | 2012 | 2014 | 2016 |
|---|---|---|---|---|---|
| In general in the economy | 100.0 | 103.2 | 106.6 | 104.0 | 100.5 |
| Agriculture, hunting, and forestry | 100.0 | 88.3 | 88.5 | 103.5 | 107.3 |
| Fishing, fish farming | 100.0 | 97.0 | 106.1 | 105.1 | 92.5 |
| Mining operations | 100.0 | 104.3 | 104.6 | 103.1 | 101.1 |
| Manufacturing industries | 100.0 | 105.2 | 110.2 | 107.4 | 103.3 |
| Production and distribution of electricity, gas, and water | 100.0 | 103.0 | 103.2 | 100.4 | 102.3 |
| Construction | 100.0 | 99.6 | 101.0 | 99.8 | 94.9 |
| Wholesale and retail trade, repair of motor vehicles, motorcycles, household products | 100.0 | 103.6 | 105.8 | 100.8 | 95.6 |
| Hotels and restaurants | 100.0 | 101.7 | 103.6 | 101.7 | 95.0 |
| Transport and communications | 100.0 | 103.2 | 105.5 | 102.6 | 100.2 |
| Real estate transactions, leases | 100.0 | 104.0 | 104.8 | 99.4 | 98.9 |
| Source: Efficiency of the Russian economy. *Federal State Statistics Service*. Available at: http://old.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/efficiency/# (accessed: December 17, 2019). | | | | | |

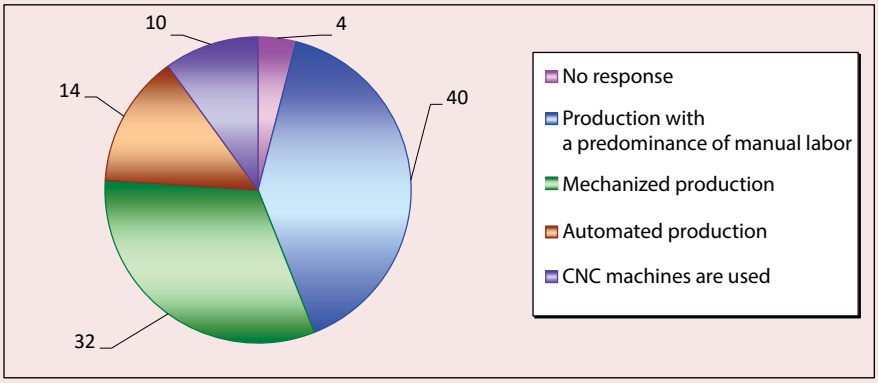
[15] Labor productivity. Results of a survey of 500 managers of industrial enterprises. Ministry of Industry and Trade of Russia, The Center for Strategic Research, Monitoring Centre of the industry development, Technological Development Agency, 2017.

the readiness of enterprises for modernization of industrial productions and development of digital technologies may be judged by the results of a survey of heads of leading industrial enterprises, conducted by the Vologda Research Center of RAS[16].

In the Vologda Oblast, only 14% of managers, who participated in the survey, noted that their company's production is automated. There are machines with numerical control at every tenth enterprise. A third of respondents (32%) indicated that their company's production is fully mechanized. However, manual labor production dominates in the majority of enterprises in the region: 40% of the survey participants answered this way (*Fig. 4*).

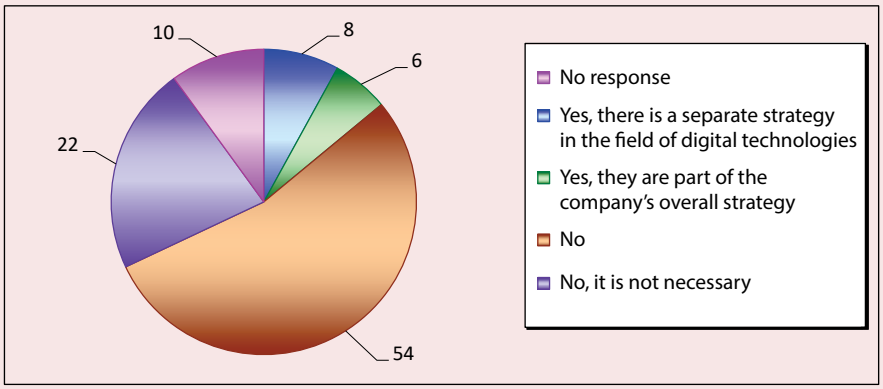
The majority of industrial enterprises in the region (54%) do not have a strategy for the development and implementation of digital technologies (*Fig. 5*), while 22% of respondents do not see the need for them.

Figure 4. Distribution of answers to the question "How can You characterize Your production according to the proposed list of criteria?", % of respondents




Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies, VoIRC RAS, 2018.

Figure 5. Distribution of answers to the question "Does Your company have documents in the field of development and implementation of digital technologies?", % of respondents




Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies, VoIRC RAS, 2018.

[16] The sample includes 50 industrial enterprises of the Vologda Oblast. The sampling error does not exceed 5%.

The monitoring showed that 54% of enterprises conduct training and professional development of employees in order to use digital technologies more often. 46% of respondents noted that they study the best practices of other organizations. At the same time, nearly 26% of respondents do not plan to use digital technologies (*Tab. 7*).

More than half of the survey participants (54%) pointed out that one of the barriers that complicate the process of using digital technologies is a high cost of projects. About 40% of respondents spoke about insufficient qualification of personnel, 26% drew attention to the lack of sufficient own experience in the use of digital technologies (*Tab. 8*).

Table 7. Distribution of answers to the question " What steps does Your organization take or plan to take to start using digital technologies for business more actively?", % of respondents

| Respond option | % |
|---|---|
| Training and professional development of current employees | 54.0 |
| Study of the best practices of other businesses | 46.0 |
| We do not plan to use digital technologies in the near future | 26.0 |
| Cooperation with external experts and consultants | 8.0 |
| Hiring new employees with experience in implementing or using digital technologies | 6.0 |
| Purchase of ready-made assets (companies) with competencies in the field of digitalization | 4.0 |
| Raising capital to launch production digitalization projects | 4.0 |
| Creation of alliances with other companies to explore the possibilities of digital technologies | 0.0 |
| Establishment of working groups and participation in external working groups to promote digital initiatives | 0.0 |
| Other | 2.0 |
| Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies, VoIRC RAS, 2018. | |

Table 8. Distribution of answers to the question "What are the most serious barriers that complicate or slow down the process of widespread use of digital technologies in Your company?", % of respondents

| Respond option | % |
|---|---|
| High cost of digital technology projects | 54.0 |
| Lack of qualifications of the staff that use digital technology | 40.0 |
| Lack of sufficient own experience in the use of digital technologies | 26.0 |
| Lack of digital solutions that take into account the specifics of the company's business | 20.0 |
| Insufficient level of infrastructure development | 14.0 |
| Economic uncertainty in the country | 12.0 |
| Lack of awareness of the benefits of digital technologies among decision makers in a company | 12.0 |
| High operating costs for systems that use digital technologies | 8.0 |
| Lack of information about the successful experience of using digital technologies in other companies of an industry | 6.0 |
| Lack of qualification of personnel implementing and maintaining digital technologies | 6.0 |
| Introduction of digital technologies requires changes and costs on the part of suppliers and consumers | 6.0 |
| Lack of special measures of state support for the usage of digital technologies by companies | 4.0 |
| Unwillingness of employees to change the usual forms of work | 2.0 |
| Insufficient budgets allocated for projects using digital technologies | 0.0 |
| End-user's commitment to familiar products (services) | 0.0 |
| Regulatory restrictions, lack of standards for the usage of digital technologies by companies | 0.0 |
| Weak protection of digital technologies from criminal attacks | 0.0 |
| Negative experience of using digital technologies in a company | 0.0 |
| Negative experience of using digital technologies in other companies in an industry | 0.0 |
| Other | 0.0 |
| Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies. VoIRC RAS, 2018. | |

Thus, the vast majority of industrial enterprises in the region do not have plans for the development and implementation of digital technologies; a head of every fifth one does not see the need for them. Among the digital technologies used by enterprises of the real sector, the Internet of things technologies prevail. The wide spread of digital technologies is hindered by a high cost of projects, insufficient qualification of personnel, and lack of experience. The lack of financial resources is a key factor hindering the re-equipment of production facilities [22]. This conclusion can be extended to the industrial sector of the Russian economy as a whole, since nearly all regions of the Russian Federation have the same problems, they are characterized by the same trends. As a result, the competitiveness of most Russian industries remains low.

**Propositions**

Unfavorable geopolitical situation, increased competition on world markets, and extremely low growth rates of the Russian economy further actualize the issue of the need for the development of the Russian Federation within the framework of a global trend – new industrialization. The Russian economy needs a purposeful development of material production, the creation of a high-tech manufacturing industry, and an increase in its share in the structure of industry, in order to regain its former position as a highly developed country in scientific and technical terms.

In this regard, the ideas of the new industrialization are extremely important for the Russian Federation. The rise of the role of material production in the system of social reproduction, the development of manufacturing industries should be considered a huge advantage of Russia and its individual regions. Accordingly, the task is to develop methods and mechanisms for the flow of resources from the excessively developed sphere of commodity circulation (in the Vologda Oblast, its share reaches more than 50% of the organizations' turnover) to the sphere of production of goods and provision of intangible services.

The formation of a new development model, which includes the structural restructuring of the economy, the revival of the real sector on the basis of the most advanced technological innovations are in the agenda. In the context of the unfolding new industrial revolution, the structural and technological factor comes to the fore, acting as the basis for the future material structure of the economy capable of generating new sources of growth, ensuring a high level of product competitiveness. This is possible only with a large-scale technological modernization of the domestic industrial complex [23].

While developing the potential of global technological leadership, developed countries focused on the following aspects. First, determination of national priorities for scientific and technological development and development of individual economic sectors within the framework of state scientific and technical, innovation and industrial policy; mutual coordination of long-term forecasts, strategies, plans, and programs in the economy's priority sectors. Second, formation of appropriate institutions and mechanisms that contribute to the implementation of goals and objectives to achieve technological leadership in priority areas. Third, acceleration of the participation of national corporations in global value chains. Four, increase of the competitiveness of the economy and its sustainable growth through selective support of scientific research and the introduction of technological progress.

Advanced foreign experience is also very useful for the Russian Federation. At the same time, its usage in Russian practice is impossible without the development and implementation of an adequate state industrial policy aimed at a significant contribution of the production

sector to the growth of the country's economy and the formation of its balanced structure. The lack of an adequate industrial policy threatens to further lag Russia in terms of labor productivity and product competitiveness in global markets, and it may become a systemic and insurmountable obstacle to development in the foreseeable future [24].

In the list of tasks of industrial policy, priority should be given to the following activities:

– promotion of technological re-equipment of the country's industrial enterprises;

– modernization of fixed assets;

– creation of conditions for the implementation of the results of intellectual activity in industrial production;

– expansion of the production of innovative products;

– development of the production and innovative potential of industrial enterprises.

In the context of scientific and technological changes and digitalization of the economy, industrial policy implies the implementation of a set of measures that meet the modern requirements of social development and national interests of the growth of innovative industries, sustainability, and socio-economic balance of the country:

– economic and non-economic support for scientific and technological development in all its facets;

– balanced structural policy of capital investments in the scientific and technological sphere, public investments based on the principles of public-private partnership contributed to the creation of an innovative economy in many countries of the world;

– strengthening of vertical and horizontal links and interactions of innovation participants, including cross-country cooperation, ensuring the completeness of the cycle from invention to R&D implementation;

– development of innovative infrastructure, including a network of channels for knowledge and technology transfer, exchange of experience, communication between researchers and entrepreneurs;

– formation of incentives for entrepreneurs engaged in innovation, aimed at coordinating local interests and system-wide guidelines of the country's movement (it is necessary to strengthen interest in innovation, streamline the regulatory framework, the system of income distribution and taxation, and reduce the tax burden on innovative businesses);

– integration of the interests of entrepreneurs, goals of the government, and the usage of foresight management mechanisms;

– institutional changes, including a system of clear and coordinated rules for innovation and scientific activities, relevant development funds and institutions, the creation of special bodies responsible for system strategic planning, coordination and scientific and technological policy;

– change of the economic growth model, creation of technological leadership scenarios, new models for managing the processes of scientific and technical changes and mechanisms for implementing technological development strategies.

Successful implementation of industrial policy, first, will be facilitated by the creation of a favorable regulatory environment, bringing it in line with the requirements of the digital economy as a new way of life and qualitatively new industrial relations. Second, it is necessary to provide appropriate information, material, and technical equipment for the implementation of new technologies and activities. Third, it is important to foresee changes in training courses, the system of training and retraining of personnel, and institutions for advanced training in new specialties. In addition, it is necessary to

develop suitable mechanisms aimed at supporting domestic companies that are most advanced in terms of new technologies.

An important role in the regulation of these processes should be given to the government. It needs to undertake development of a set of measures for the reindustrialization of industry, introduction of high-tech industries and innovatively active enterprises, ensuring an increase in the level of innovative potential [25; 26], structural transformation of the national economy, strengthening of the competitiveness level of industries and the economy as a whole, and on this basis – the socio-economic development of all territories of the country[17]. It is the government that plays a leading role in determining the state scientific and technological policy, priorities in the investment sphere, financing of fundamental sciences and risk projects in order to transfer production to a new basis [27]. At the same time, it has a very wide range of methods for implementing scientific and technological policies aimed at solving the problems of neoindustrialization (*Tab. 9*).

Thus, for the implementation of industrial policy aimed at neoindustrialization, it is necessary to form a new management paradigm, which will become an adequate methodological basis for the innovative and technological development of the country's economy and its branches.

**Conclusion**

Russia faces the task of the new industrialization based on modern high-tech industries. To solve it, it is necessary to adjust the state industrial policy. Objectively, it is necessary to increase the role of the government as an active economic entity and economic institution. In the national economic system of Russia, it is necessary to strengthen the planning beginnings to ensure the integrity and sustainability of the system, and a fuller realization of the public interest to apply a comprehensive approach to strategic development in branch and territorial aspects.

A strong state, while realizing public interests, can create conditions for the growth of the manufacturing industry. The development of a high-tech manufacturing industry is an

Table 9. Methods of implementing the government scientific and technological policy in the neo-industrialization conditions

| No. | Direct methods | Indirect methods |
|---|---|---|
| 1. | R&D financing from federal and regional budgets | Tax credits and benefits |
| 2. | Control of ongoing purchases of technologies and innovations abroad | Stimulation of enterprises through changes in pricing and customs policies |
| 3. | Insurance of the risk existing in innovative activity | Accelerated depreciation |
| 4. | Subsidizing scientific and technical developments | Formation of innovative scientific and technological centers on the basis of the country's leading universities |
| 5. | Subsidized financing of individual innovative projects and allocation of funds for the creation of interaction platforms | Improvement of legislation in matters of patent law, intellectual property |
| 6. | Partial provision of government guarantees to attract to projects funds of different types of investors: banks, investment companies, etc. | Creation of a legal mechanism for the purchase or entry into the capital of small innovative companies of large business |
| 7. | Institute of special investment contracts | |

Source: own compilation according to Lenchuk E.B.,Vlaskin G.A. Formation of the digital economy in Russia: problems, risks, prospects. *The Bulletin of the Institute of Economics of the Russian Academy of Sciences*, 2018, no. 5, p. 9.

[17] *New Technological Revolution: Challenges and Opportunities for Russia. Expert and Analytical Report.* Moscow, 2017. 136 p.

important factor of the economic growth, ensuring of the competitiveness of Russian products in the domestic and global markets, and improving population's living standards.

The relevance and acuteness of problems require the following study. In particular, it is necessary to develop and test methodological tools for the comprehensive assessment of the level of scientific and technological development of the manufacturing sector of the Russian Federation in the transition to the digital economy; to assess the effectiveness of regions' industrial policy in the conditions of scientific and technological change and digitalization of the economy; to develop a mechanism for implementing regional industrial policy aimed at regulating the processes of the economy's innovative development in accordance with the requirements of the Fourth Industrial Revolution and transition to the digital economy.

The results of the study may be useful for federal and regional government authorities for adjusting the state industrial policy, as well as for developing a set of measures to boost economic growth.

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Received May 29, 2020