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Industrial development under sanctions pressure: evidence from Russia

Развитие промышленности в условиях санкционного давления: данные из России

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Abstract

One of the most important sectors of the economy in Russia is industry. In this regard, the state seeks to stimulate the development of innovations in this area. Over the past few years, many industrial sectors in Russia have been in a crisis situation, which is caused by several factors: a decrease in the level of real investment, a decrease in the solvent demand of enterprises-customers and public consumers, and the introduction of financial and economic sanctions in 2014 against Russia by the United States and the European Union countries, as well as the effect of other macroeconomic factors independent of the activities of industrial enterprises. This study aims to identify the main trends in the development of industrial production in Russia in recent years, and an explanation of its causes. This topic is relevant in connection with the foregoing and may be of interest to academic economists studying industry development trends in developing countries. The aim of the study is to analyze the state of industry in Russia from 2015 to 2018 during the period of sanction pressure on the industrial and financial sectors of the Russian economy. Having examined the latest data on the results of the activity of Russian industry as a

Аннотация

Одной из важнейших отраслей экономики в России является промышленность, в этой связи государство стремится стимулировать развитие инноваций в данной сфере. За последние несколько лет многие отрасли промышленного производства в России оказались в кризисном положении, что вызвано действием ряда факторов: снижением уровня реальных инвестиций, сокращением платежеспособного спроса предприятий-заказчиков и потребителей-населения, введение финансово-экономических санкций в 2014 г. в адрес России со стороны США и стран Евросоюза, а также действие других макроэкономических факторов, не зависящих от деятельности промышленных предприятий. Исследование нацелено на определение основных тенденций развития промышленного производства в России в последние годы, объяснение её причин. Данная тема актуальна в связи с выше сказанным и может быть интересна ученым-экономистам, изучающих тренды развития промышленности в развивающихся странах. Целью исследования является анализ состояния промышленности в России в период с 2015 по 2018 годы в период санкционного давления на промышленный и

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whole, one can note positive trends in the development of industrial production in Russia despite a number of negative internal and external factors. It is concluded that today, for Russia, the strategic tasks in industrial policy are reduced to overcoming technological backwardness and carrying out technological modernization of industries based on the use of innovative achievements, as well as import substitution for the sectors of the economy that are sensitive to foreign sanctions.

Key Words: Industrial development, industry and sanctions, industry in Russia, developing economy.

финансовый сектора экономики России. Рассмотрев свежие данные по результатам деятельности российской промышленности в целом можно говорить о положительных тенденциях в развитии промышленного производства в России несмотря на ряд негативных внутренних и внешних факторов. Сделан вывод о том, что сегодня для России стратегические задачи в промышленной политики сведены к преодолению технологической отсталости и выполнению технологической модернизации отраслей промышленности на основе использования инновационных достижений, а также импортозамещению для чувствительных к иностранным санкциям отраслей экономики.

Ключевые слова: Развитие промышленности, развивающаяся экономика, промышленность и санкции, промышленность в России.

Introduction

The need for orientation of the innovation system, formed in Russia over the last decade, towards a technological breakthrough is recognized by scholars and practitioners as the basis for industrial policy in Russia. Otherwise, Russia may for a long time be far from modern trends in world scientific and technological development. Today, the rates and real results in the technological development of Russia cannot be considered satisfactory. Moreover, the technological development of Russia is currently carried out in the conditions of severe external constraints. Therefore, Russia has to rely more on its own resources and search for new long-term reliable partnerships in terms of technology and cooperation. In these conditions, the role of the state and large economic structures in the technological development of the national economy is growing (Faskhutdinov, 2015; Kudrin and Gurvich, 2015).

One of the most important sectors of the economy in Russia is industry. In this regard, the state seeks to stimulate the development of innovations in this area (Frolov et al, 2019; Vertakova et al, 2016). Industry is a sector of the economy that has priority socio-economic importance, as it provides the population with consumer goods, and provides other sectors of the economy with the necessary means of production. Over the past few years, many sectors of industrial production in Russia have been in a crisis situation, which is caused by several factors: a decrease in the level of real investment (Berezinskaya, 2017), a decrease in the solvent demand of enterprises-customers and public consumers (Alexeev and Chernyavskiy, 2018), and the introduction of financial and economic sanctions in 2014 against Russia by the United States and the European Union countries, as well as the effect of other macroeconomic factors independent of the activities of industrial enterprises (Gurvich and Prilepskiy, 2015; Ovcharenko et al, 2019).

Studying research in the field of industrial development, it is seen that the most popular topic is the sustainable development of industry and its factors (Azapagic and Perdan, 2000; Wallner, 1999; Cagno et al, 2019). Another topic often encountered in the study of industrial development is effective industrial development management (Kovacs, 2018). In the framework of this study, it is necessary to note the works related to the study of industrial development in Russia in general (Plotnikov and Vertakova, 2014) and individual industries in particular. The impact of climate change on the Russian electric power industry is studied in Klimenko et al. (2018), it was concluded that there are some negative factors, but overall climate change will positively affect the development of Russian energy systems due to fuel saving. Positive forecasts are being made regarding Russian shipbuilding in Vishnevskiy et al (2017). Prospects of the food industry are considered in Glinskiy (2018), the paper presents a model for the growth of the food industry in Russia. The work by Locatelli (2006) is devoted to the development of the oil industry in Russia. In Makarov and Payson (2009), a number of specific problems facing the Russian space

industry are considered. However, there are not so many studies regarding the current assessment of the development of industry in modern Russia in recent years and its prospects. This paper aims to fill this gap.

This study aims to identify the main trends in the development of industrial production in Russia in recent years and provide an explanation of its causes. This topic is relevant in connection with the foregoing and may be of interest to academic economists studying industry development trends in developing countries. The aim of the study is to analyze the state of industry in Russia from 2015 to 2018 during the period of sanction pressure on the industrial and financial sectors of the Russian economy. To achieve this goal, the following tasks are formulated:

- to analyze the general dynamics of industrial development;
- to study the development of individual industries;
- to identify the development trend of industry in the near future.

Methodology

The issues of the methodology and methods of researching the results of activities of industries in the scientific literature are considered quite widely, while this topic is characterized by relevance and causes academic and practical interest. Taking into account the experience accumulated in science in this paper, the provisions of dialectics are used; traditional statistical techniques for processing economic information are applied; methods of induction, deduction, generalization method (synthesis) were used; tabular and graphical ways of presenting research materials were applied. The research information base was compiled by state statistics for the period under review, and materials from academic publications. Since for quantitative research, science operates only with official, reliable sources of information, and statistical publications are published somewhat later than the end of reporting periods, the authors can have "margin" data for 2018.

Results and discussion

Table 1 presents general indicators of the development of the Russian economy in 2017-218. Gross domestic product at current market prices in 2018 compared with 2017 increased from 92.1 to 103.9 trillion rubles, or 12.8%, including gross value added of industrial production increased from 23.0 to 27.8 trillion rubles, or 20.6%. Industrial production is growing at a faster pace than the Russian economy as a whole, which indicates a more dynamic growth in industrial production than in other sectors. In general, the share of gross value added of industrial production in gross domestic product increased by 2.1% and reached 29.8% in 2018.

Table 1.
Economic indicators of the Russian Federation

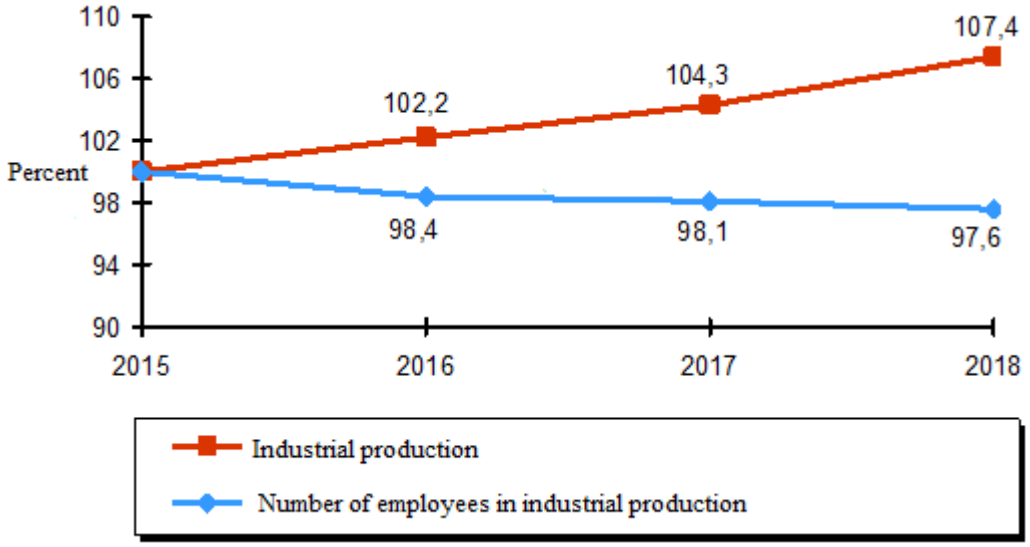
	2017	2018	2018 by 2017
Gross domestic product (at current market prices), million rubles	92 101 348	103 875 800	112,8
including gross value added of industrial production (at current basic prices)	23 008 904	27 745 427	120,6
Share of gross value added of industrial production in gross domestic product, percent	27,7	29,8	2,1
Volume indices of gross value added of industrial production, as a percentage of the previous year	101,3	102,5	1,2
Fixed assets, billion rubles	109103	120351,9	110,3
including in industrial production	48685,2	53881,5	110,7
Average annual number of employees, million people	71,8	71,6	99,7
including in industrial production	13,7	13,6	99,3
Share of people employed in industrial production in the total number of employees, percent	19	18,9	-0,1

Source: Industrial production in Russia - 2019: a statistical compilation. Federal State Statistics Service of the Russian Federation. Available at: https://gks.ru/bgd/regl/b19_48/Main.htm (in Russian).

In the period under review, the index of physical volume of gross value added of industrial production is also in positive dynamics; in 2017, it amounted to 101.3%, in 2018 – 102.5%. There is a positive growth dynamics of the index of physical volume of gross value added of industrial production. In 2018, compared with 2017, the volume of fixed assets increased by 10.3% and reached 120.3 trillion rubles.

One should note the dynamics of a decrease in the number of people employed in Russia as a whole by 200 thousand people over the study period, including in industrial production by 100 thousand people.

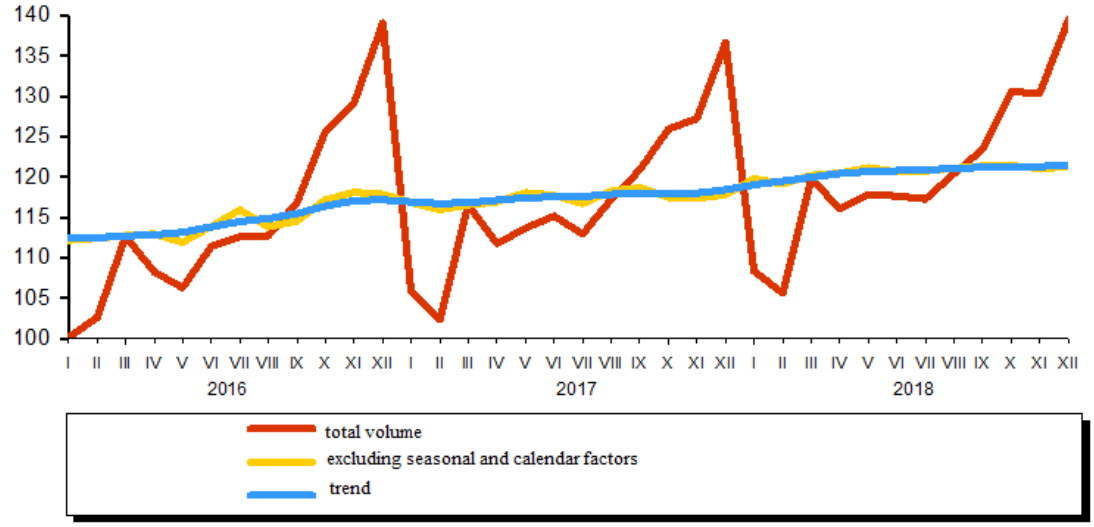
In more detail, the ratio of the growth of industrial production and the decline in employment can be seen in Figure 1. For clarity, the indicators for 2015 are taken as 100%. Between 2015 and 2018, industrial production increased by 7.4%, while the number of employees in industry decreased by 2.4%. This was mainly due to the growth of labor productivity.



Source: Industrial production in Russia - 2019: a statistical compilation. Federal State Statistics Service of the Russian Federation. Available at: https://gks.ru/bgd/regl/b19_48/Main.htm (in Russian).

Figure 1. *Dynamics of industrial production and the number of employees in organizations (2015 = 100).*

The growth of the industrial production index is graphically presented in Figure 2. In general, an uptrend is visible.



Source: Industrial production in Russia - 2019: a statistical compilation. Federal State Statistics Service of the Russian Federation. Available at: https://gks.ru/bgd/regl/b19_48/Main.htm (in Russian).

Figure 2. *Industrial production index as a percentage of the average monthly value of 2010.*

One of the most acute problems of Russian industry can be called the high depreciation of fixed assets of the industry (Table 2), for example, the degree of depreciation of fixed assets:

- in mineral wealth mining in 2018, it amounted to 57.8%, or 1.4% more than in 2017, the share of completely worn out fixed assets in the total fixed assets of organizations in 2018 was 23.9%;
- in manufacturing in 2018, it amounted to 50.6%, or 1.8% more than in 2017, the share of fully worn-out fixed assets in the total fixed assets of organizations in 2018 was 18.2%;
- in electric power, gas and steam supply and air conditioning in 2018, it amounted to 44.0%, or 0.8% more than in 2017, the share of completely worn out fixed assets in the total fixed assets of organizations in 2018 was 13.1%;
- in water supply; water disposal, organization of waste collection and disposal, pollution elimination activities in 2018, it amounted to 40.3%, or 0.5% more than in 2017, the share of completely worn out fixed assets in the total fixed assets of organizations in 2018 was 16.4%.

In general, the situation with the renewal of fixed assets of industrial production is extremely difficult, requiring serious investment.

Table 2.
The degree of depreciation of fixed assets and the proportion of completely worn out fixed assets

	Depreciation degree of fixed assets		**Share of completely worn out fixed assets in the total volume of fixed assets**	
	2017	**2018**	**2017**	**2018**
Mineral wealth mining	**56,4**	**57,8**	**22,5**	**23,9**
including:				
coal mining	52,2	51,8	15,8	17,0
crude oil and natural gas production	58,0	59,4	23,6	25,1
metal ore mining	45,9	45,6	13,3	13,9
mining of other minerals	43,4	45,8	16,0	16,4
Processing industries	**48,8**	**50,6**	**17,1**	**18,2**

	Depreciation degree of fixed assets		Share of completely worn out fixed assets in the total volume of fixed assets	
	2017	2018	2017	2018
including:				
food production	46,7	48,3	12,8	13,6
beverage production	61,1	61,1	27,5	27,3
manufacture of wearing apparel	48,6	52,3	18,9	19,5
production of coke and petroleum products	49,6	52,8	19,5	22,2
manufacture of medicines and materials used for medical purposes	36,5	37,5	11,0	10,8
manufacture of rubber and plastic products	51,9	53,4	14,7	15,1
metallurgical production	50,2	50,6	19,4	19,9
manufacture of finished metal products, except machinery and equipment	46,0	45,3	14,6	14,5
manufacture of computers, electronic and optical products	45,3	47,0	14,8	15,3
manufacture of electrical equipment	52,7	52,5	18,6	19,0
manufacture of machinery and equipment, not included in other groups	45,9	48,7	14,8	16,4
manufacture of vehicles, trailers and semi-trailers	54,2	57,5	24,4	26,0
furniture manufacture	53,7	54,4	18,5	18,1
Electric power, gas and steam supply and air conditioning	**43,2**	**44,0**	**12,5**	**13,1**
Water supply; water disposal, organization of waste collection and disposal, pollution elimination activities	**39,8**	**40,3**	**16,5**	**16,4**

Source: Industrial production in Russia - 2019: a statistical compilation. Federal State Statistics Service of the Russian Federation. Available at: https://gks.ru/bgd/regl/b19_48/Main.htm (in Russian).

However, it is worth noting that in recent years from 2016 to 2018, there has been an increase in investment in fixed assets of the considered industries (Table 3). For example, overall investment growth for the period under review was:

- in mineral wealth mining – 18%;
- in processing – 22.9%;
- in electric power, gas and steam; air conditioning – 21%;
- in water supply; water disposal, organization of waste collection and disposal, pollution elimination activities – 9%.

The growth of investments should be noted over the period under review in such industries as:

- coal mining – by 70%;
- mining of metal ores – by 59.7%;
- manufacture of rubber and plastic products – by 50.9%;
- manufacture of finished metal products, except machinery and equipment – by 140.7%.

In general, investments in fixed assets for the period from 2016 to 2018 have a positive trend.

Table 3.
Investments in fixed capital by type of economic activity at actual prices.

	2016	2017	2018	2018 by 2016, %
		Billion rubles		
Mineral wealth mining	**2710,4**	**3023,2**	**3199,6**	118,0
including:				
coal mining	98,6	139,9	167,6	170,0
crude oil and natural gas production	1597,7	1807,1	1851,7	115,9
metal ore mining	159,1	187,1	254,1	159,7
mining of other minerals	58,1	63,2	69,8	120,1

	2016	2017	2018	
		Billion rubles		
Processing industries	**2103,3**	**2296,5**	**2584,9**	**2018 by 2016, %**
including:				
food production	193	237,1	260,2	134,8
beverage production	34,9	36,5	42,6	122,1
manufacture of wearing apparel	3,6	4,4	4,5	125,0
production of coke and petroleum products	385,8	447,1	443,6	115,0
manufacture of medicines and materials used for medical purposes	28,6	35,5	40,7	142,3
manufacture of rubber and plastic products	40,3	47,4	60,8	150,9
metallurgical production	269,2	285,7	310,1	115,2
manufacture of finished metal products, except machinery and equipment	48,9	95,8	117,7	240,7
manufacture of computers, electronic and optical products	61,7	65,9	68,3	110,7
manufacture of electrical equipment	29,7	40,4	42,8	144,1
manufacture of machinery and equipment, not included in other groups	63	65,7	62,5	99,2
manufacture of vehicles, trailers and semi-trailers	96,7	82,3	134	138,6
furniture manufacture	18	11,8	13,4	74,4
Electric power, gas and steam supply and air conditioning	**866**	**943,7**	**1047,5**	121,0
Water supply; water disposal, organization of waste collection and disposal, pollution elimination activities	**148**	**147,7**	**162,6**	109,9

Source: Industrial production in Russia - 2019: a statistical compilation. Federal State Statistics Service of the Russian Federation. Available at: https://gks.ru/bgd/regl/b19_48/Main.htm (in Russian).

In general, the results of industrial enterprises in 2017-2018 are presented in Table 4.

The volume of own-made goods shipped, own works and services provided increased by 15.2% and amounted to 44 trillion rubles in 2018. It should be noted that the balanced financial result (profit minus loss) increased by 37.6% and amounted to 3.1 trillion rubles in 2018, which allowed increasing the overall profitability of goods, products (works, services) sold from 10.9% up to 12%, or by 1.1%. At the same time, costs per 1 ruble of products (works, services) decreased from 94.1 to 88.9 kopecks.

Thus, having examined the latest data on the results of the activity of Russian industry as a whole, one can note some positive trends in the development of industrial production in Russia despite a number of negative internal and external factors.

Table 4.
Key performance indicators of processing organizations.

	2017	2018	2018 by 2017
Volume of own-made goods shipped, own works and services provided, billion rubles	38712	44600	115,2
Production index, as a percentage of the previous year	102,5	102,6	0,1
Average annual number of employees of organizations, thousand people	6896,6	6880,4	99,8
Balanced financial result (profit minus loss), million rubles	2294789	3158176	137,6
Profitability of goods, products (works, services) sold, %	10,9	12	1,1
Costs per 1 ruble of products (works, services), kopecks	94,1	88,9	-5,2

Source: Industrial production in Russia - 2019: a statistical compilation. Federal State Statistics Service of the Russian Federation. Available at: https://gks.ru/bgd/regl/b19_48/Main.htm (in Russian).

Discussion

Decree of the Government of the Russian Federation No. 328 of April 15, 2014 (State Program, 2014).

The priorities of this State Program are focused on the creation in Russia in the basic sectors of the economy, primarily in the processing industry and the agro-industrial sector, of highly productive export-oriented sectors developing on the basis of modern technologies and provided with highly qualified personnel. The priorities of state policy in the implementation of the State Program are based on the principle of managing the risks of industrial development based on a matrix correlation of the parameters of priority industries and possible instruments of the industrial policy. The allocation of industries and, accordingly, industry subprograms of the State Program is carried out according to the type of markets for manufactured products.

Products of the following traditional engineering sectors are oriented mainly to the domestic market:

- automotive industry;
- agricultural engineering, mechanical engineering in food and processing industries;
- mechanical engineering of specialized industries;
- transport engineering.

The following sectors are oriented towards serving the interests of industry and providing it with means of production:

- machine tool industry;
- light industry;
- heavy engineering;
- power engineering;
- robotics;
- additive technologies and technologies of digital production;
- industrial software.

The following traditional industries are oriented towards consumer sector:

- light industry;
- folk art crafts;
- baby products industry.

The following industries are oriented towards providing industrial production with materials:

- metallurgy;
- composites;
- rare and rare earth metals;
- chemical sector.

The State Program includes the following set of measures ensuring the development of industry as a whole:

- ensuring a stable financial position of industry and the formation of a set of measures of state financial support;
- creating conditions for the technological development of industries and supporting innovation;
- measures to manage regional industrial development, support and coordinate the efforts of the constituent entities of the Russian Federation to create and develop industrial parks, technology parks, industrial clusters and to implement regional industrial development programs;
- actions in the field of technical regulation and ensuring the uniformity of measurements that have a system-wide impact on industrial production.

Key government support measures for some Russian manufacturing industries are described in Table 5.

The strategic goal of the State Program is to create in the Russian Federation a competitive, sustainable, structurally balanced industry capable of effective self-development through integration into the global technological environment, development and application of advanced industrial technologies, aimed at the formation and development of new markets for innovative products effectively solving the problem of ensuring economic development and improving the national defense.

Table 5.
Key government support measures for some Russian processing industries.

Industry	State support measures
Aviation industry	Subsidies for creating service centers; R&D subsidies; compensation for interest on loans; reimbursement of costs for entering the global market
Automotive industry	Subsidies for maintenance of jobs; R&D subsidies; compensation of costs associated with the issuance and support of warranty obligations
Light industry	Subsidizing interest on loans to replenish working capital; equipment subsidies
Specialized engineering	Subsidizing 15–20% of discounts on equipment; subsidizing 10% of leasing; subsidizing soft loans for the purchase of equipment

Source: Report on the competitiveness of the Russian economy in terms of manufacturing 2018 (2019). Chamber of Commerce and Industry of the Russian Federation. Available at: http://ngtpp.ru/wp-content/uploads/2019/05/Doklad.pdf (in Russian).

Conclusions

The prevailing macroeconomic and political conditions are such that the priorities and development trends of the Russian industry as a whole, as well as of individual Russian regions, are predetermined mainly by the interests of the state and large business structures, since it is through these resources that the overwhelming majority of investment and innovation projects are implemented. For Russia, the strategic objectives are reduced to overcoming technological backwardness and carrying out technological modernization of industries based on the use of innovative achievements, as well as import substitution for the sectors of the economy that are sensitive to foreign sanctions.

Bibliographic references

Alexeev, M. & Chernyavskiy, A. (2018). A tale of two crises: Federal transfers and regional economies in Russia in 2009 and 2014–2015. Economic Systems, 42 (2), 175-185, https://doi.org/10.1016/j.ecosys.2017.07.002

Azapagic, A. & Perdan, S. (2000). Indicators of Sustainable Development for Industry: A General Framework. Process Safety and Environmental Protection, 78 (4), 243-261, https://doi.org/10.1205/095758200530763

Berezinskaya, O. (2017). Investment drought in the Russian economy: Structural characteristics and turnaround perspectives. Russian Journal of Economics, 3 (1), 71-82, https://doi.org/10.1016/j.ruje.2017.02.005

Cagno, E., Neri, A., Howard, M., Brenna, G. &Trianni, A. (2019). Industrial sustainability performance measurement systems: A novel framework. Journal of Cleaner Production, 230, 1354-1375, https://doi.org/10.1016/j.jclepro.2019.05.021

Faskhutdinov, A. (2015). Modernization of the Russian Economy in Terms of Innovative Development. Procedia - Social and Behavioral Sciences, 210, 188-192, https://doi.org/10.1016/j.sbspro.2015.11.358

Frolov, V., Trofimov, O., Zakharov, V., Kaminchenko, D., & Pavlova, A. (2019). Opportunities and risks from cooperation among companies within the production sphere and the sphere of services in Russia in the context of industry 4.0. Amazonia Investiga, 8(20), 596-608. Retrieved from https://www.amazoniainvestiga.info/index.php/amazonia/article/view/190

Glinskiy, V., Serga, L., Alekseev, M., Samotoy, N. & Simonova,E. (2018). The Development of the Food Industry as a Condition for Improving Russia's National Security. Procedia Manufacturing, 21, 838-845, https://doi.org/10.1016/j.promfg.2018.02.191

Gurvich, E. & Prilepskiy, I. (2015). The impact of financial sanctions on the Russian economy. Russian Journal of Economics, 1 (4), 359-385, https://doi.org/10.1016/j.ruje.2016.02.002

Industrial production in Russia – 2019: a statistical compilation (2019). Federal State Statistics Service of the Russian Federation. Retrieved from https://gks.ru/bgd/regl/b19_48/Main.htm (in Russian)

Klimenko, V.V., Fedotova, E.V. & Tereshin, A.G. (2018). Vulnerability of the Russian power industry to the climate change, Energy, 142, 1010-1022, https://doi.org/10.1016/j.energy.2017.10.069

Kovacs, O. (2018). The dark corners of industry 4.0 – Grounding economic governance 2.0. Technology in Society, 55, 140-145, https://doi.org/10.1016/j.techsoc.2018.07.009

Kudrin, A. & Gurvich, E. (2015). A new growth model for the Russian economy. Russian Journal of Economics, 1 (1), 30-54, https://doi.org/10.1016/j.ruje.2015.05.002

Locatelli, C. (2006). The Russian oil industry between public and private governance: obstacles to international oil companies' investment strategies, Energy Policy, 34 (9), 1075-1085, https://doi.org/10.1016/j.enpol.2004.09.007

Makarov, Y. & Payson, D. (2009). Russian space programmes and industry: Defining the new institutions for new conditions. Space Policy, 25 (2), 90-98, https://doi.org/10.1016/j.spacepol.2009.02.010

Ovcharenko, R., Goncharova, O., Kondratenko, E., Trofimov, G., & Glushchenko, A. (2019). Sanctions on Russia: effectiveness and impacts on the national security of Russia. Amazonia Investiga, 8(22), 565-573. Retrieved from https://www.amazoniainvestiga.info/index.php/amazonia/article/view/804

Plotnikov, V. & Vertakova, J. (2014). Manufacturing Industry in Russia: Problems, Status, Prospects. Procedia Economics and Finance, 14, 499-506, https://doi.org/10.1016/S2212-5671(14)00739-4

Report on the competitiveness of the Russian economy in terms of manufacturing 2018 (2019). Chamber of Commerce and Industry of the Russian Federation. Retrieved from http://ngtpp.ru/wp-content/uploads/2019/05/Doklad.pdf (in Russian)

State Program of the Russian Federation "Industrial Development and Competitiveness Enhancement" (2014), approved by Decree of the Government of the Russian Federation No. 328 of April 15, 2014. Retrieved from http://base.garant.ru/70643464/ (in Russian)

Vertakova, Y., Grechenyuk, O. & Grechenyuk, A. (2016). Identification of Clustered Points of Growth by Analyzing the Innovation Development of Industry. Procedia Economics and Finance, 39, 147-155, https://doi.org/10.1016/S2212-5671(16)30264-7

Vishnevskiy, K., Karasev, O., Meissner, D., Razheva, A. & Klubova, M. (2017). Technology foresight in asset intensive industries: The case of Russian shipbuilding, Technological Forecasting and Social Change, 119, 194-204, https://doi.org/10.1016/j.techfore.2016.05.001

Wallner, H.P. (1999). Towards sustainable development of industry: networking, complexity and eco-clusters. Journal of Cleaner Production, 7 (1), 49-58, https://doi.org/10.1016/S0959-6526(98)00036-5