European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com
e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2022.08.22

ICEST 2022
III International Conference on Economic and Social Trends for Sustainability of Modern Society

DIGITAL TRANSFORMATION OF THE INDUSTRIAL SECTOR OF THE ECONOMY

Alexey A. Sokolov (a)*, Konstantin V. Baldin (b, c), Ruslan H. Ilyasov (d)
*Corresponding author

(a) Volgograd Institute of Management - branch of Russian Academy of National Economy and Public Administration under the President of Russian Federation, Gagarina St., 8, Volgograd, Russia, asokolov.vlg@mail.ru
(b) MIREA — Russian Technological University, Vernadsky Avenue, 78, Moscow, Russia, kvbaldin@mail.ru
(c) All-Russian Research Institute «Center», st. Sadovaya - Kudrinskaya, house, 11, building 1, Moscow, Russia, kvbaldin@mail.ru
(d) Kadyrov Chechen State University, Sheripova St., 32, Grozny, Russian Federation, ilyasov_95@mail.ru

Abstract

The article considers the peculiarities of the evolutionary development of the industrial sector of Russia's economy under quarantine restrictions and sanctions pressures. The paper aims to identify new directions and new models of industrial development in the prevailing conditions of geopolitical and economic development. In order to implement the goal, a statistical content review of the development of the industrial sector of the economy was conducted, the peculiarities of its development were noted, and the main problems of growth in the industry were outlined. The main anti-sanction measures to protect Russian business and population were analyzed, their priority and rationality were outlined. New trends in the remote organization of the production process in the new realities, which led to an increase in the cost of new digital technologies, were assessed. The analysis of new digital production models, which are being tested on the basis of various industrial enterprises, was carried out. An evolutionary approach was used, which applied methods of systematization, analogy, generalization, visualization, analytical review, modeling and generation of new knowledge. The conclusion draws conclusions about the new directions of development of the industry and measures of state support.

Keywords: Digital technology, industry, import substitution, manufacturing, sanctions

https://doi.org/10.15405/epsbs.2022.08.22
Corresponding Author: Alexey A. Sokolov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

The industrial production of any state has certain basic specifics, which determine it as one of the powerful drivers of future economic development. Industry is a technologically capacious and dynamic sector, the main feature of which is the convergence of labor productivity without regard to any barriers (politics, business climate, etc.). In addition, industry forms a large share of jobs in the economy due to its scale and labor intensity, so it has certain social elevators in its field. It is the most tradable sector, the products and goods of which can actually be exported to other countries at 100%. Therefore, the development and maintenance of this sector should be one of the priorities of the country's economic development strategy, especially in the worsening conditions of external epidemiological and sanctions pressure.

The COVID-19 pandemic has opened up new development opportunities for all sectors of the economy based on the latest developments in science and technology. The pandemic and forced social isolation, remote format of work and communication accelerated the processes of digitalization in the industrial sector of the economy, industries specializing in IT-technologies and building infrastructure for contactless service began to develop actively. Under the influence of the coronary crisis, many top managers of companies with a turnover from $3 billion to $100 billion began to make complex decisions, optimizing existing business models, looking for new markets and new approaches. Industrial companies in the mining and metallurgy sectors were least able to transform, as it is quite difficult to transfer production processes into an online format. Companies specializing in the production of consumer goods have been very mobile in their transition to remote management technologies and digital monitoring of production processes.

The main problem of industrial production is the closing of borders and world markets. In the absence of sales any production is idle and loses profit, so it is necessary to search for new markets and master new logistic schemes. High dependence of industrial production on foreign components and spare parts also imposes certain problems on the main production and forces Russian enterprises to look for domestic analogues of imported parts. This restructuring requires certain time, financial expenses for search and logistics, which delays the process of growth of industrial production.

2. Problem Statement

Industrial production today in the post-sanction environment and under conditions of external sanctions pressure is the main driver of the country's future economic growth. The focus on import-substituting production and the search for new approaches to the production of domestic products will stabilize the situation in the country caused by severe sanctions and the imposition of a commodity embargo on Russia. High investment resources accompanying any modernization of the production sphere should be provided on favorable terms and state support, which requires the development of the main directions for the reformatting of the industrial sector.

https://doi.org/10.15405/epsbs.2022.08.22
Corresponding Author: Alexey A. Sokolov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

3. Research Questions

The following questions were posed in this study to find an answer to them:

i. What stages in the evolution of the industrial sector can be distinguished?

ii. Why is the development of Russia's industrial sector a driver of economic growth?

iii. What changes has the industry undergone during the period of quarantine and sanctions pressure?

iv. What are the prospects and directions for the development of the industry in the new realities?

4. Purpose of the Study

The purpose of the research is to assess the situation in industrial production in Russia as a result of the pandemic and new sanctions restrictions in the current geopolitical situation in the world. Based on the analysis of the dynamics of Russia's industrial sector in recent years, new directions for future economic development are planned.

5. Research Methods

Russia's industrial sector is represented by two main groups: mining and processing. In fact, today it is the extractive industry that is developed and forms the main share of the country's GDP, while processing and refining reaches only 30% of the total volume of industrial production. The economic sanctions imposed by the EU countries and the USA for the first time in 2014 gave grounds for the development and implementation of a comprehensive strategy of import substitution and development of our own processing complexes. Within the framework of the comprehensive program, the target program "Development of industry and increasing its competitiveness" was launched on April 15, 2014, defining the main vectors of development of the industrial sector until 2024. During the period of implementation of this program the following types of industrial production were launched: production of medical shoes, production of structural plastics, production of high-frequency switches for satellites, production of domestic components for the Russian aircraft engine PD-14, production of many food products. By 2022, there are still problems in high-tech industries, where imports reach up to 90%. The withdrawal from the Russian market in March 2022 of many foreign manufacturers and suppliers requires an immediate solution and search of Russian analogues for such industries as: machine building, electronic industry, machine tools, aircraft building, textile industry, pharmaceutical production, so in 2022 it is urgent to review planning in these industries and look for sources for investment projects.

Following sanctions pressures, the COVID-19 pandemic that swept the world opened up new problems in the Russian economy - its high dependence on supplies of components and spare parts, labor migration, and logistics supplies of downstream products.

In this work, theoretical and empirical methods of scientific knowledge were used to build the logic of the study and to obtain the results. To assess the current situation, we used scientific reports of

https://doi.org/10.15405/epsbs.2022.08.22
Corresponding Author: Alexey A. Sokolov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

the Higher School of Economics (HSE Report, 2021), analytical reports of the rating company PricewaterhouseCoopers, we investigated the digitalization practices of various industrial enterprises using the method of content analysis (Artificial intelligence: scientific report, 2021). The generalized empirical materials were systematized and visualized by means of methods of graphical data analysis and logical analysis. Through the application of the hypothetical method, the directions of future development of industrial enterprises were proposed. The methods of generalization and synthesis were used in the final part of the scientific article to summarize the results of the research.

Information sources for the study were the works of Russian and foreign scientists studying the problems of digitalization in industry, in particular (Adeyemi et al., 2020; Aliev et al., 2021a; Aliev et al., 2021b; Boyko et al., 2017; Chebotarev, 2018; Dzhandzhugazova et al., 2018a; Dunbar et al., 2020; Emeksuzyan et al., 2021; Fedotova, 2008; Fedotova, 2014a; Fedotova, 2014b; Koch & Koch, 2019). The works of the following scholars dealing with the development of the industrial sector and its integration into the global information system served as the basis for shaping the future development of the sector, (Altukhov et al., 2019; Barnewold & Lottermoser, 2020; Nesterenko & Kozlova, 2018; Plotnikov et al., 2020; Sekerin et al., 2017; Sudarushkina & Stefanova, 2017).

6. Findings

Economic sanctions of 2022 that replaced quarantine restrictions, the release of market niches of foreign companies require the search for new business partners in friendly countries of Asia and the East. In these geopolitical conditions of economic developments, a number of regulations and counter-sanctions by Russia have been prepared (Figure 1).

Figure 1 shows that over the period 2014-2022, Russia imposed a number of significant restrictions on the purchase and supply of imported components and equipment for the needs of domestic institutions and companies. Russia imposed a number of significant restrictions on the procurement and supply of imported components and equipment for the needs of domestic institutions and companies. First of all, these measures apply to budgets, public institutions, and state corporations, which must update their own material and technical base through public procurement procedures. These measures are recommended to private corporate structures.

Industrial enterprises over the period 2014-2022 under the influence of a number of factors of external pressure were forced to adapt their business processes to the new realities of the economy to reduce operating costs. Thus, as seen in Figure 2, the main trends were the transfer of some employees to remote work (68%), the development of online business (53%), and business diversification (30%). Thanks to these measures, many enterprises were able to maintain their own production and stay in the market. In the period 2018-2023, the cost of new digital technologies in the total amount of companies increased significantly - by 9.4%. It remains to be noted that with the ongoing processes of transition to digital "twins" of many corporations, these costs will only grow. In this situation it is necessary to avoid the high dependence of Russian industrial enterprises on software and technology imports.

The most successful import substitution practices include the experience of the following companies: Rostelecom, which switched virtually entirely to domestic products (it built its own infrastructure for startups); in the agribusiness sectors, the work of domestic agricultural holdings -

https://doi.org/10.15405/epsbs.2022.08.22
Corresponding Author: Alexey A. Sokolov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

development of "smart" greenhouses, which in 2021 provided the domestic food market with 60% of tomato supplies, 94% of cucumber supplies; plans for implementation; Rosatom State Corporation on the digital product platform "Logos" is implementing full import substitution of the whole for the first time. In 2023 it is planned that operators will switch to domestic equipment for the construction of LTE-networks. Companies must also use Russian software, included in the register of approved software. Rostec companies, such as Bulat, Spektr, Concern Avtomatika, Concern Sozvezdiye and others are actively involved in the development of base stations on Russian equipment for the creation of 5G/IMT-2020 communication networks.

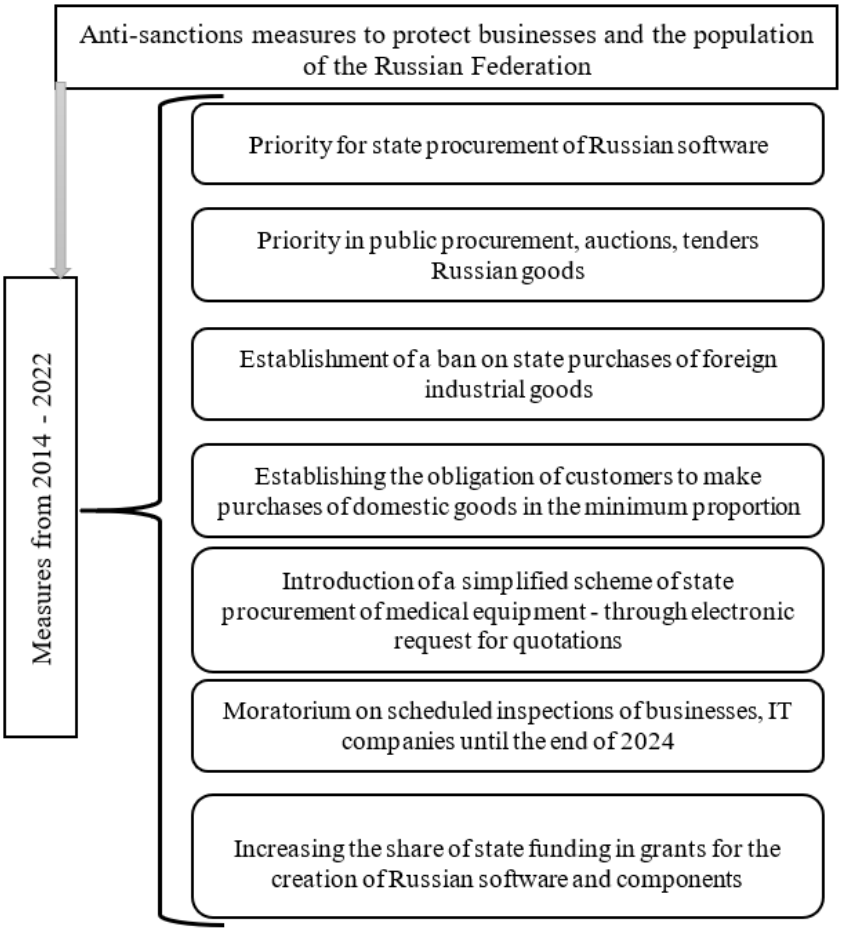

Figure 1. Anti-sanction measures to support businesses and the population of Russia

Thus, an obvious trend in the development of the industrial sector is the emergence of new forms of organization of production processes based on domestic software equipment, which will allow building new models of work and interaction in the digital space.

New models of industrial enterprises in Russia are now partially launched into the production process and are undergoing certain approbation. For example, the virtualization project being implemented by Rosenergoatom Concern (part of Rosatom State Corporation). In fact, the work of all services in a virtual space in which the user can enter from any point without reference to a specific location. The software and hardware complex (HSC) used in this process is created from 100% domestic components.

https://doi.org/10.15405/epsbs.2022.08.22
Corresponding Author: Alexey A. Sokolov
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Another area of development in the industrial sector is the quantum industry, which is only just taking shape today. In the future, the first prototypes of quantum processors on four platforms are expected: superconductors, atoms, ions and photons. This, in turn, suggests that it is already time for business to get involved in pilot projects, because the time when it was possible to evaluate quanta as purely basic science has passed. By the time powerful computers become available, companies should be ready to implement them - for this we should already be moving to industrial problems with quantum and quantum-inspired algorithms.

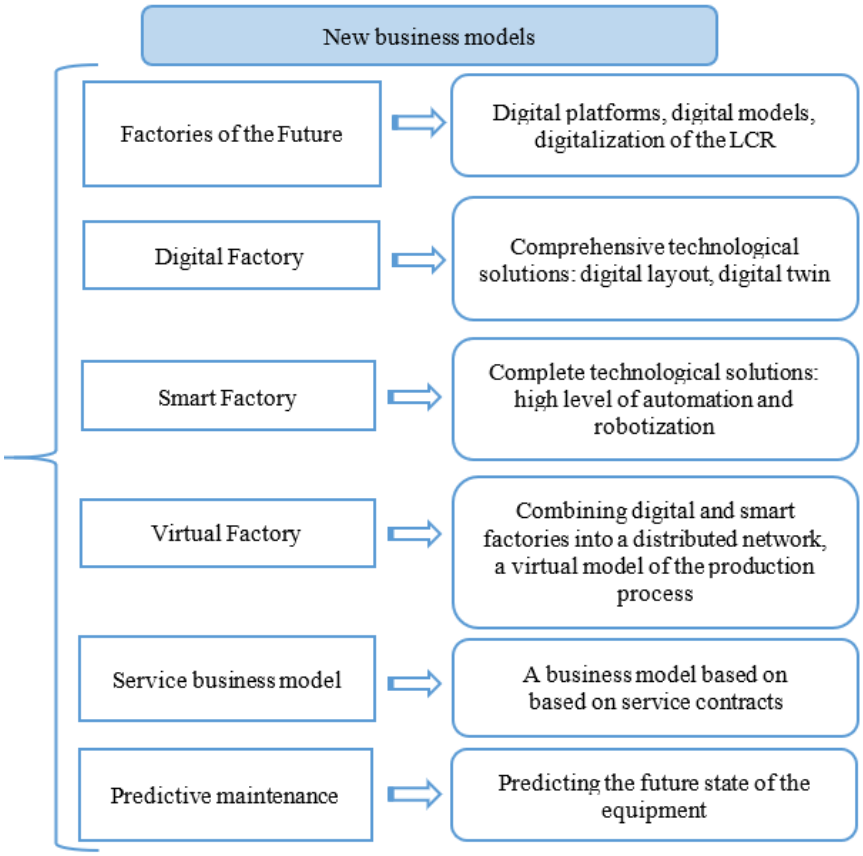

Figure 2. Examples of new business models and changes in business processes (PwC, 2020)

7. Conclusion

Industry includes a large number of different industries with different specifics of work and products, so it is difficult to claim a single universal model of digitalization of the entire sector. Such a complex organization of the sector requires the development and availability of a strictly differentiated approach to assessing the readiness of enterprises of different industries, i.e. the level of their "digital" maturity. In addition, the digitalization of the industrial sector dictates the need to develop a whole range of new technologies in unadapted infrastructural conditions.

Undoubtedly, the external sanction pressures of 2022 will accelerate the pace of production and transition to Russian technologies, attracting investment resources to high-tech industries. To this end, it is necessary to take a number of measures aimed at strengthening the Russian economy:

- develop the legal and regulatory framework, which should be as specific as possible and the results should be monitored;
- build technological production infrastructure - create clusters, technology parks, business incubators, transport and logistics complexes, and special economic zones;
- conduct investment search and attract resources - preferential loans, grants, subsidies, leasing programs;
- conduct a marketing analysis of the market, and it is necessary to create a positive image of the goods labeled "Made in Russia".

References

Adeyemi, A., Yan, M., Shahidehpour, M., Botero, C., Guerra, A. V., Gurung, N., Zhang, L. C., & Paaso, A. (2020). Blockchain Technology Applications in Power Distribution Systems. *The Electricity Journal, 33*(8), 106817. https://doi.org/10.1016/j.tej.2020.106817

Aliev, A. T., Baldin, K. B., & Saveliev, A. V. (2021a). Management of innovative activities of construction industry enterprises in modern conditions of digital transformation of the Russian economy. *Economic Systems, 4*, 125-134. https://doi.org/10.29030/2309-2076-2021-14-4-125-134

Aliev, A. T., Baldin, K. B., & Saveliev, A. V. (2021b). 145-154. Inflation, prices and regional incomes in the socio-economic development of Russia in the context of the spread of COVID-19. *Economic Systems, 4*, 145-154. https://doi.org/10.29030/2309-2076-2021-14-4-145-154

Altukhov, A. I., Dudin, M. N., & Anishchenko, A. N. (2019). Global digitalization as an organizational and economic basis for the innovative development of the agro-industrial complex of the Russian Federation. *Problems of the market economy, 2,* 17-27. https://doi.org/10.33051/2500-2325-2019-2-17-27

Artificial intelligence: scientific report. (2021). https://clck.ru/sFyA5

Barnewold, L., & Lottermoser, B. G. (2020). Identification of Digital Technologies and Digitalisation Trends in the Mining Industry. *International Journal of Mining Science and Technology, 30*(6), 747-757. https://doi.org/10.1016/j.ijmst.2020.07.003

Boyko, E. P., Evnevich, M. A., & Kolyshkin, A. V. (2017). Ekonomika predpriyatiya v cifrovuyu epohu [Enterprise economics in the digital age]. *Russian entrepreneurship, 183*(7), 1127-1136. https://creativeconomy.ru/lib/37769

Chebotarev, A. (2018). Cifrovye tekhnologii nastoyashchego i budushchego [Digital technologies of the present and the future]. *Aviapanorama, 4*(130), 4 -11.

Dunbar, W., Fraser, J., Reynolds, A., & Kunz, N. (2020). Mining Needs New Business Models. *The Extractive Industries and Society*, *7*(2), 263-266. https://doi.org/10.1016/j.exis.2019.07.007

Dzhandzhugazova, E. A., Dusenko, S.V., Romanova, M. M., Orlova, L. N., Golondarev, K. S., & Kurbanov, S. A. (2018a). Entrepreneurial clusters as a model of spatial development of Russian tourism. *Journal of Environmental Management and Tourism, 4*(28), 757-765. https://doi.org/10.14505//jemt.v9.4(28).08

Emeksuzyan, A. R., Baldin K. V., Aliev A. T., & Surtaeva O. S. (2021). *Investments and innovations in the industrial development of the regional space of Russia.* Syktyvkar: ed. GOU VO "KRAGiU".

Fedotova, G. V. (2008). The specifics of building national systems of state financial control in Western countries and the applicability of foreign experience in Russia. *Finance and credit, 10*(298), 77-80.

Fedotova, G. V. (2014a). Rol' institutov razvitiya v realizacii gosudarstvennoj investicionnoj politiki [The role of development institutions in the implementation of state investment policy]. *Finance and credit, 5*(191), 43-47. https://cyberleninka.ru/article/n/rol-institutov-razvitiya-v-realizatsii-gosudarstvennoy-investitsionnoy-politiki/viewer

Fedotova, G. V. (2014b). Formation of the national legislative base for the strategic management of the economy. *Izvestia of the Southwestern State University. Series: Economy. Sociology. Management, 1,* 20-29.

HSE Report. (2021). Digital transformation of industries: starting conditions and priorities. *Report to the XXII Apr. international scientific conference on problems of economic and social development*. Publishing house of the Higher School of Economics.

Koch, L. V., & Koch, Y. V. (2019). Analysis of existing approaches to measuring the digital economy. *Scientific and Technical Vedomosti of SPbPU. Economic sciences, 12*(4), 78-80.

Nesterenko, E. A., & Kozlova, A. S. (2018). Directions of development of the digital economy and digital technologies in Russia. *Economic security and quality, 2*(31), 9 -14.

Plotnikov, V., Golovko, M., Fedotova, G., & Rukinov, M. (2020). Ensuring national economic security institutional regulation of the shadow economy. *Lecture Notes in Networks and Systems, 87,* 342-351. https://doi.org/10.1007/978-3-030-29586-8_40

PwC. (2020). Digital Factories. *Shaping the Future of Manufacturing*. Retrieved 15 May 2022. https://www.pwc.de/de/digitale-transformation/digital-factories-2020-shaping-the-future-of-manufacturing.pdf

Sekerin, V. D., Burlakov, V. V., Gorokhova, A. E., & Dzurdzya, O. A. (2017). Innovations' latency sources. *Revista Espacios, 38*(62), 26.

Sudarushkina, I. V., & Stefanova, N. A. (2017). Digital economy. *Azimut of scientific research: economics and management, 1*(18), 182-184.