Vol. 15 • No. 4 • 2021 THE WORLD OF NEW ECONOMY

ISSN 2220-6469 (Print)
ISSN 2220-7872 (Online)

WORLD OF NEW ECONOMY

DOI: 10.26794/2220-6469

The edition is reregistered
in the Federal Service for Supervision
of Communications,
Informational Technologies and Media Control:
PI No. ФС77-67300
of 30, September, 2016

Publication frequency — 4 issues per year

Founder: "Financial University"

The Journal is included in the list
of academic periodicals recommended by the Higher Attestation Commission for publishing the main findings of PhD and ScD dissertations, included in the core of the Russian Science Citation Index (RSCI)

The Journal is distributed by subscription.
Subscription index: 42131 in the consolidated
catalogue "The Press of Russia"

The journal is included into the list of periodicals recommended for publishing doctoral research results by the Higher Attestation Commission

Founder and editor of the magazine from 2007 to 2015 Doctor of Economics, Professor N.N. Dumnaya

Editor-in-chief
S.N. Silvestrov

Science journal editorship manager
V.A. Shadrin

Publishing editor
Yu.M. Anyutina

Translators:
V. I. Timonina, Z. Mierzwa

Reference Manager
V.M. Alekseev

Proofreader
S.F. Mihaylova

Makeup
S.M. Vetrov

Editorial office address:
123995, GSP-5, Moscow, Leningradskiy prospekt, 53, room 5.6
Tel.: +7(499) 553-10-74 (internal 10-88).
E-mail: julia.an@maul.ru; wne.fa.ru

Signed off to printing: 17.11.2021
Format 60 × 84 1/8
Order № 904
Relative printer's sheet 13,49
Printed in the Department of Polygraphy of the Financial University (Leningradskiy prospekt, 49)

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-6-15
UDC 339.3;338.2;004.9(045)
JEL F01

Rural Digitalization in China

E.F. Avdokushin[a], Wang Zhui[b]
[a] Moscow Pedagogical State University, Moscow, Russia;
[b] Lomonosov Moscow State University, Moscow, Russia
[a] https: //orcid.org/0000-0001-5878-9639; [b] https://orcid.org/0000-0003-0568-503X

ABSTRACT

The article shows how the process of the Chinese economy's digitalization, which began in urban areas, manufacturing, and rich provinces of China, now starts to engulf the rural areas. The digital gap between certain provinces and between urban and rural areas must be liquidated as part of the Chinese government's strategy to make the country a thriving innovation society by the mid-21st century. The article lays out basic directions and means of bridging the digital gap between urban and rural areas and several aspects of digital modernization in China's agriculture. A particular focus is on developing green, environmentally friendly agriculture and the birth of a green way of life in rural areas and smart villages.

Keywords: digital economy; structure of the digital economy; digital transformation; digital gap; information infrastructure; environmentally friendly agriculture; smart village; green way of life; informatization of agriculture

For citation: **Avdokushin E.F., Wang Zhui. Rural digitalization in China. *The World of New Economy*. 2021;15(4):6-15. DOI: 10.26794/2220-6469-2021-15-4-6-15**

INTRODUCTION

China's digital economy is on the rise, contributing to the transformation and modernization of traditional industries and adding new impetus to economic development. [1] In 2018, the contribution of the digital economy to GDP growth among other industries reached 67.9%, was a key driver of China's national economic development. From 2003 to 2018, the growth rate of China's digital economy was significantly higher than the GDP growth rate for the same period. However, the gap between the growth rate of the digital economy and GDP is increasing since 2011 (*fig. 1*).

As shown in *Fig. 1*, China's digital economy has grown steadily in recent years and its share in GDP has continued to increase. In the future, the role of the digital economy in stimulating economic growth should become increasingly visible, through digital innovations and accelerated penetration of traditional industries.

The digitization of traditional industries also increased markedly in the 10s 21th century. In 2018, the volume of this segment of the digital economy exceeded 24.9 trillion yuan with nominal growth of 23.1% and on an annual basis was 27.6% of GDP. The digital economy of industry, services and agriculture accounted for 18.3, 35.9 and 7.3% of the industry's value added, respectively.[1] (*fig. 2*)

Digitization is developing in a number of sectors, such as production of computers, communications and other electronic equipment, in central and provincial cities. This is particularly evident in the automobile industry in Jiangsu Province, Chongqing city, in manufacturing industries, in industrial enterprises, which production chemical raw materials and products in Guangdong, Zhejiang and others provinces, and pharmaceutical production in Guangdong, Sichuan provinces. Other provinces and cities are also using digital technologies for digital transformation, which significantly reduces business transaction costs and improves operational efficiency. According to statistics, the digital industry, i.e. the first segment of China's digital economy in 2018, reached 6.4 trillion yuan (7.1% of GDP). It's share in the digital economy is 20.5%. As we can see, digital industries continue to dominate China's digital economy. In 2018, the scale of digitization of various industries amounted to 24.9 trillion-yuan, nominal growth compared to the same period last year, as noted above, was 23.1%. The share of digital industries in the digital economy increased from 49% in 2005 to 79.5% in 2018. The share of these activities in GDP increased from 7% in 2005 to 27.6% in 2018, and the contribution of the digital industry segment to the growth of the digital economy reached 86.4%.[2] Thus, the share of industrial digitization in China's digital economy is higher than that of digital production itself. This is an indication that digital technologies, products and services are actively penetrating various industries, accelerating the integration of traditional industries and ICT, by increasing of volume production and efficiency. The digitization industry of various traditional domains has become the main engine of digital economic growth, and the internal structure of the digital economy has been optimized.

China's digital economy grew rapidly in the software services, information technology and Internet industries: income in this sector rose by 14.2% and 20.3% on an annual basis, respectively. Demand for information, investment in the digital economy and e-commerce is steadily increasing, which contributes to the development of the digital economy.

While noting the undeniable success of the digital economy, it should be noted that in

[1] White Paper on China's Digital Economy Development. URL: http://www.caict.ac.cn/kxyj/qwfb/bps/201904/t20190417_197904.htm; Digital Economy Development and Cooperation Initiative. URL: http://www.cac.gov.cn/2016–09/29/c_1119648520.htm.

[2] White Paper on Development and Employment in China's Digital Economy. URL: http://www.caict.ac.cn/kxyj/qwfb/bps/201904/t20190417_197904.htm.

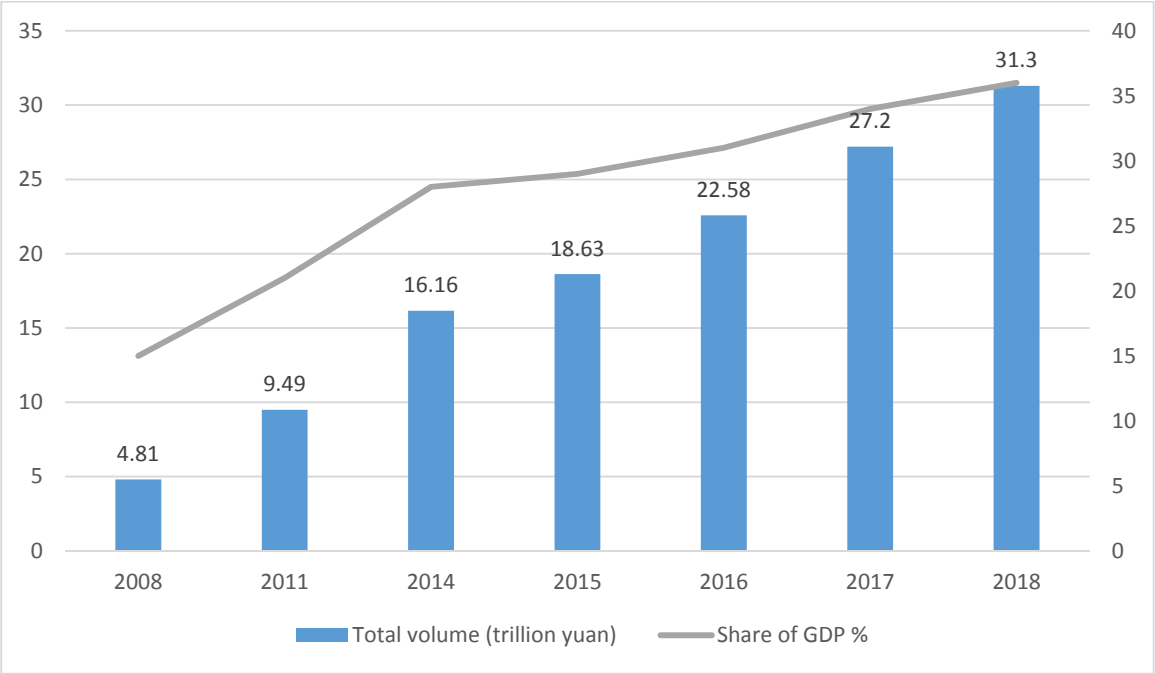


Fig. 1. **The volume of China's digital economy and its share in GDP in 2008–2018**

Source: URL: http://www.caict.ac.cn/kxyj/qwfb/bps/201904/t20190417_197904.htm.

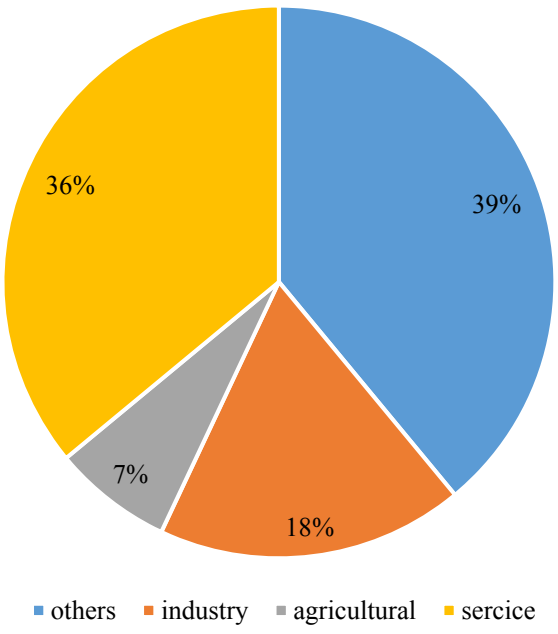


Fig. 2. **The share of the digital economy in various industries in China in 2018**

Source: URL: http://www.caict.ac.cn/kxyj/qwfb/bps/201904/t20190417_197904.htm.

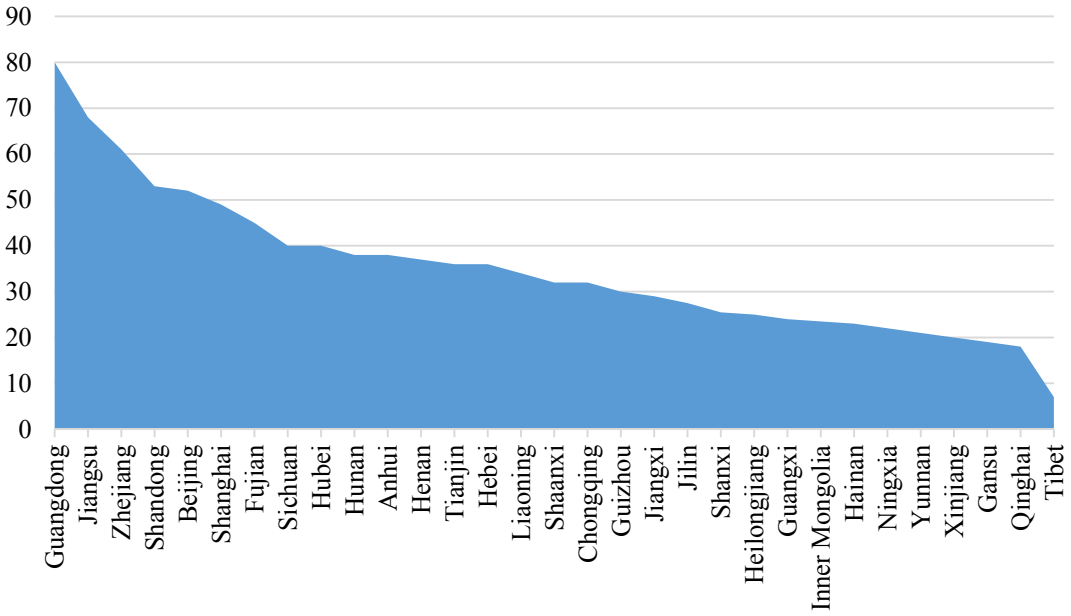


Fig. 3. **DEDI China Provinces Index**

Source: URL: http://www.ccidwise.com/uploads/soft/191104/1–191104153253.pdf.

the process of the digitization of the Chinese economy, there is an uneven distribution of the process by sector. For example, the use of big data technologies is largely concentrated in certain industries, including finance, telecommunications, and public services. The impact of big data in many other industries is less noticeable.

INEQUALITY IN DEVELOPMENT OF THE DIGITAL ECONOMY

Consider in more detail the situation of inequality in the development of the digital economy in China by geographically and industry. While China has achieved significant results, as the digital economy has developed, it faces serious challenges. Owing to differences in socio-economic and technological factors, the digital economy, represented by digital products and the Internet, has spread unevenly throughout the country. In recent years, there has been a digital divide within the country.

CCID Consulting is measured the digital economy in 31 provincial administrative districts across the country in 2016. Specific index rating DEDI[3] is shown on *fig. 3*. The composite index of DEDI is gradually decreasing from the east coast to the west, which largely corresponds to the GDP of these provinces, although in some regions this dependence is not absolute (http://www.caict.ac.cn/kxyj/qwfb/bps/201904/t20190417_197904.htm).

According to "Digital China Index Report" (2019) (http://www.ccidwise.com/ uploads/soft/191104/1–191104153253.pdf), published by the Research Institute of Chinese company Tencent, the index of digital China in 2018 was generally stable and rapidly growing. The common indices of Guangdong, Jiangsu, Beijing, Zhejiang and Shandong rank 1st-5th at the provincial level. The Beijing, Shenzhen, Shanghai, Guangzhou and Chengdu rankings are among the top five.

In 2018, the digital economy accounted for more than 20% of GDP in all provinces and cities. The digital economy in Beijing and Shanghai was dominated by more than 50% of GDP. GDP of the digital economy of

[3] Index DEDI — digital economy development index.

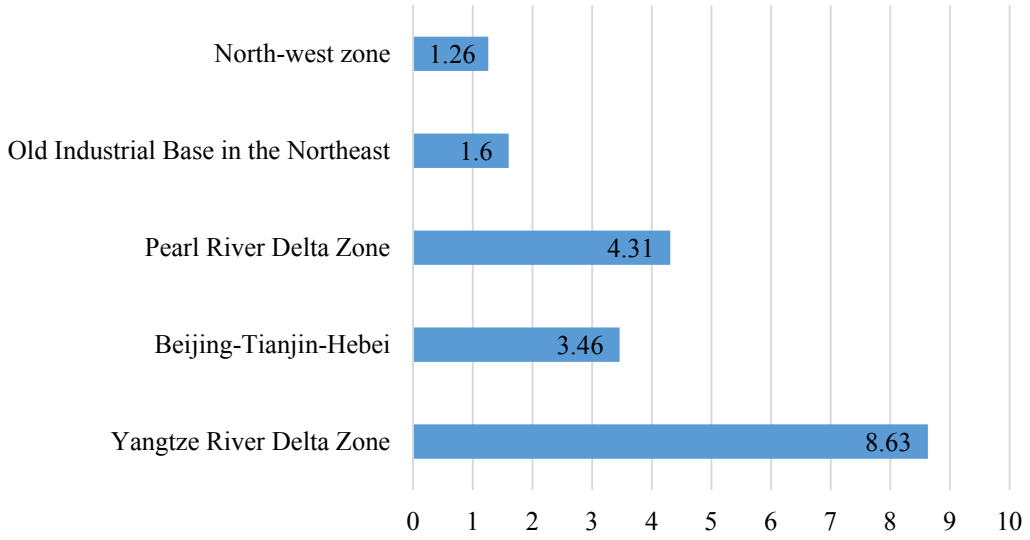


Fig. 4. **The volume of the digital economy in various regions of China in 2018 (trillion yuan)**

Source: Tencent Research Institute database.

Guangdong, Tianjin, Zhejiang and Jiangsu — more than 40%. The digital economy of Fujian, Shandong, Hubei, Liaoning and Sichuan and Chongqing provinces accounts for more than 30% of GDP, while the digital economy of other provinces and cities — accounts for more than 20% of GDP (http://www.ccidwise.com/uploads/soft/191104/1–191104153253.pdf).

The digitization process in China has obvious cluster effects, large urban agglomerations: Beijing-Tianjin-Hebei, in the Yangtze Delta, in the Zhujiang Delta, in Chengdu-Chongqing, in the middle of the Yangtze River, in the Guangzhong Plains and the Central Plain far exceed the share of other 214 cities in the total index. In 2018, the main indicators of the above-mentioned urban agglomerations in China as a whole maintained relatively rapid growth, and urban agglomerations Beijing-Tianjin-Hebei, Yangtze River Delta and Guangzhong Plains increased by more than 90%. Urban Middle Yangtze River and Central Plains Metropolitan Area followed by growth rates between 80 and 90%, above the national average, while urban agglomerations in the Zhujiang Delta and Chengdu Chongqing Delta grew somewhat slower than these figures. This region is the last in all major urban clusters.

In 2018, the absolute size of the digital economy in the Yangtze Delta region was the largest — 8.63 trillion yuan, and followed by the Zhujiang Delta region — 4.31 trillion yuan. The development of the digital economy in the north-west has been relatively slow: 1.60 trillion yuan and 1.26 trillion yuan respectively (*fig. 4*).

In general, the size of the digital economy is closely linked to the level of regional economic development. In addition, factors such as social status, age, geographical location and standard of living in China have a significant impact on the development of the digital economy. First, at the socio-economic level: the higher the level of income and education of the population, the higher the number of Internet users, the higher the participation in the digital economy. Although poor and less educated people have permanent access to the Internet, the gap between them and the richer and more educated members of Chinese society in the application of digital technologies and digital products is increasing. The digital divide is

growing accordingly. Second, there is the age factor: young people are significantly more active in accessing digital content (view Internet browsing and online consumption) than older persons (http://www.caict.ac.cn/kxyj/qwfb /bps/201904/t20190417_197904.htm). In addition, young people represent a significant proportion of Internet users through school access. With the national penetration rate in China reaching 49.3%, the penetration rate for people, whom aged 55–74, is less than 10%. [2] Finally, in China there is still a significant digital divide between cities and villages, which are still "digital depressive areas". This situation reflects unequal access to information and development opportunities for urban and rural residents, which will further widen the social gap between them. [3]

Inequality in the development of the digital economy — is not only a problem of uneven development and application of computer technologies, but also a continuing increase in social inequality. This means that more and more people across China are being excluded from the new information economy. Network backwardness in the central and western regions of China hinders the development of the local economy, thus bridging the digital divide between regions, and between urban and rural areas is an important task facing China.

BRIDGING THE GAP

In the documents: "Views the Central Committee of the Communist Party of China on implementation rural renewal strategies"[4] and "Strategic Plan for rural renewal (2018–2022)" mentioned, that a new generation of information technology innovations is now at an unprecedented pace and continues to generate new products, business models and formats for global advancement. The profound transformation of the economic structure and industrial form has created unprecedented opportunities for the development of digital villages. Digital village strategy must be implemented and digital agriculture must be actively promoted.[5] In May 2019, General Chancellery the Central Committee of the Communist Party of China and the General Chancellery of the Council of State published "Digital village strategy plan", which clearly defines them as a strategic direction for the rejuvenation of rural areas. In accordance with "Digital rural development strategy plan",[6] China will promote the digitization of agriculture, using the following measures to bridge the digital divide between regions, urban and rural areas and achieve balanced economic development.

To accelerate the construction of rural information infrastructure:

Strengthen the joint construction and use of infrastructure, and accelerate the development of rural broadband, mobile Internet, digital television and Internet networks of the next generation. [4]

- Improve information terminals and improve service delivery. Promote the development of information terminals, technology products and mobile Internet applications (APP). Fully implement the extension of information to villages and households for an integrated agricultural services platform.
- Accelerate the digital transformation of rural infrastructure (including its digital and intellectual transformation), such as water, highways, electricity, refrigeration chain logistics, agricultural production and rural processing. Promote the creation of the "smart" water economy, the "smart" transport, the "smart" networks and the "smart" logistics.

To develop of rural digital economy:

- Strengthen the digital agriculture framework. Improve the "unified map" for

[4] Digital China Index Report (2019). URL: https://www.sohu.com/a/315467226_472878.

[5] Views the Central Committee of the Communist Party of China on implementation rural renewal strategies. URL: http://www.moa.gov.cn/ztzl/yhwj2018/spbd/201802/t20180205 _6136480.htm

[6] Strategic Plan for Rural Renewal (2018–2022). URL: http://www.gov.cn/zhengce/2018–09/26/content_5325534.htm?trs=l.

natural resources monitoring by remote sensing and integrated surveillance platform, introduce dynamic monitoring of permanent main agricultural land. Promote the construction of Big Data Centers for agriculture and rural areas, and the entire production chain of important agricultural products, and — integration and exchange of basic data in agricultures и rural areas. [5]

• Promote the digital transformation of agriculture. Promote the use of cloud computing, big data, the Internet of things and artificial intelligence in agricultural production and management, as well as to promote the full and in-depth integration of the next generation of information technologies with crop, seed, animal husbandry, fisheries and the agricultural processing industry to create scientific and technical agriculture, "smart", brand agriculture.

• Establish an innovative agricultural turnover system. Introduce the "Internet+" project to bring agricultural products from villages to cities, as well as strengthen the construction of processing facilities, packaging, a chain of refrigerators, warehousing and other agricultural products. [5] Expand the distribution of rural post offices and express delivery, and accelerate the establishment of a number of intelligent logistics distribution centers. Create a "green" supply chain and promote "green" logistics. Promote the use of artificial intelligence and big data for the development of rural shops, and promote the use of online and offline channels.

• Actively develop new rural enterprises. Promote deep connectivity between the Internet and traditional agriculture, develop new forms of business (креативное сельское хозяйство, туризм в деревне и сельское хозяйство в городах), contribute to the development of new industries such as rest and recreation, living in a rural family, and revitalizing the rural economy of shared consumption. [5]

To expand the supply of agricultural innovation technologies and science:

• Promote the intensification of the use of agricultural machinery. Facilitate the balancing a combination of next-generation information technology and the production of agricultural equipment, as well as develop and promote agricultural intellectual equipment. Encourage the development of industrial Internet and upgrading the level of agricultural intellectual machinery in agricultural engineering and equipment. Facilitate connected of informatization with agricultural equipment, agricultural machinery and management of agricultural equipment.

• Optimize agricultural science and technology information services. To create a group of innovation centers for new technologies to promote cooperation in production, education, research and design. Support the creation of an online agricultural technology exchange market. Improve the information services platform for agricultural science and technology, and encourage technical experts to solve problems of agricultural production challenges online for farmers.

To create "smart green villages" [6]:

Promote a method ecological net agriculture. [7] Establish an electronic control system for agricultural resources, contribute to reducing the use of chemical fertilizers and pesticides. Develop implementation the Internet of things in rural areas. Contribute to preserving water on agricultural land, introduce modern equipment of agricultural parks and develop "green" agriculture. Promote "green" way of life in rural area. Establish an integrated platform for monitoring the environment of rural settlements; strengthen the monitoring and protection of drinking water sources.

To develop rural networked culture:

Increase construction of rural cyber-cultural facilities. Promote construction of digital radio and television and "smart"

broadcasting. Promote the digitization of rural cultural resources, create "banks of digital cultural relics" and "digital museums" in historical and cultural cities, traditional villages, and to strengthen the protection and inheritance of traditional Chinese culture in rural areas.

To modernize rural administration:

Improve the efficiency rural management. Increase the level of improvement, modernize integrated rural management, and implement its online organization. Contributing to the dissemination "Internet+ community" in rural areas, increase level of informatization of complex services at village level and actively promote informatization of rural management. Speed up the implementation of the "Xueliang"[7] Project in rural areas and deepen the construction of safe rural areas. Accelerate the progress of "Internet+ state legal services". Based on a nationwide integrated online platform of government services, improve online public services.

To expand information services for rural residents:

- Promote the informatization of rural education. Develop the project "Internet+ education", establish the link between urban high-quality educational resources and rural primary and secondary schools, and to assist rural schools in developing national courses.
- Improve public information. Facilitate the establishment of comprehensive social security and social assistance system covering rural areas. Actively develop the project "Internet+ medical health care", support urban and rural medical institutions to increase the level of informatization, and orient urban health facilities to provide rural health facilities with distance education.

[7] The project "Xueliang" is aimed at ensuring public safety of villagers. Thanks to technology and cooperation between the local government and the radio and television network company, the villagers can see images of several important crossroads in the village in real time by turning on the television. If a villager discovers a hidden security threat, he can immediately make a video call to the police station via the platform and call the police directly.

To stimulate endogenous motivation for rural regeneration:

- Support the development of new actors in agriculture and services. Accelerate the reduction of fees for farmers' cooperatives, family farmers' networks, marketing channels, financial credit and talent training.
- Support new types of professional farmers in every way. Implement the "Internet+ small farmers" plan to expand their development opportunities.
- Activate rural resources through the development of digital agriculture, smart tourism and smart industrial parks in accordance with local conditions. Use information to manage the flow of funds, technology, talent and materials.

To enhance digital development for poverty reduction:

Promote in-depth development of online anti-poverty measures, strengthen support for rural industry, and make full use of big data platforms to consolidate the results of aid to the poor.

To implement a general plan to promote the integrated development of information in cities and villages:

- Coordinate the development of digital villages and "smart" cities. Promote the digital, networked and intellectual development of urban and rural production, daily life and environmental space. To direct the development of the digital economy between the city and the village in order to meet the needs of the urban and rural population at all times.
- Enhance integration and sharing of information resources. Through the national system of data-sharing platforms, to facilitate open and effective integration of information resources related to rural governance in the various departments. Promote international exchanges and cooperation in digital villages.

CONCLUSION

The State policy for the digitization of rural areas defines the goals, objectives and

measures for the development of the digital economy in rural areas. It has three main components.

First, a new development concept and requirements for the quality development of rural areas. The Strategic Plan of the new concept of development is based on the generation and use of innovation, coordinated action, environmental friendliness, openness and sharing of resources. In order to meet the requirements of qualitative development, public policy is aimed at improving digital productivity, accelerated development of new kinetic energy through informatization, active promotion of the digital transformation of agriculture. At the same time, actively developing new rural business formats and using information resources to stimulate the flow of capital, materials, technology and talent, various rural opportunities and improvements in agriculture and rural areas need to be fully developed.

Second, a comprehensive implementation of China's innovation strategy. This strategy fully covers the main decisions of the central government and their implementation in the area of rural renewal and informatization policy. In the area of renewal policy, the strategic rollout of the "five updates" is under way: industrial, cultural, environmental, and then organizational and talent renewal. This strategy realistically reflects the construction plan of "digital China" and fully reveals the leading role of informatization in the modernization of rural areas.

Third, priority for agricultural and rural development. In the light of the general economic problem and concerning the development of agricultural informatization, rural areas and farmers, overall planning is strengthen, political support is enhance, and resource priorities are prioritize in investment guarantees in project fund, in public service and financial arrangements. The guiding role of the government is to use financial and social capital to invest in digital agriculture, increase investments with the most efficient use of them.

In the context of the digital wave that has engulfed the whole world, countries have started the "digital revolution" and are developing the digital industry in every possible way. The Chinese leadership is aware of the problems of planning at the national level, the lack of overall planning of resources, the weakness of infrastructure and the obvious differences in the digitization of cities and villages. China is shaping a strategy of "digital village" and building digital villages as one of the priority areas of development.

The strategy aims to accelerate the intensification of agricultural production, popularize rural information services and improve the livelihood of farmers. "Digital village" is an endogenous process of agricultural development and transformation, accompanied by the application of network, information and digitization, as well as improving farmers' modern information skills. Currently, a new generation of information technology innovations is becoming more active than ever, constantly generating new technologies, products and models, and contribute to a profound transformation of the global economic structure of industry. In the future, accelerated construction of rural information infrastructure, integration of modern agriculture in online and offline mode is planned, rapid improvement of rural information services, adoption of fourth- and fifth-generation broadband and mobile networks in rural areas, as well as alleviating some rural problems. The development of information technology, products, applications and services would help to popularize telemedicine and distance education, bridging the digital divide between urban and rural areas.

China has contributed to the development of world economic civilization. China's digital economy is trying to contribute to global economic growth with its own experience. These efforts should contribute to quality and more sustainable development of the world economy.

REFERENCES

1. Ma Huateng, Meng Zhaoli, Yan Deli, Wang Hualei. The digital economy. Beijing: CITIC Press Corporation; 2016. (In Chinese). (Russ. ed.: Ma Huateng, Meng Zhaoli, Yan Deli, Wang Hualei. Tsifrovaya transformatsiya Kitaya. Opyt preobrazovaniya struktury natsional'noi ekonomiki. Moscow: Alpina Publisher; 2019. 256 p.).
2. Sun Zhunyei et al. The laws of the spread of the space of the global Internet and factors affecting them. *Jingji dili*. 2015;(35). (In Chinese).
3. Liu Y., Meng L. The elderly in the digital world: The Internet as a socio-technically untrusted system for older Chinese Internet users. *Journal of Electronic*. 2013(2):190–201. (In Chinese).
4. Lei Ming. Coordinating the raise of the village. Pressreader. May 08, 2021. URL: https://www.pressreader.com/china/china-russian/20210508/281831466635027 (In Russ.).
5. Wang Li. Village revival through rural and agricultural modernization. Kitai. May 26, 2021. URL: http://www.chinapictorial.com.cn/ru/rbestxinwen/202105/t20210526_800247669.html (In Russ.).
6. Han Yiyuan. For a green future. Kitai. 2021;(6). (In Russ.).
7. Zhang Qi. How to build a moderately prosperous society. Kitai. 2021;(5).

ABOUT THE AUTHORS

Evgeny F. Avdokushin — DSc in Economics, Professor of the Department of Economic Theory and Management of the Institute of Social and Humanitarian Education, Moscow State Pedagogical University, Moscow, Russia
Aef2005@yandex.ru

Wang Zhui — a postgraduate student at the Faculty of Economics, Lomonosov Moscow State University, Moscow, Russia
Ruiwang1991020@gmail.com

The article was received on 01.05.2021; revised on 20.05.2021 and accepted for publication on 20.08.2021.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-16-28
UDC 336.74(045)
JEL G18

Digital Currencies: Conceptualization of Risks and Regulatory Opportunities

V.V. Maslennikov[a], A.V. Larionov[b]
[b] Financial University, Moscow, Russia
[a] https://orcid.org/0000-0001-6199-9979; [b] https://orcid.org/0000-0001-8657-6809

ABSTRACT

The subject of the study is the risks of the development of digital currencies. The study suggests that when solving the existing technological problems of creating a digital currency, Suppose we are talking about digital currencies not controlled by the state and the central bank. The study suggests that after solving the existing technological problems concerning the creation of digital currency, a reorientation of the national entities can occur to make payments in digital currencies to anonymize payments, avoid taxes, and reduce the costs associated with the transfer. As a result, the capabilities of national state bodies in regulating the economic activities of economic entities may decrease. The share of their shadow interaction may also increase. Problems in the performance of the fiscal function of the state may become more acute. The purpose of this research is to conceptualize the risks of the emergence and regulation of the use of supranational digital currencies as a means of payment. The moving of national cash flows to the supranational level — to the sphere of digital currency exchange will negatively affect the completeness of filling the state budget and its ability to perform basic functions. This process will create a real threat to economic security. The study reveals aspects of the development of the digital ruble and the possibility of reducing the risks of using digital currencies by creating new mechanisms for state regulation of economic entities. The research examines the prospects for reducing the attractiveness of supranational digital currencies.

Keywords: financial technologies; digital currency; digital ruble; digitalization; economic security; payment systems; money; cash flow; eco-platforms; central bank

For citation: **Maslennikov V.V., Larionov A.V. Digital currencies: Conceptualization of risks and regulatory opportunities. *The World of New Economy*. 2021;15(4):16-28. DOI: 10.26794/2220-6469-2021-15-4-16-28**

INTRODUCTION

The research examines potential risks, resulting from the development of supranational digital currencies (then — SDC) [1] as a payment tool. The study suggests that the rise of volume of SDC in settlements could lead to a shift of domestic cash flows to the supranational level. For the moment, there are limitations linked to the high cost of generating new SDC units and its inefficiency. Following the introduction of a new way to produce SDC that allows low-cost generation, we can expect a global "reboot" of the SDC system. Therefore, SDC might gradually become widespread. SDC will demonstrate a maximum trust of economic entities of different countries, reducing the usage of national currencies as a payment tool. The increased attractiveness of SDC may be linked to anonymity of transactions, absence of commission, cross-border restrictions on settlments, a number of other characteristics that make SDC more competitive than national currencies. The upward trend in the use of SDC will also be caused by the further development of the payment infrastructure so that it can be used in settlements. Currently, there are 26K ATMs worldwide that accept Bitcoin,[2] 86% of which are in the US.

The development of the described above situation creates new risks for Russia's economic security. Settlements using SDC outside the national regulatory framework implies a lack of capacity to monitor their movements, obtaining information for the taxation of economic entities and their transactions, the collection of commissions etc. With the transfer of cash flows to the supranational level, the ability of traditional monitoring of economic interactions between entities on the basis of data on the cash flow is impaired. Since the creation of the new SDC production technology, threats to the state economic security may increase significantly. The chance of a high-tech SDC emergence will increase with the rapid development of information technology and increased competition among financial conglomerates [1].

The SDC problem first emerged with the advent of bitcoins during the global financial crisis of 2008 year. [2] However, the SDC had a very limited distribution. The development of SDC technologies will involve an increasing number of economic actors in the process of using them.[3] As a result, SDC as a form of settlements can strengthen its position by increasing popularity among citizens of different countries. The more people use SDC, the less dependent they are on national currencies.

The situation is exacerbated by the fact that most regulators (central banks) do not have any technical and legal capacity to regulate SDC.[3] In particular, in Russia has adopted the Federal Act from 31 July 2020 No. 259 "On digital financial assets, digital currency and on amending selected legislative acts of the Russian Federation", to introduce the concept of "digital currency" in the regulation field. At the same time, art. 14 p. 4, of the Act stipulates that the organization of the issuance of digital currency in Russia is regulated in accordance with federal laws. As of September 2021, there are no such federal laws, probably due to lack of clarity: how to establish control by a national regulatory body over processes that are predominantly outside

[1] Supranational digital currencies are monetary surrogates created internationally and not recognized by most central banks, including the Bank of Russia, as a means of payment.

[2] Prevalence of bitcoin-receiving ATMs, by region of the world. URL: https://zen.yandex.ru/media/pstat/rasprostranennost-bankomatov-prinimaiuscih-bitkoiny-po-regionam-mira-61387f5f4e045b4b82fbd7be

[3] Regulation of cryptocurrencies. Research of country experiences. 2017. Official website of the Eurasian Economic Commission. Internet-resource. URL: http://www.eurasiancommission.org (accessed: 12.09.2021).

national jurisdiction and the perimeter of the national financial system. In the future, the Bank of Russia will still have to establish an appropriate regulatory system, as a number of legal proceedings has already increased in Russian practice regarding the SDC purchase. [4]

Complete prohibition of SDC in a particular country, may not have a significant impact on the volume of transactions using SDC. Moreover, a formal ban can lead to negative economic impact, as one country may restrict the use of SDC while another will support them [5]. The result would be a breach of the principle of establishing an "effective state regulatory system", since the costs of implementing government regulation should not exceed the benefits of its application. The use of SDC can increase with the development of financial eco-platforms if they decide to settlement in SDC.[6]

In view of the prospects of increasing the volume of transactions in SDC, it is advisable to analyze the main risks associated with their development. It is necessary to identify the factors, determining the increase in demand, and offer tools aimed at regulating and monitoring the use of SDC.

RISKS ASSOCIATED WITH THE DEVELOPMENT OF DIGITAL CURRENCIES

It can be predicted that with the increased user confidence in SDC, the volume of transactions to be performed will increase gradually at first, but then with considerable acceleration. The latter will increase the risks associated with the growth of SDC transactions. Economic shocks can have a significant impact. An example of a similar-scale shock is the COVID-19 pandemic, which creates risks to sustainable economic development.[7] With the pandemic, people in many countries have become wary of making cash payments, which in the medium term may contribute to an already declining use of cash.[8] Currently, the limitations for widespread use of SDC are their manufacturing technology, requiring huge amounts of electricity; binding of SDC to a certain asset; insufficient level of confidence among most economic actors and some others.

Today's SDC generation technology initially contains internal technological limits for further expanding the use of digital currencies as a payment tool. Removing them will boost the use of innovative SDC. But it should be borne in mind that these limits on the amount of generated SDC are also the internal mechanism of the deficiency of a given asset that supports the value of digital currencies. Therefore, the effective implementation of the new SDC generation technology can only be achieved by simultaneously creating a new internal volume limitation mechanism, for example, by linking the SDC to a group of economic indicators, to a group of assets, etc. Such solutions can spread the SDC risk across several benchmarks and/or assets.

The potential for explosive growth of SDC can be seen in the analysis of their fluctuations on cryptocurrency trading platforms. Against the backdrop of low interest rates, SDC along with new forms of investment, are attractive for investment.[4]

Average volume of transactions of cryptocurrency through Bitfinex[5] from 01 March 2013 to 01 June 2021 was 3.4 bln. USD, which is relatively small compared to the turnover of traditional currencies (e.g., USD, euros and etc.). At certain times, however, cryptocurrency trading platforms experienced a significant increase in transactions, for example, in times of crisis (during the COVID-19 pandemic), against

[4] Digital Disruption in Banking and its Impact on Competition. Organization for Economic. URL: http://www.oecd.org/daf/competition/digital-disruption-in-financial-markets.htm.

[5] Cryptocurrency trading platform.

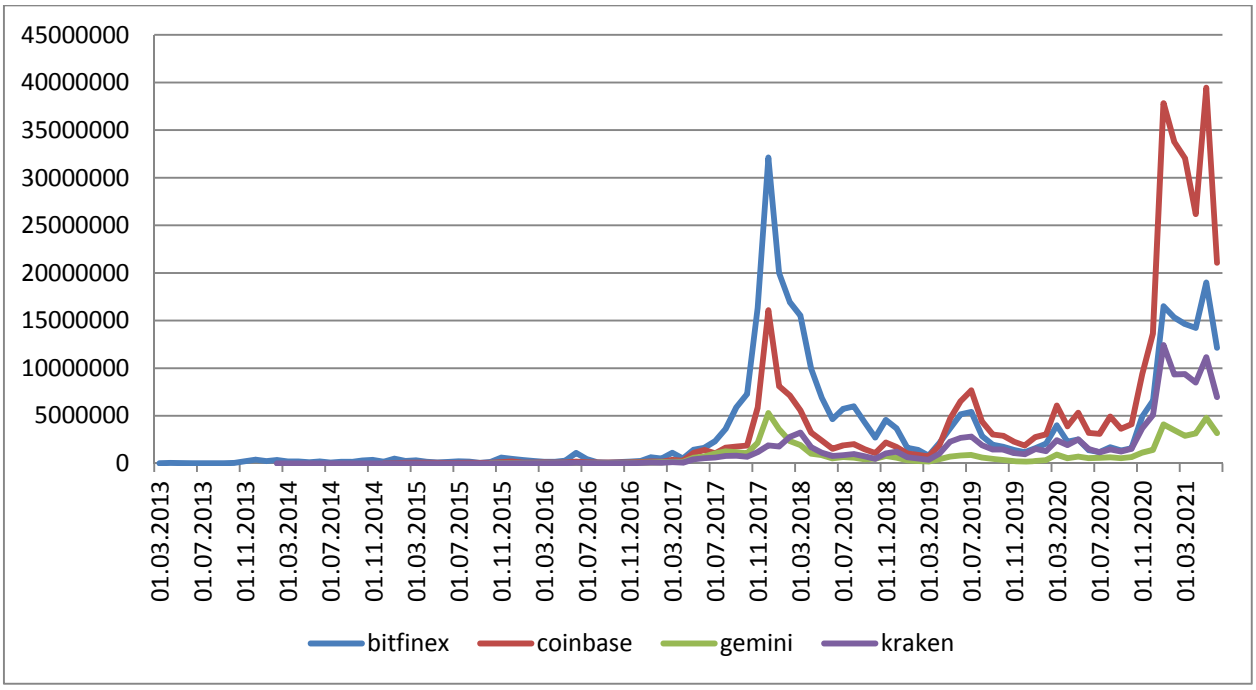


Fig. 1. **The volume of cryptocurrency trading through the leading platforms, thousand US dollars**

Source: compiled by the authors based on URL: https://data.bitcoinity.org/markets/volume/all/USD?c=e&t=b&vu=curr

the backdrop of an overall increase in economic volatility (*fig. 1*).

Since the attractiveness of SDC depends heavily on the stability of their exchange rate, replacing traditional money with digital currencies is only possible when SDC is used primarily as a non-speculative investment tool, namely as a means of settlements. However, there are SDCs linked to specific national currencies. For example, Tether's digital currency is pegged to the dollar, which determines its exchange rate against the USD and the US economy as a whole, rather than the current speculative mood.

Use of SDC in settlements attracts economic entities without commissions (or minimum commissions) and anonymity in making payments. This is largely due to the fact, that in the last two decades, banking secrecy has been eroding. The old principle "money loves silence" is no longer applicable to traditional banks. The Swiss Federal Court was decided that banks should transmit to the French tax authority's historical data on taxpayers.[6] Combined with higher taxes and improved tax administration, this has fueled the demand for supranational transactions, uncontrolled national regulators. The development of SDC will entail significant risks in the economy that need to be identified as well as effective management practices developed (see *table*).

Reduced effectiveness of state economic regulation. Rapid changes in payment technology require a corresponding overhaul of state regulation of payment systems. With the projected accelerated increase in SDC payments, public authorities may fail to make the necessary changes to monitoring systems and control the process of the national economy on time. This is because, that the present

[6] The end of bank secrecy? What will change after the decision of the Swiss Federal Court. URL: https://www.forbes.ru/finansy-i-investicii/381933-konec-bankovskoy-tayny-chto-izmenitsya-posle-resheniya-federalnogo-suda.

monitoring and control systems are based primarily on the analysis of cash flows, which, if economic agents use SDC for reciprocal payments, would be beyond the government-controlled horizon.

In the absence of effective monitoring tools, state bodies lose a chance to prevent and compensate market crises. It necessary to develop new tools for early warning of distress on financial market. [9] This is another reason why it is now necessary to start developing mechanisms for state regulation of the economy in relation to conditions, when a viable alternative to the widespread use by national economic agents of supranational payment systems. In parallel, services should be actively developed using digital ruble as a convenient alternative to SDC for the more law-abiding part of national economic actors. Initial testing of the digital ruble platform prototype is planned for Q1 2022.[7]

Lack of consumer protection. There is a threat of operational risk related to issues of information theft, use of virus programs, SDC exchange fraud, etc. [10] Although the technology is safe enough at present, the emergence of fraudulent schemes cannot be ruled out in the future. Already now, fraudsters are legalizing obtained money with the help of SDC, which leads to lengthy trials.[8] Without a reliable system of control and regulation, the volume of such fraudulent transactions can become significant. Taking into account the experience of payment systems, SDC smooth functioning should be explored. [11] Since malfunctions are fairly regular in the operation of information services, they can also occur in SDC-based systems, which will have a negative impact not only on the economic agents, who use these systems, but indirectly in the Russian economy as a whole. In particular, Google's services repeatedly implemented operational risk in 2020–2021 (*fig. 2*). Even developed ensure continuity systems, which using in Google, are not completely safe from outages (8 service outages were reported in March 2021).

Dilution of the state budget. SDC transactions will reduce the effectiveness of fiscal policy. Such cases abound current time for accounts opened abroad. Attempts to levy taxes on accounts that are beyond the control of national Governments do not lead to meaningful results. For SDC payments, the situation will be even worse, as they occur outside the control of any state, and obtain information about them through the conclusion of inter-state agreements it is not possible. That is why it is necessary to find new mechanisms of tax control of economic entities, implying that they can use SDC for mutual payments.

Loss of the national monetary system. Increasing demand for SDC as a payment tool will inevitably reduce the use of the national currency by economic agents. This threatens the disappearance of the single monetary system, as well as the stability of the national currency. In this case, the SDC can become an extremely harmful cash surrogate for the state.

Growth of shadow interaction of economic agents. Given the fact, that SDC operations are outside the state's control, that is, the probability of an increase in illegal transactions using them, a broadening of the base for financing illegal activities. There is a need for public authorities to develop mechanisms to improve the ability to monitor cash flows in the informal sector. The situation is aggravated by the fact that entities involved in shadow banking are actively involved in the promotion of new financial technologies, which reduces the ability of the state to regulate them. [12]

Reduced volume of use of national payment infrastructure. Use of SDC is

[7] Digital rouble concept. Bank of Russia. 2021. URL: https://cbr.ru/Content/ Document/File/120075/concept_08042021.pdf.

[8] Bitcoin on the arm: the seller of the "crypts" has to pay back the money (pravo.ru). URL: https://pravo.ru/story/230001/

Table

Sources of risk associated with the development of IDC (international digital currency)

Source of risk	Characteristic
Reduced effectiveness of state economic regulation	Economic entities leaving payment systems using SDC will lead to a lower share of payments (of which domestic), available for regulation and control by public authorities
Lack of consumer protection	Since economic entities pay in supranational payment systems, not regulated by the Bank of Russia, mega-regulator has little or no capacity to protect consumers of financial services
Dilution of the state budget	Massive payments between economic agents using SDC will reduce taxes and payments, their contribution to budgets at all levels and to extrabudgetary funds. The latter will reduce the state's capacity to ensure the sustainable socio-economic development of the country and to maintain the necessary level of economic security
Loss of the national monetary system	As the use of SDC for payments increases, the volume of transactions made using the national official currency will decline
Growth of shadow interaction of economic agents	Anonymity of SDC payments provides economic agents with additional opportunities to operate in the informal sector of the economy, which in turn can stimulate the development of shadow banking, but already using digital currencies
Reduced use of national payment infrastructure	Shifting economic actors to supranational infrastructure will reduce demand for national payment infrastructure, reducing its effectiveness and disruption of continuity operation

Source: compiled by the authors.

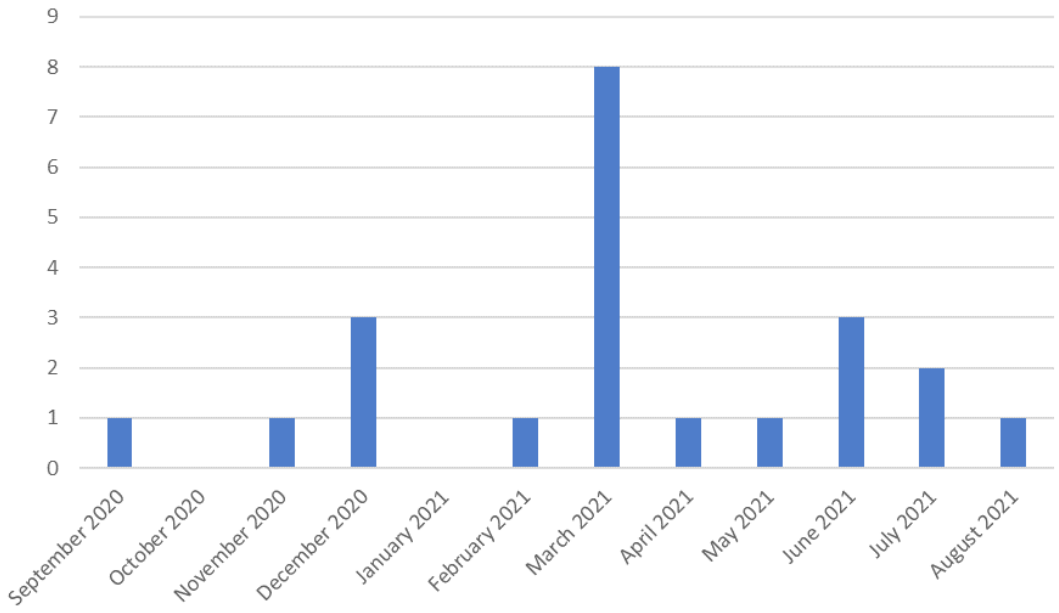


Fig. 2. **The number of failures in the work of Google in 2020–2021**

Source: compiled by the authors based on URL: https://downdetector.ru/ne-rabotaet/google/obzor/2020/09/

not based on using national payment infrastructure, which determines the decline in profitability of private entities of the national payment system, as well as increased probability of individual participants becoming unstable. In order to neutralize this source of risk, it is advisable to stimulate the development of new efficient business solutions in the sphere of payment systems ensure their functioning. [11]

It should be noted, that the above list of risks is not exhaustive and will be completed both before and after the introduction of high-tech SDC. Reducing the potential negative impact of their implementation is not possible only through appropriate control and regulation, various kinds of prohibitions and repressive measures aimed at encouraging citizens and legal entities to abandon the use of SDC in whole or in part, but also by offering them similar services of digital currencies of central banks. The latter requires an analysis of the factors influencing the willingness of entities to use SDC to make calculations.

DETERMINANTS OF GROWING DEMAND FOR DIGITAL CURRENCIES BY ECONOMIC AGENTS

Nowadays, SDC is often seen as an investment rather than a means of payment. This situationis related to the existing technological limitations of SDC, and the excessive volatility of their market value, which makes SDC attractive for speculative investment. However, demand for alternative available payment channels is bound to generate a supply supported by fast-growing "fintech". Therefore supranational payment systems using SDC will come to the fore in the foreseeable future.

The SDC of the future will be free of these disadvantages and will be used primarily as a means of payment. This process is driven by the following factors, encouraging economic agents for the implementation of calculation to SDC: decline in confidence in national currencies, development of financial technologies, in which traditional forms of money "do not fit", anonymity of settlements in SDC, wide

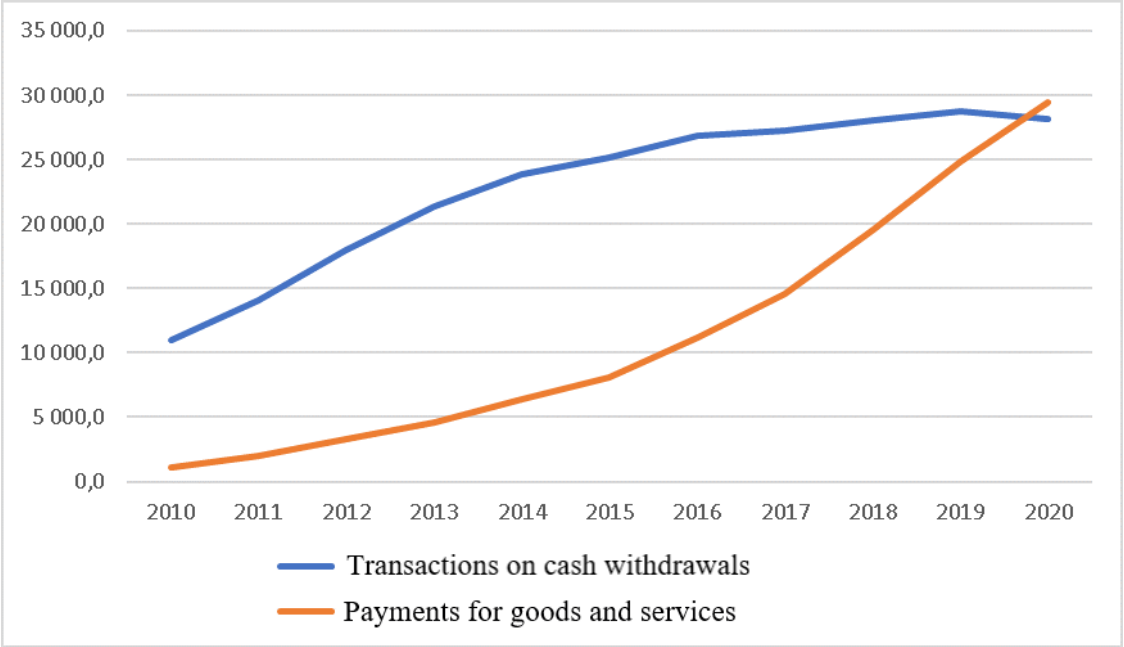


Fig. 3. **Transactions made on the territory of Russia using payment cards issued by Russian credit organizations, the Bank of Russia and non-resident banks, billion rubles**

Source: compiled by the authors based on URL: https://www.cbr.ru/statistics/nps/psrf/.

possibilities of application of international economic sanctions in case of use of SDC,[9] the difficulty of seizing or freezing funds in SDC, low transfer costs and many others.

Declining confidence in national currencies. An important factor determining the possibility of money transfers in SDC is the decline in confidence in national currencies. Loss of confidence may be the result of high volatility, economic and political crises and other causes.[13] Fiscal imbalances in many countries were particularly pronounced against the backdrop of the COVID-19 pandemic. The global currency crisis could trigger further expansion of SDC use.

Advance of financial technologies. Significantly less convenience of payment in traditional currencies than in digital currencies can lead to the rejection or substantial reduction of payments using money in traditional forms. So far, a similar movement in Russia is evident within traditional forms: from cash to non-cash payments. For example, payments for goods and services using payment cards in 2020 exceeded transactions on cash withdrawals (*fig. 3*).

The old technology of paying for goods and services in cash gives way to nothing new and become traditional. It is obviously archaic and has an internal limit for development, to be achieved in the nearest future. The high transaction costs of card payments leave little alternative for transition to more economical calculation technologies. New SDC will have such characteristics, which will have the effect of replacing national currencies with supranational. Partial elimination of this effect is possible due to increasing technological efficiency of "legal" payment channels (of which using digital ruble) at the same time as the cost of their use decreases.

Anonymity. Currently, non-cash payments using traditional channels and services are

[9] The absence of restrictions on the application of international economic sanctions.

not anonymous. This increases the need for economic actors to minimize operational risk, related with potential leakage of personalized user information, a certain category of economic entities — and the concealment of information on payments from government regulatory bodies. This encourages the continued use of cash for payments. Since the tendency of economic entities to maintain anonymity in their calculations is unlikely to diminish, the search for a modern alternative to cash will certainly continue. And such an alternative is fully represented by SDC. The digital currency created by the Central Bank should provide a high level of information protection so that only the Central Bank and, in certain cases defined by law, other public authorities have access to transaction data.

Potential for international economic sanctions if SDC is used. The growing popularity of economic sanctions imposed by many countries on each other in recent years has increased risks, related to international transfer. As a result, clients lose the ability to freely dispose of their own assets. This was the case in 2019 year when anti-Russian sanctions were imposed on some banks. In particular, the ability to transact through Visa and MasterCard was suspended for clients JSC JSB "Evrofinance Mosnarbank".[10] SDC are located outside national jurisdictions and therefore outside of political risks.

The difficulty of seizing or freezing funds in SDC is similar to the previous factor is an important advantage of the latter over traditional account-based settlements, open to financial organizations of other states. Not only foreign entities but also Russian judicial bodies are becoming an additional attraction for SDC economic entities, if you consider the difficulty in recovering assets.

[10] Evrofinance Mosnarbank — Loans, Deposits, Input, Safety Deposit Boxes, Financing. URL: https://evrofinance.ru/ru/our-company/news/news_640.html.

Low cost of transfer. The transition to SDC may also be related to the natural tendency of economic agents to save on bank commissions for money transfers. The fast payment system being developed by the Bank of Russia reduces to some extent the impact of the transfer cost factor, encouraging national economic entities to make payments through the Russian financial infrastructure. In addition, ease of use of SDC will promote its active use. In this connection, between the Bank of Russia and credit organizations, on the one hand, and operators of high-tech SDC, on the other hand, there will be a "race" in the development of the system of settlements, improvement and cheaper payment services provided.

CASH-FLOW MANAGEMENT MECHANISMS TO TAKE INTO ACCOUNT THE ENLARGEMENT OF USE SDC

To manage the risks described above, related to the increased use of SDC as a payment instrument, the state must establish a new system of state control and regulation of the national economy. This system should be appropriate to the scale of the threat and aimed at preventing the free flow of money from state-controlled payment systems to supranational payment systems. It should aim at encouraging economic agents to consciously abandon the use of SDC in their settlements in favor of the national currency, including in the form of a digital ruble. Avoidance of SDC in settlements is more likely for law-abiding economic agents, those who will strive to comply with the state-established rules for the settlement. [14] A wide range of tools is useful for this purpose. Consider some of them in more detail.

Creation of digital ruble. The efforts of central banks are commendable, aspiring to create their own digital currencies, including the efforts of the Bank of Russia

to create a digital ruble. The digital ruble can be seen as another form of money alongside traditional: cash and non-cash. Official recognition of the digital ruble by the Bank of Russia and the state forms its fundamental difference from SDC, which is a money surrogate.[11] The key advantage of the digital ruble is that, that its issuer is the Bank of Russia, controlling the volume of digital rubles in circulation.

The digital ruble needs to be made an attractive alternative to SDC in order to prevent the exist economic agents to digital currency-based payment systems. In order to be in demand, the digital ruble must offer at least the same parameters of use as the SDC, including low transfer costs, high payment processing, etc. Of course, the digital ruble cannot be a complete analogue of SDC, because it is inherently linked to the state and does not provide anonymity of payments made in relation to state control bodies, which is of course of interest to a certain category of economic entities. However, a convenient alternative to SDC in the form of a digital ruble will keep within the national monetary system the law-abiding part of economic agents, for which anonymity of payment is not a key parameter determining the choice of payment channel. At the same time, the demand for supranational numerical calculations will be maintained but substantially reduced.

Improving financial literacy to promote responsible financial behavior among economic agents. Financial literacy of citizens should be aimed at making them widely aware of possible legal and economic risks, related to the use of SDC in calculations, as well as to the development of confidence in the digital ruble. Special emphasis should be placed on working with young people who are active in using financial technology — "fintech".

Improvements in payment technologies used in state-controlled payment systems. There is a need for continuous analysis of emerging technologies, forecasting of their development trends with immediate implementation of innovations in the state-controlled payment infrastructure. Only such an approach will give the chance to keep up with the race in payment technology and will reduce the incentive of economic agents to use SDC for settlements.

Increased liability for concealment of payments using SDC. In addition to incentives, explicit restrictions on the use of SDC for calculations should also be actively used. There is also a need to tighten the liability of economic entities for not including payments in SDC in accounting and financial reports.

Monitoring by proxy-indicators. Given the difficulty of public authorities accessing direct information on payments made to SDC, for implementing the fiscal function of the state will have to transform the existing tax and tax administration system, based primarily on control of cash flows and payments. It is clear that the lack of verifiable information on payments made in SDC will require the collection and comprehensive analysis of non-financial data and its comparison with the declared information on payments made by economic agents. In such a case, the identification of inconsistencies (preferably using artificial intelligence systems) would warrant further study and analysis of the activities of the economic actor.

Control of commodity flows. There is a need to develop a system for monitoring the movement of goods and services. Such systems have now been implemented the introduction of mandatory product

[11] A reliable marker differentiating money and cash surrogates is the criterion of "recognition by the state". The digital ruble is recognized by the Bank of Russia as a means of calculation, which means that it should be considered as a means of payment. SDC (for example, Bitcoin) is not recognized by the Bank of Russia, and is therefore a cash surrogate. One of the key risks to the monetary system of the state is the transition of economic agents to large-scale use of cash surrogates.

labelling. This practice has been applied in Russia since 2017 with the adoption of the Federal Act from 31 December 2017 No. 487 "On amendment of article 4.7 of the Federal Act "On the use of cash control equipment in cash settlements and (or) settlement by electronic means of payment" and articles 5 and 8 of the Federal Act "Principles of state regulation of trade activities in the Russian Federation". Since that SDC calculations cannot be effectively traced (at the current level of information technology) it will be necessary to track the flows of the goods and services themselves. Monitoring of services may be difficult. At the same time, mechanisms for self-employed citizens monitoring could be used to regulate the provision of services.

Development of imputed taxes. Extending the use of imputed taxes is advisable, as when economic agents use SDC for mutual payments it will be difficult to assess the real volume of business transactions. This will eliminate the main motivation for using SDC in settlements for many economic entities.

Monitoring the digital footprint of perfect payments in SDC. High-tech ways of moving economic agents into the informal economy must be resisted by equally modern methods of counteracting this dangerous phenomenon. Because the Internet is needed for SDC settlements, it probably, Automated Network Activity Tracking Systems will be useful for monitoring the process, which digital currency converters.

It should be noted that, with a view to active development of digital currencies and the risks of increasing demand for payments, non-binding government measures are required.

CONCLUSION

The development of SDC is a significant factor in the development of digital financial technologies and the current trend towards financial eco-platforms (and not just government banks). With technological refinements, SDC will gain competitive advantages over traditional forms of money. The state faces a real risk of losing control over cash flows at the national level. The risks associated with the use of SDC will increase with the growing demand of economic agents to make settlements using them. The main downside to this scenario is the reduced capacity of the state to implement fiscal policies, and, consequently, its core functions financed from the state budget.

Such a dangerous development can be expected on the horizon of 7–10 years. The period can be adjusted to the dynamics of financial technology, political and economic factors. Public authorities face the challenge of finding new approaches to regulating national economic transactions. They also need to offer economic actors new financial instruments comparable to SDC, reducing the attractiveness of payments in digital currencies by all reasonable legal, economic and technological methods.

Further research should seek to identify new regulatory tools and develop each of them individually to determine the optimal parameters for their use.

REFERENCES

1. Dubinin S.K. The modern financial conglomerates competition. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2021;65(8):14–21. (In Russ.). DOI: 10.20542/0131–2227–2021–65–8–14–21
2. Borkova E.A. Gilmanov D.V. Bitkoin. Historical parallels and development prospects in the world market. *Ekonomicheskie otnosheniya = Journal of International Economic Affairs*. 2019;9(1):327–338. (In Russ.). DOI: 10.18334/eo.9.1.39973
3. Bauer V.P., Smirnov V.V. Institutional features of the development of competitive cryptocurrency. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2020;24(5):84–99. (In Russ.). DOI: 10.26794/2587–5671–2020–24–5–84–99
4. Yankovskiy R.M. Cryptocurrencies in the Russian law: Surrogates, "other property" and digital money. *Pravo. Zhurnal Vysshei shkoly ekonomiki = Law. Journal of the Higher School of Economics*. 2020;(4):43–77. (In Russ.). DOI: 10.17323/2072–8166.2020.4.43.77
5. Xie R. Why China had to "ban" cryptocurrency but the U.S. did not: A comparative analysis of regulations on crypto-markets between the U.S. and China. *Washington University Global Studies Law Review*. 2019;18(2):457. URL: https://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1684&context=law_globalstudies
6. Maslennikov V.V., Larionov A.V., Maslennikov S.V. Conceptual approaches to the development of a new unified strategy for the development of the Russian financial market. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2021;14(3):6–19. (In Russ.). DOI: 10.26794/1999–849X-2021–14–3–6–1
7. Portanskiy A., Sudakova Yu., Larionov A. Assumptions of the global economic crisis and its inception in the spring of 2020 due to the COVID-19 pandemic. *Vestnik mezhdunarodnykh organizatsii: obrazovanie, nauka, novaya ekonomika = International Organisations Research Journal*. 2020;15(2):191–212. (In Russ.). DOI: 10.17323/1996–7845–2020–02–09
8. Auer R., Cornelli G., Frost J. Covid-19, cash, and the future of payments. *BIS Bulletin*. 2020;(3). URL: https://www.bis.org/publ/bisbull03.pdf (дата обращения: 12.09.2021).
9. Betz F., Oprică S., Peltonen T.A., Sarlin P. Predicting distress in European banks. *Journal of Banking & Finance*. 2014;45:225–241. DOI: 10.1016/j.jbankfin.2013.11.041
10. Larina O.I., Akimov O.M. Digital money at the present stage: Key risks and development directions. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2020;24(4):18–30. (In Russ.). DOI: 10.26794/2587–5671–2020–24–4–18–30
11. Masino M.N., Larionov A.V., Masino N.N. Uninterrupted functioning of the payment system: Recommendations for managing the continuity of the functioning of the payment system. *Bankovskoe delo = Banking*. 2020;(9):44–51. (In Russ.).
12. Usoskin V.M. Shadow banking: Regulatory reform and its effectiveness. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2019;23(4):69–79. (In Russ.). DOI: 10.26794/2587–5671–2019–23–4–69–79
13. Sergeyev V.M. On the deeper roots of the modern financial crisis. *Polis. Politicheskie issledovaniya = Polis. Political Studies*. 2009;(3):47–53. (In Russ.).
14. Maslennikov V.V., Larionov A.V. Impact of the behavioral cycle on cash flow formation. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2020;24(5):100–111. (In Russ.). DOI: 10.26794/2587–5671–2020–24–5–100–111

ABOUT THE AUTHORS

Vladimir V. Maslennikov — DSc (Economics), Professor, Moscow, Russia
VVMaslennikov@fa.ru

Alexander V. Larionov — Cand. Sci. in Public and Municipal Administration, Cand. Sci. (Econ.), Leading Research Fellow, Center for Strategic Forecasting and Planning, Institute for Economic Policy and Economic Security Problems, Financial University, Moscow, Russia
AVLarionov@fa.ru

The article was received on 13.09.2021; revised on 25.09.2021 and accepted for publication on 01.10.2021.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-29-40
UDC 338.1(045)
JEL E02

The Role of "Soft" State Support in Developing Large Business

A.A. Blokhin[a], E.S. Krivova[b]
[a] Institute of Economic Forecasting of the RAS, Financial University, Moscow, Russia;
[b] Lomonosov Moscow State University, Moscow, Russia
[a] https://orcid.org/0000-0003-2132-4664; [b] https://orcid.org/0000-0002-5342-0098

ABSTRACT

The article analyses the consequences of dividing large companies into priority and non-priority ones for the state by including them in the List of the system-forming companies and carrying out appropriate support procedures in relation to them. We have shown that such procedures for the state were rather institutional than financial and costly since support was transferred to large state-owned banks that carried out it while maintaining the principles of self-sufficiency of investments. Comparison of two samples of companies included in this List and their counterparts, not from the List demonstrates a clear difference in their dynamics before the adoption of the List and after it. Priority companies are steadily and many times (3–4 times) growing in terms of revenue, non-priority ones "stagnate", remaining practically at the same level even at current prices. The almost one-time division of companies by priority in 2009 turned out to be stable over the next decade, which allows us to speak of the resulting redistribution of markets and their transformation in favour of the groups of leaders formed due to it in the respective industry markets. The analysis allows us to evaluate this example as a weak institutional impact, with a noticeable sectoral and macroeconomic effect. We noted that a change in the architecture of markets after the described impact leads not only to a change in the strategies of their participants but also to a restructuring of mechanisms of state regulation.

Keywords: Institutions; risks; system-forming companies; regulation; institutional rent; market architecture

For citation: **Blokhin A.A., Krivova E.S. The role of "soft" state support in developing large business.** ***The World of New Economy*****. 2021;15(4):29-40. DOI: 10.26794/2220-6469-2021-15-4-29-40**

Most of the papers on the impact of the State on the economy discuss the amount of support, comparisons with the foreign level of subsidy of the business, its lending by the State, development of State ownership, use of State assets for business or market development. A great deal of work has been done on the analysis of State regulatory institutions with reform proposals modelled on those countries that have successfully implemented them. [1–4]

At the same time, the quantitative effects of selected institutional measures, especially those of minor magnitude, have not been widely studied. While we understand the difficulty of constructing such estimates, and even more so of presenting them in a systematic way, we would like to highlight in this paper an example of weak institutional impact on large businesses, of significant quantitative impact on the economy. In particular, we will analyze the consequences of including companies of big business in the List of systemically important organizations of Russia, developed by the Government Commission on Increasing Sustainability of the Development of the Russian Economy (then — the Commission) in December 2008.

High uncertainty 2008–2009, with falling resource prices in world markets, and devaluation of the national currency, the drop in exports, affected most Russian large enterprises, that resulting in reduced investment and bank financing in all sectors of the economy. In the context of a strong deterioration of market and financial situation this could lead to an intersectoral "domino effect", when the suspension of one major enterprise would lead to a chain of bankruptcies that have a significant impact on the socio-economic situation of the country.

In accordance with official documents, the following measures have been implemented to support systemically important enterprises:

- provision of credit, including government guarantees and interest rate subsidies;
- additional capitalization;
- protectionist measures in the form of customs and tariff policies.

It was noted, however, that the inclusion of an organization in the list was not a guarantee of financial support. The main objective of working with such companies — is to maintain their sustainability using not only credit instruments but also other measures, such as government guarantees, interest rate subsidies, tax debt restructuring, public order, customs and tariff policies, etc. [5]

In practice, the range of measures applied was much smaller than. A working group was set up under the Commission with the participation of the Ministry of Economic Development, the Ministry of Finance and the Ministry of Regional Development, major state banks (Sberbank, IEB, VTM, Gazprombank and etc.), administration of subject of the Russian Federation and management of the company which prepared the Company's Health Plan for approval, first at the working group and then at the Commission. Not all of these plans were supported.

We stress that the support in this case was provided largely on the basis of professional expertise of the said banks and in the form of credit or other support from them, with partial guarantees from the State. That is, the State used its institutional resource, but spent almost no financial resources. At most — government-controlled banks have been mobilized but have proposed company restructuring projects based on cost-effectiveness, while respecting the principles of cost recovery.

The List was later actively adjusted in 2014–2015, and in 2020 the List was expanded not only to include the List but also the range of State support measures. Then our analysis is therefore

limited to 2019 to ensure methodological comparability.

Thus, even the very fact that large companies were on the List was important to them because it produced visible indirect results. The impact on the companies was primarily in the low-risk and high-finance environment and some other administrative advantages. It should be pointed out that, for a State, such an impact is not very costly in terms of the costs required to achieve the desired results. In any case, the opportunity costs of producing comparable effects without this institutional impact would be markedly higher.

There are other examples of government support for business worldwide. Thus, from 2006 to 2015, Brazil implemented a broad support programmer that included tax credits (2.9% of GDP), subsidized loans (1.3% of GDP), earmarked and non-earmarked loans — both through public banks and private. The main focus of lending was on financing large-scale businesses with fixed capital investments in manufacturing, trade and AIC, and services. The main result of the programmer was a non-business-level environment that allowed both large and small companies to maintain production and improve profitability, and discouraged the entry of potentially more productive firms. Public spending was not commensurate with the result. [6]

The analysis will be based on the theory of economic dominance in a multi-level economy proposed in [7–9], the essence of which is that a business operating in a better institutional setting receives an institutional rent that enables it to grow. On the contrary, a business that finds itself in the worst conditions lags behind the first group and loses its development potential by moving "with great friction". This is especially noticeable for big business, which itself can influence institutions [10] and form "growth poles". [11]

The State, by creating better conditions for business, facilitates that it receives from the buyer of its products an increase in price or a higher margin from a financial, trade or other intermediary organization. The buyer or intermediary pays the business for the reduced risks of its activities, choosing it as its partner, supplier or customer. However, it should be remembered that the size of the market does not change much, and that a business that does not receive this institutional advantage loses part of its market, — it is the management of the redistribution and concentration of resources in the economy, not the creation of new markets or additional factors for their development. The institutional impacts themselves may be small in relation to the resulting institutional rents and their implications for business development. By analogy with investments there can be a peculiar "institutional accelerator".

Two samples of companies were selected to assess the effects described — List and "analog companies", as appropriate — comparable in terms of revenue and in the same industries (as of 2005, their revenue varied no more than 3–4 times). Number of companies in both samples for each industry and in general did not necessarily coincide. All companies in two samples had to be in the Expert Rating-400 for 2005–2007. Inclusion in this rating meant that they corresponded to the characteristic of "large Russian companies", and the use of its data for 2005–2008 allowed a comparison of the series years prior to the development of the List in 2008 and their reaction to the event.

The companies of the largest sectors of the Russian Federation economy were analyzed: energy, chemical and petrochemical industries, non-ferrous and iron and steel industries, engineering (including motor building, engine building, motor building, railway engineering), companies providing communications and telecommunications service. Pharmaceutical, gas, coal, electricity, agro-industry, retailers were not included in the sample, since in

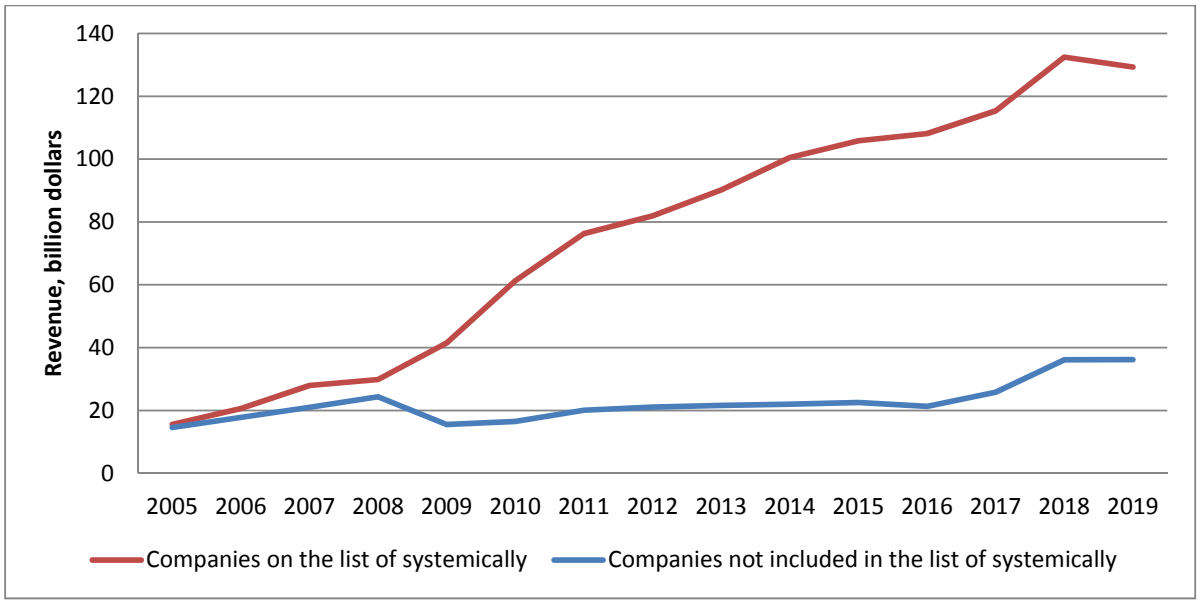


Fig. 1. **Dynamics of revenue for two samples of companies, in billion RUB**

Source: compiled by the authors based on SPARK data. URL: https://www.spark-interfax.ru/#/analysis/FIRMS/0/0.

the Expert-400 rating for them, there were no companies-analogues that did not appear in the List.

The analysis was carried out during a long and rather dynamic period of business development in Russia (2005–2019), during which the names and composition of large companies could change, therefore, in most cases the information for the sample companies was tracked by year of the selected period according to the taxpayer identification number (TIN).

The results of the comparison are presented in *fig. 1–5*.

Graph on fig. 1 shows average revenue for 27 non-listed companies and 23 listed companies. From his analysis, it can be seen that the inclusion of companies in the List has resulted in a higher growth than that of companies that are not on the List.

In 2005–2008, companies from both samples have similar average earnings, with a significant discrepancy starting from the year of adoption of the List. However, the difference between the two groups of companies is already found in 2009 — the graph of the "system-forming" sample went up, and analog companies — down. The first group is further steadily "rising" and the second — practically remains about the same level with a small "growth" after 2017.

The measures applied by the Commission (or, more precisely, by listed participants from major banks) to systemically important companies could have an impact on economic performance and the market position of companies, but most were not long- or even medium-term. However, the momentum created by the institutional split into two groups continued throughout the period. That is "state attention" and almost symbolic "administrative approval" were not only significant in the implementation of anti-crisis measures of the Government of the Russian Federation in 2009, but in years. In addition, it should be added that the measures applied by the Commission were "distributed" among companies on the List in a way that was far from uniform, a taking into account the need for support and the possible effectiveness of the measures taken on a case-by-case basis.

Table 1

Metallurgical companies included in both samples

Companies on the list of systemically important enterprises	Volume of realization in 2005 (mln rubles)
Chelyabinsk Electrometallurgical Plant	19 371.6
Plant "Magnezit"	8812.7
Corporation "Avisma"	18 349.8
Russian Bronze Company	14 117.3
Companies not included in the list of systemically important enterprises:	**Volume of realization in 2005 (mln rubles)**
"Profit"	16 800.4
MP "Red October"	8812.7
Zlatoust metallurgical plant	7246
Ashinsky Metallurgical Plant	6836.9
Kosgorod Metallurgical Plant	6290.6
Serovsky ferroalloy plant	6162
Metallurgical Plant named by A.K. Serova	7386

Source: compiled by the authors based on the Expert-400 rating for 2005. URL: https://raex-a.ru/project/expert400/2005/resume.

However, all schedules by industry and individual companies (*fig.* 2–5) are roughly synchronous (with some natural differences) going up. The graphics of analog companies from the second sample are equally synchronous almost "not growing".

Such synchronization within each of the samples leads to the additional certainty that it is the division of large businesses into priority and non-priority for government support, it has itself been a factor in their dynamics, creating significant preferences in their development. A similar analysis of four branches of the economy shows similar performance of companies (*fig. 2–5*). Companies sampled with roughly equal economic performance in 2004–2007.

Metallurgy

Within the framework of this analysis, such companies as "Severstal", "Norilsk nickel", "Euraz Group", "Rusal", Magnitogorsk Metallurgical Plant, Novolipetsk Metallurgical Plant, "Mechel" and others were not included in the sample. Comparison of companies with companies of significantly smaller size did not seem reasonable because of significant differences

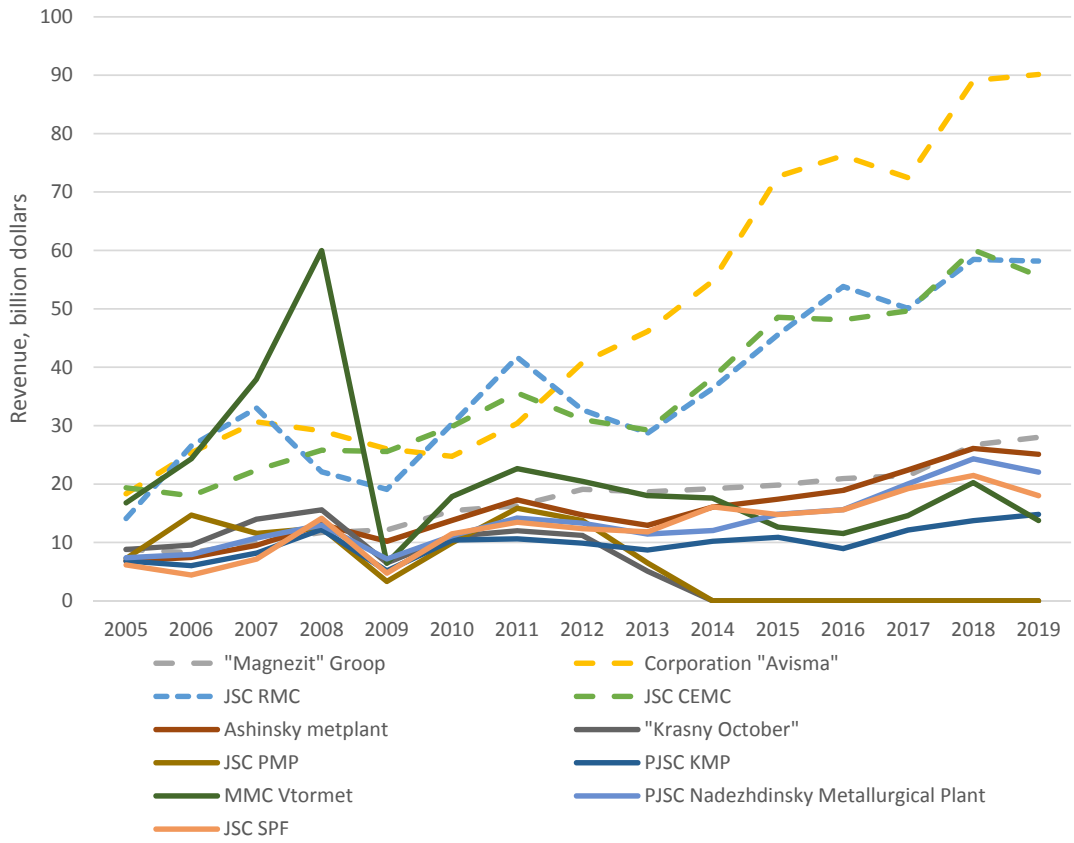


Fig. 2. **Dynamics of revenue for two samples of companies in the metallurgy in billion rubles**

Source: compiled by the authors based on SPARK data. URL: https://www.spark-interfax.ru/#/analysis/FIRMS/0/0.

in revenues in 2005. Companies from both metallurgical samples are represented in *table. 1.*

By *fig.* 2 it can be seen that companies listed in 2008 are growing faster than their counterparts. This supports the hypothesis that government measures support business in reducing external risks and open up new opportunities for growth — not only for the sample as a whole, but also for the industry. The same hypothesis is confirmed for the industries discussed below. From the graph on *fig.* 2 it is also seen that two enterprises ceased operations in 2014–2016 (MP "Red October", Zlatoust metallurgical plant), and the companies that have been included in the system-forming list have a higher level of revenue growth (except LLC "Magnesite Group", which, on average during 2008–2019, remains higher in revenue than the companies not included in the list).

Oil production

Companies on the List (dotted) and their non-listed counterparts show different revenue trends from the year following the adoption of the List, however, in the period 2005–2008, companies had approximately equal performance (*fig. 3*).

As in the case of metallurgy, too large companies were excluded from the sample for which no analogues could be found: "Lukoil", "TNC-BP Holding", "Rosneft", "Surgutneftegaz", "Tatneft", "Slavneft", "Russneft". Oil companies from both industry samples are represented in *table 2.*

Chemistry and petrochemicals

Companies on the List (dotted) and their counterparts show similar trends as in other industries reviewed (*fig. 4*).

The chemical and petrochemical industries show a similar trend: listed

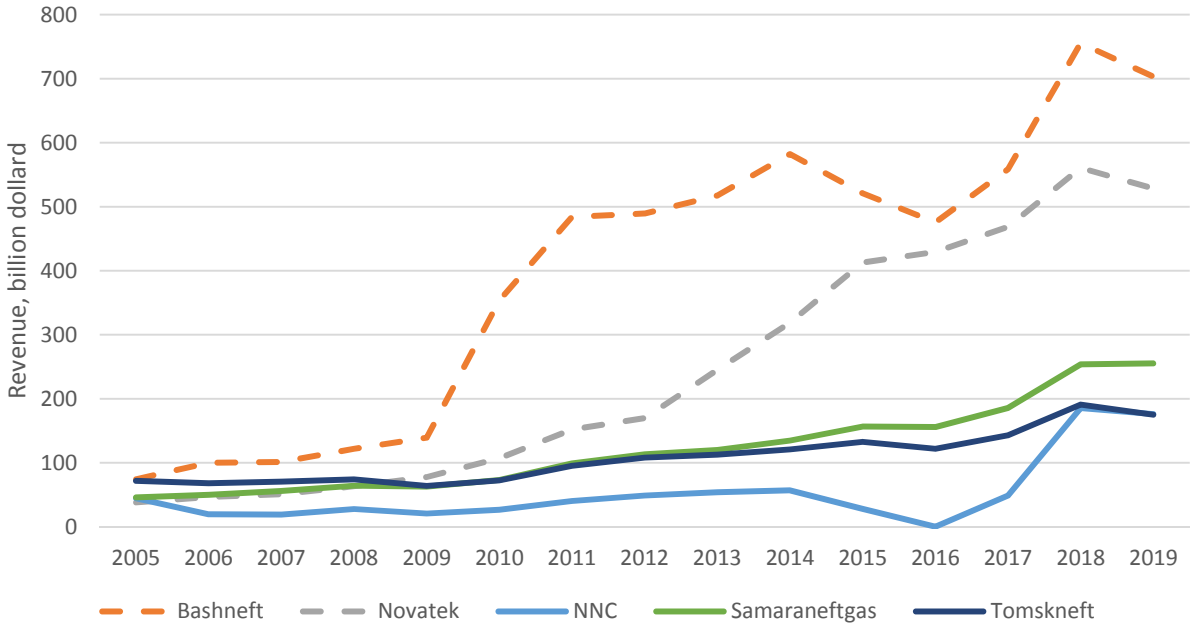


Fig. 3. **Dynamics of revenue for two samples of oil-producing companies, billion RUB**

Source: compiled by the authors based on SPARK data. URL: https://www.spark-interfax.ru/#/analysis/FIRMS/0/0.

Table 2

Oil companies included in both samples

Companies on the list of systemically important enterprises	Volume of realization in 2005 (mln rubles)
"Bashneft"	74 187,30
"Novatek"	38 477,00
Companies not included in the list of systemically important enterprises	**Volume of realization in 2005 (mln rubles)**
"Samaeaneftegas"	45 713,00
"Tomskneft"	71 666,80
OC "Alyans"	44 496,00

Source: compiled by the authors based on the Expert-400 rating for 2005. URL: https://raex-a.ru/project/expert400/2005/resume.

companies outperform non-inclusive companies, with strong growth starting in 2008–2009. Companies in both chemical and petrochemical samples are represented in *table 3*.

Machinery

Engineering is the largest industry by number of companies analyzed, as this is the predominant direction in the List. The selected companies on the List (dotted) and their analogue companies are represented on *fig. 5*.

JSC "Tagaz" and JSC "Izhavto" have ceased their activities. Six companies on the List have higher revenue growth than non-listed companies. Engineering companies in both samples are represented in *table 4*.

As you can see from the graph on *fig. 5*, in engineering, the prioritization of

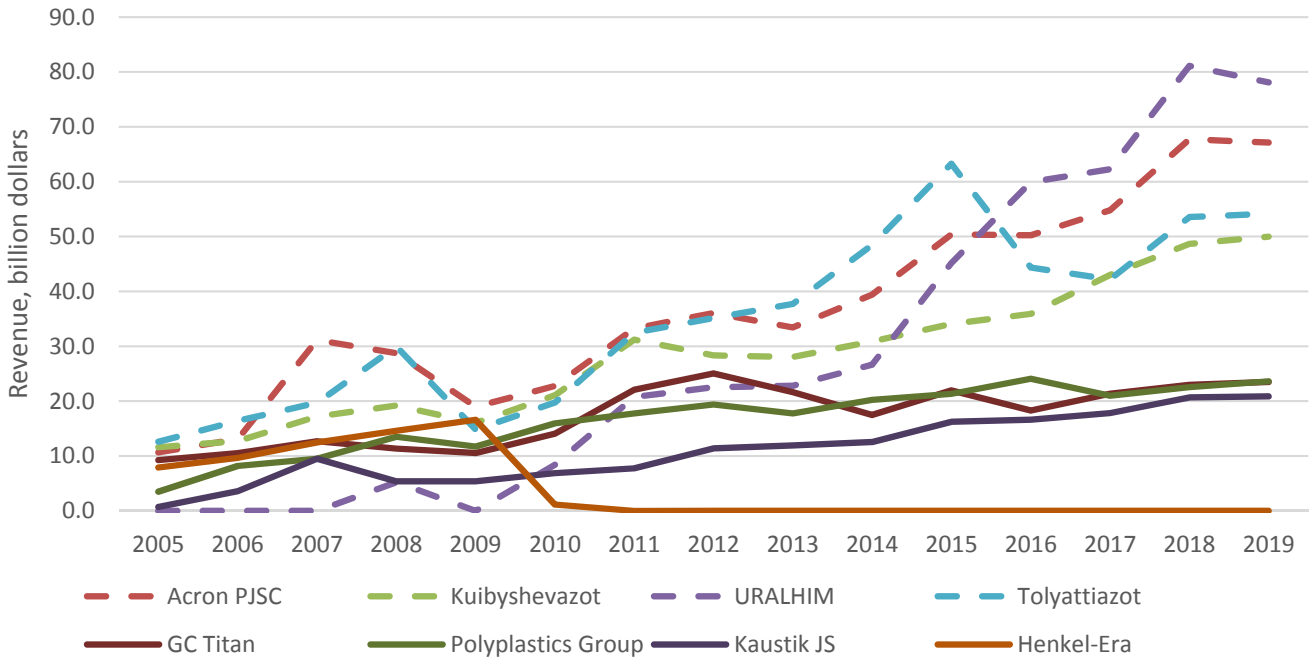


Fig. 4. **Dynamics of revenue for two samples of chemical and petrochemical companies, mln RUB**

Source: compiled by the authors based on SPARK data. URL: https://www.spark-interfax.ru/#/analysis/FIRMS/0/0.

Table 3

Chemical and petrochemical companies included in both samples

Companies on the list of systemically important enterprises	Volume of realization in 2007 (mln rubles)
"Akron"	31 105.2
URALHIM	н.д.
"Tolyattiazot"	19 712
"Kuibyshevazot"	17 331
Companies not included in the list of systemically important enterprises	**Volume of realization in 2007 (mln rubles)**
"Henkel-Era"	12 479.3
NIKOS Group	11 329.7
Polyplastics Group	9511.9
Titan Group of Companies	12 705.2

Source: compiled by the authors based on the Expert-400 rating for 2005. URL: https://raex-a.ru/project/expert400/2005/resume.

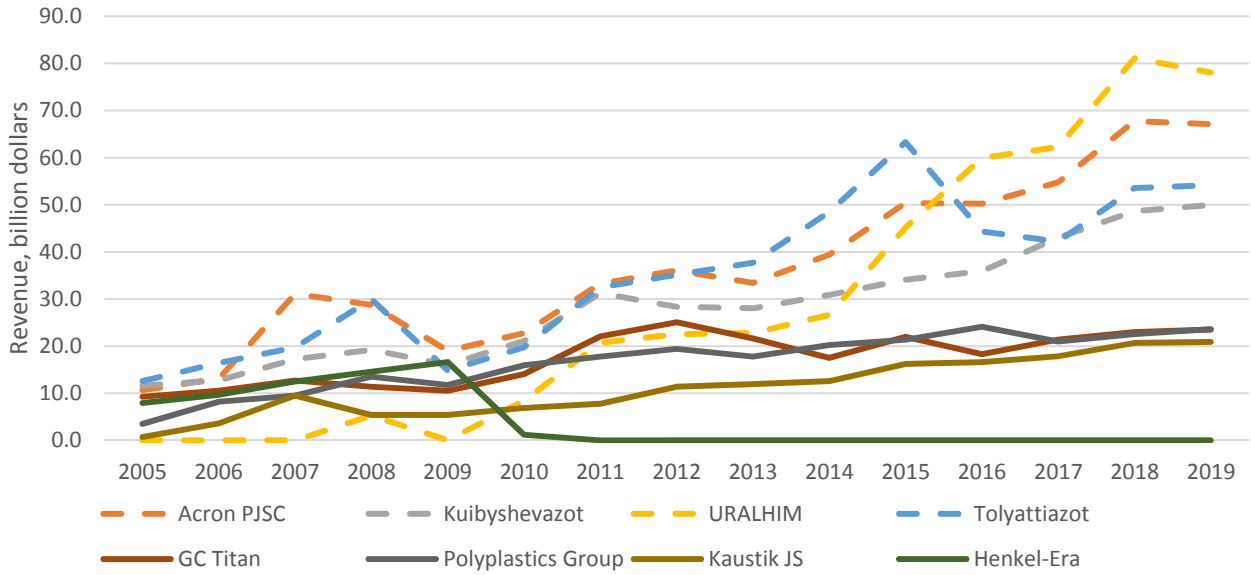


Fig. 5. **Dynamics of revenue for two samples of engineering companies, billion RUB**

Source: compiled by the authors based on SPARK data. URL: https://www.spark-interfax.ru/#/analysis/FIRMS/0/0.

companies has resulted in an equally unclear distribution between winners and losers. The results are more lubricated than in the other industries reviewed. This probably indicates, on the one hand, that the industry is less mature than others to consolidate the leading group and consolidate its institutional advantages, and, on the other hand, that it has brought together very different companies from its subsectors, weakly competing in markets. However, once again, the impulse of the company to enter the List contributed to their growth, and the failure to do so was doomed to stagnation. It should be borne in mind that all the figures given are in current prices, — they have deteriorated in line with inflation.

A number of conclusions can be drawn from the analysis.

1. Weak or "soft" governance can, under certain conditions, lead to visible macroeconomic and/or sectoral impacts. In particular, the article shows that the inclusion of large Russian companies in the List in 2009 demonstrated the division of these into priority and non-priority for the State. At the same time, the State spent almost no financial resources directly to support them, but rather encouraged large State banks and used administrative resources to organize the work of the relevant commissions. Note, however, that financial expenditures in other areas of the Program of Crisis Measures of the Government of the Russian Federation of the period were made in significant amounts, but decisions on these measures have been taken under other procedures and without regard to the work of this Commission. In this sense, the establishment of the List and the support of its member companies can be considered a relatively weak State influence, institutional rather than financial.

2. The article evaluates the effect of this low level of exposure and shows that it has been noticeable at the level of quantitative performance of companies. In particular, when comparing two samples of listed companies with their counterparts in other large companies, of comparable size and industry, — it was found that companies in the first sample performed 3–4 times better

Table 4

Engineering companies included in both samples

Companies on the list of systemically important enterprises	Volume of realization in 2007 (mln rubles)
"Power Machines" Concern	19 697.8
"Irkut" Corporation	26 159.2
Ufa motor-building software	15 829.9
"Uralwagonzavod"	31 595.4
"Sevmash"	6900.4
"Energy" by C.P. Korolev	10 309.2
Companies not included in the list of systemically important enterprises	**Volume of realization in 2007 (mln rubles)**
Taganrog Automobile Plant	28 067
"Izhavto"	23 068.5
"Indezit International"	18 896.4
Company Group "Electric Shield-Samara"	17 010.2
"Hydraulic Machines and Systems" Group	13 399.4
"HTZ" Group	11 592.9
"Sevkabel" Holding	10 582.3
"Boretz"	7889.1

Source: compiled by the authors based on the Expert-400 rating for 2005. URL: https://raex-a.ru/project/expert400/2005/resume.

than companies in the second sample. This result can be seen for individual industries and for the sample as a whole. Company performance increases over the 10-year period after entry into the List. For analog companies, performance is almost stagnant for most of the period, even at current prices.

3. Almost a single institutional impact produced a sustainable result over a long period of time. This means that relevant markets have been redistributed and transformed, and this has resulted in a sustainable advantage that provides leaders with institutional rents. Companies "stratified" by hierarchical levels and this, in turn, allowed "priority" companies to take the leading positions, institutionally establishing their right to control the market from the entry of the aspiring companies. [12] On the contrary, non-priority companies have long fallen into an institutional trap [13] and got stuck in it. This confirms the mechanism for the formation of dominant structures in a multi-level economy [14, 15] through the acquisition of institutional advantages and institutional rents as described in the next source. [7–9]

4. Industry-by-industry comparisons show that the effect of the division of priority and non-priority companies is more pronounced in such industries, like metallurgy, chemistry and petrochemicals, oil production, and more lubricated in

mechanical engineering, which can be explained both by the greater diversification of its sub-sectors and by the fact that the industry is still in the process of developing its architecture, and this weak institutional impact has failed to entrench the division into leaders and outsiders.

5. Methodological tool has worked and can be used for more detailed assessments, but not universal. Its main difficulty — identification of weak institutional impacts with significant effects, which can only be done in a meaningful analysis. The main point, however, is that it has led to the discovery of a precedent in which such institutional acceleration has become a reality. *Leave aside the assumption that the Government of the Russian Federation has listed the same companies, which are able to grow rapidly, "guessing" their forthcoming positive dynamics. It should be emphasized, that the resource of such administrative impacts is limited and may not always be effectively used.*

6. Regulation of markets, in which State-led leadership groups have emerged, need to conduct a new balance of interests among participants. Changing the architecture of markets after these impacts leads not only to changes in the strategies of market participants, but also to changes in government regulations.

REFERENCES

1. North D. C. Institutions and economic growth: An historical introduction. *World Development*. 1989;17(9):1319–1332. (Russ. ed.: North D. C. Instituty i ekonomicheskii rost: istoricheskoe vvedenie. *THESIS: teoriya i istoriya ekonomicheskikh i sotsial'nykh institutov i sistem = THESIS: Theory and History of Economic and Social Institutions and Systems*. 1993;(2):69–91. URL: http://socioline.ru/_seminar/predmet/om/s_nort-1993.pdf
2. Auzan A. A. et al. Institutional economics: A new institutional economics theory. Moscow: INFRA-M; 2011. 447 p. (In Russ.).
3. Shastitko A. E. New institutional economic theory. Moscow: Economics Faculty of MSU, TEIS; 2002, 591 p. (In Russ.).
4. Mau V. A., Kuz'minov Ya.I., eds. Strategy 2020: New growth model — new social policy. Final report on the results of expert work on topical issues of Russia's socio-economic strategy for the period up to 2020. Bk. 1. Moscow: Delo; 2013. 430 p. (In Russ.).
5. Obaji N. O., Olugu M. U. The role of government policy in entrepreneurship development. *Science Journal of Business and Management*. 2014;2(4):109–115. DOI: 10.11648/j.sjbm.20140204.12
6. Dutz M. Business support policies: Large spending, little impact. Washington, DC: The World Bank; 2017. 46 p. URL: https://openknowledge.worldbank.org/bitstream/handle/10986/28946/121668-REVISED-Brazil-Public-Expenditure-Review-Business-Support-Policies.pdf?sequence=1&isAllowed=y
7. Blokhin A. A. Institutional rent in a multilevel economy. *Studies on Russian Economic Development*. 2019;30(4):376–383. DOI: 10.1134/S 1075700719040026 (In Russ.: *Problemy prognozirovaniya*. 2019;(4):16–26).
8. Blokhin A. A., Lomakin-Rumyantsev I.V., Naumov S. A. Alpha business in the Russian food market. *Ekonomicheskie strategii = Economic Strategies*. 2019;21(6):68–77. (In Russ.). DOI: 10.33917/es-6.164.2019.68–77
9. Vertogradov V. A. Alpha market strategies, beta and gamma in the context of theory economic dominance. *Ekonomicheskie strategii = Economic Strategies*. 2020;22(2):50–53. (In Russ.). DOI: 10.33917/es-2.168.2020.50–53
10. Pappe Ya. Sh., Galukhina Ya. S. Russian big business: The first 15 years. Economic chronicles 1993–2008. Moscow: SU HSE; 2009. 423 p. (In Russ.).
11. Perroux F. Note sur la notion de pôle de croissance. *Économie appliquée*. 1955;8:307–320.

12. Fligstein N. The architecture of markets: An economic sociology of twenty-first-century capitalist societies. Princeton, NJ: Princeton University Press; 2001. 274 p. (Russ. ed.: Fligstein N. Arkhitektura rynkov: Ekonomicheskaya sotsiologiya kapitalisticheskikh obshchestv XXI veka. Moscow: HSE Publ.; 2013. 392 p.).
13. Polterovich V.M. Institutional traps and economic reforms. Moscow: Russian School of Economics; 1998. 42 p. (In Russ.).
14. Yaremenko Yu.V. Structural changes in the socialist economy. Moscow: Mysl'; 1981. 304 p. (In Russ.).
15. Yaremenko Yu.V. Theory and methodology of researching a multilevel economy. Moscow: Nauka; 2000. 400 p. (In Russ.).

ABOUT THE AUTHORS

Andrey A. Blokhin — DSc in Economics, Chief Researcher at the Institute of Economic Forecasting of the Russian Academy of Sciences, Professor at the Financial University, Moscow, Russia
andraleks@rambler.ru

Ekaterina S. Krivova — 1st year master's student, Faculty of Economics, Lomonosov Moscow State University, Moscow, Russia
krivova.ekaterina99@gmail.com

The article was received on 20.08.2021; revised on 15.09.2021 and accepted for publication on 30.09.2021.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-41-47
UDC 338;26/.28(045)
JEL O21

Risk Management in the Food Security System of the Russian Federation

R.R. Gumerov[a], I.A. Kirichenko[b]

[a] Development Centre of Target Program Management of the All-Russian Academy of Foreign Trade, Ministry of Economic Development of the Russian Federation, Moscow, Russia;

[b] Centre for State Regulation, Investment, and Institutional Development of the Institute for Macroeconomic Research of the All-Russian Academy of Foreign Trade, Ministry of Economic Development of the Russian Federation, Moscow, Russia

[a] https://orcid.org/0000-0003-1057-9434; [b] https://orcid.org/0000-0002-1657-5648

ABSTRACT

Based on the analysis of the current situation in the domestic food market and the assessment of the current regulatory framework, the article substantiates the need for a transition to a new model of planning and managing the country's food security, which can be conventionally called the "big challenges" model. Ensuring food security is an ongoing process characterized by a periodic change in tactical tasks and guidelines, mechanisms for their solution against the background of a growing lack of information and a constantly changing external environment. We formulated the main principles of the new model: a combination of strategic planning and operational-tactical management of the development of the domestic food market, the integration of long-term structural measures to increase the income of the Russian population with the mechanisms of domestic food aid, the formation of a risk management system, including price risks and risks arising from export products of the agro-industrial complex, scenario forecasting. The existing regulatory framework in the field of strategic planning and management does not imply the implementation of such a model, and the methods and instruments of state policy used do not make it possible to implement its basic principles in practice. The paper formulates the main directions and mechanisms for adjusting the new model in relation to the tasks of ensuring the food security of the Russian population.

Keywords: food security; Food Security Doctrine of the Russian Federation; big challenges; risks; strategic planning; adaptive strategy

For citation: **Gumerov R.R., Kirichenko I.A. Risk management in the food security system of the Russian Federation. *The World of New Economy*. 2021;15(4):41-47. DOI: 10.26794/2220-6469-2021-15-4-41-47**

In its most general form, security is the state of security of individuals, society and the State against internal and external threats. Under the Federal Act from 28 December 2010 No. 390 "On Security", activities to achieve it include: "security threat forecasting, identification, analysis and assessment; definition of public policy guidelines and strategic security planning; legal regulation in the field of security; development and implementation of a set of operational and long-term measures to detect, prevent and eliminate security threats and to localization and neutralize the consequences of their occurrence; application of special economic security measures and a number of other areas and activities".[1]

The main lines of State economic policy in the area of food security in the Russian Federation are specified in the Doctrine of food security of the Russian Federation[2] (then — Doctrine). Doctrine defines food security as "State of social and economic development in which the food independence of the Russian Federation is ensured, physical and economic accessibility of food to every citizen is guaranteed, in accordance with the mandatory requirements, in quantities not less than the rational consumption of foodstuffs necessary for an active and healthy lifestyle". According to an American cryptographer and computer security specialist — Bruce Schneier "security is a process, not a product". With regard to food security, this implies that it must be achieved through a continuous sharing of long-term, tactical, situational public policy measures. Food security is a continuous process, characterized by a change in tactical tasks and orientations, mechanisms for solving, at least because, that our perceptions of adequate nutrition and sustainable consumption are changing.

Theoretical analysis and empirical knowledge of developments in the domestic food market suggest that the Doctrine has not been brought up to the level of practical tools and algorithms for managing food supply risks. The formulation listed of the food security risk and threat Doctrine is vague and non-operational, they are not linked to certain indicators and performance of food security, sources of risk, dangerous developments and their consequences, opportunities and mechanisms for State regulation of the food market (including regulation of foreign trade). Food security measures are also well articulated in the Doctrine, without reference to specific strategic goals, tactical objectives and indicators of the current state of food security.

Moreover, of the updated version of the State Programmer for the Development of Agriculture and the Regulation of Markets for Agricultural Products, Raw Materials and Food,[3] prepared in accordance with the Decree of the Government of the Russian Federation of 26 May 2021 No. 786 "Management system of State programmers in the Russian Federation" and will enter into force on 1 January 2022, removing the goal of food security (independence).

The economy of the 21st century is developing under conditions of "great challenges" — combination of challenges, threats and opportunities that require an unconditional response from the

[1] Federal Act from 28 December 2010 No. 390 "On Security" (latest version). URL: http://www.consultant.ru/document/cons_doc_LAW_108546/.

[2] Decree of the President of the Russian Federation from 21 January 2020 No. 20 "On the approval of the Doctrine of food security of the Russian Federation". URL: http://www.consultant.ru/ document/cons_doc_LAW_343386/.

[3] Resolution of the Government of the Russian Federation from 02 September 2021 No. 1474 "On changes to the State Programmer for the development of agriculture and the regulation of markets for agricultural products, raw materials and foodstuffs and the recognition of the invalidation of certain acts and certain provisions of certain acts of the Government of the Russian Federation".

State, the complexity and scale of these challenges and opportunities being such that they cannot be addressed, eliminated or realized solely through increased resources.[4] Genesis of "great challenges" is connected, on the one hand, with the complexity of interactions of technological, institutional, financial elements of modern economy, on the other hand — increasing fundamental "uncertainty of the future" and scarcity of information. Great challenges pose significant risks to society, the economy, public administration, but they also represent an important factor in the emergence of new opportunities and prospects for scientific, technological and socio-economic development (new "windows of opportunities"). [1] In an environment of growing fundamental uncertainty, risk management assumes particular importance, as the risk of a significant deviation from economic expectations, including for food security, increases significantly as strategic planning horizons expand. [2, 3]

It is important to distinguish between risks and subjective errors (in the justification of objectives, set of activities and/or the amount of funding needed) that may lead to the non-achievement of objectives. Such errors should be avoided at the stage of planning programmers, projects and individual activities. In contrast to such predictable factors, measures to neutralize, reduce exposure, elimination of the consequences of a dangerous event may be of a purely preventive nature. Classical risks include, for example, the unfavorable development of the epidemiological situation that emerged at the end 2019: the COVID-19 pandemic and its demographic, economic and social consequences. Although in theory such specific events may be considered as probable,[5] obviously that it has not been possible to prepare in advance for the pandemic and to neutralize its specific effects. A distinction should also be made between risks and the impact of persistent adverse factors (for example, the sanctions regime), which have been sufficiently studied and should be assessed and taken into account at the project created stage by adjusting the level of funding of activities and/or project targets.

Over recent years, the Russian economy has demonstrated a high degree of resilience to crisis events and a mobilization capacity to deal with crisis situations in a manual mode, however, price hikes in the food market in the autumn of 2020 once again demonstrated the lack of built-in mechanisms and procedures to automatically respond to the food security risks of the country's population. [4] In the second half of 2020, the country experienced a marked increase in the prices of basic foodstuffs beyond the average rate of agflation observed in recent years. Overall, the increase in prices of observed foodstuffs was 106.7% in 2020, the highest in the last 5 years since — the imposition of sanctions against Russia and the adoption of counter-protective measures in 2014. Of course, part of the increase in food prices was due to the spread of coronavirus infection, but the impact of the latter cannot be exaggerated. The health situation in European countries was no less serious

[4] Decree of the President of the Russian Federation from 01 December 2016 No. 642 (ed. from 15 March 2021) "On the Strategy for Scientific and Technological Development of the Russian Federation". URL: http://www.consultant.ru/document/cons_doc_LAW_207967/.

[5] As early as 2015, Nature published an article on the development of a deadly human-induced artificial virus as a result of experiments by American scientists with bats. In October 2019, Johns Hopkins University hosted the Event 201 (event 201) pandemic exercise with the Bill and Melinda Gates Foundation and the World Economic Forum, in which the spread of the pandemic of a new hypothetical zoonotic coronavirus, transmitted first from bats to pigs and onwards to humans, was simulated. According to the results of the simulation during the first 18 months "killed" 65 million people, within 18 months trade and movement of people on the planet were paralyzed, and the world economy collapsed (a fall of 11%).

than in Russia, but the rise in food prices in EU countries was markedly lower than in our country.[6] Price increases were highly selective and most affected segments of the food market. While food prices rose by 6.7%, sugar prices rose by 64.5%, sunflower oil by 25.9%, cereals and pulses by 20.1%.[7] Such structural biases cannot be explained by the impact of the pandemic.

At the end of February 2020, Bloomberg named Russia as one of the world's five medium-development countries where the impact of global food price increases can be greatest.[5] This can be accepted as price hikes in the domestic food market are particularly painful for the Russian population due to low overall income levels and their significant differentiation by population groups. [6, 7]

In 2019, food expenditure (without alcohol and non-alcoholic drinks) accounted for 35.2% of all final consumption expenditure of Russian households.[8] The situation is exacerbated by a significant income disparity among citizens (households), with some 19 million to 20 million people unable to purchase even a minimum food basket. Obviously that any price hikes for certain groups and even for food commodities with the current expenditure pattern have a negative multiplier effect on the whole sphere of personal consumption. Higher prices of staple foods that are high priority and invisible (with no alternative), may not even have a significant impact on consumption, but it reduces the amount of money a household can spend on other relevant needs (housing, transport, communications, industrial goods, health, education, recreation).

Certainly, along with increasing efficiency of domestic agro-industrial complex, the fundamental basis for combating food inflation is the increase in the population's income from basic work and/or other legal sources of income on the basis of the systematic technological modernization of the Russian economy and the creation of high-productivity jobs, establishment of a multi-level system of strategic planning, developed markets free from monopolies. In this article, we would like to refer to operational and tactical measures to manage the risks of price hikes in the domestic food market.

As before, in 2007–2008, 2010–2012 and 2014 years, food security risk management in 2020–2021 years was reduced to a situational response to the impacts of pre-existing hazards. Interim multilateral price control agreements were revived,[9] emergency customs and tariff restrictions.[10] The procuratorial authorities were again called upon to assess the validity of individual price increases.

A new strategic planning and management paradigm [8] requires a transparent and predictable system to respond proactively to changing food market conditions Using a set of defined standard tools and generic scenarios to respond to price fluctuations, depending on their cause, volume and other factors. The system should be based on medium-

[6] Certificate "On consumer price indices in Russia and foreign countries in December 2020".URL: https://www.gks.ru/bgd/free/B 09_03/IssWWW.exe/Stg/d02/ind-zen2901.htm.

[7] Consumer price index operating Data in December 2020. URL: https://rosstat.gov.ru/storage/ mediabank/Irep0Kmp/CPI-dec.pdf.

[8] Household consumption income and expenditure. URL: https://rosstat.gov.ru/storage/ mediabank/8JZxiZIM/doh07_05.xlsx.

[9] Resolution of the Government of the Russian Federation from 14 December 2020 No. 2094 (ed. 27 March 2021) "Agreements between the federal executive authorities and economic entities to reduce and maintain the prices of certain types of socially significant foodstuffs". URL: http://www.consultant.ru/ document/cons_doc_LAW_370922/.

[10] Resolution of the Government of the Russian Federation from 10 December 2020 No. 2065 "On the introduction of changes in the rates of export customs duties on goods leaving the Russian Federation outside the States-parties to the Customs Union agreements". URL: http://www.consultant.ru/document/ cons_doc_LAW_370533/.

term food security risk management plans, aligned with both domestic AIC development priorities and objectives, and risk management plans at different levels and governance areas. For example, the sugar market began to send price signals as early as mid-July 2020, when sugar producers' prices began to rise markedly. Whereas at the beginning of July industrial sugar producer prices for white beet sugar were 25.44 rubles/kg, by the end of October they had reached 41.35 rubles/kg.[11] At the same time, processing plants continued to rely on inputs from the previous season, i.e. price increases were not caused by increased production costs but by market expectations. It is obvious that the executive branch should have responded to the dynamics of producer prices already at that time, without waiting for a surge in retail sugar prices in the retail chain in the autumn of the same year.

Following the recent surge in food prices, measures were taken to empower the executive branch in the area of food market price regulation through continuous monitoring.[12] However, the regulatory mechanism is still set up to respond to price spikes in an ad hoc manner (first tracking, recording, then developing a specific solution), and the instruments of such a response are not clearly defined, procedures are time-consuming.

Since risks are likely, different risk management scenarios should be developed as part of risk management planning. Clearly, there is a need to improve the methodology of strategic planning, moving from the so-called formative strategy to the adaptive one. In the latter, the desired outcomes are presented as several alternative futures, a range of possible scenarios, executive responses and expected outcomes. [9] Each scenario would have to take into account a combination of the following factors: dangerous events, their sources and consequences; level of risk and acceptable (accepted) limits of its spread; normative, organizational, financial capacity to influence risk; mode of risk processing and associated operating procedures. Regulations developed should be implemented automatically in sequence when some threshold or limit values are reached for prices and other parameters of the domestic food market. [10]

It is seeming, that economic and social policy priorities need to be adjusted to exports of agricultural and food products; incentives for the latter are in latent conflict with food security objectives. An analysis of the development of the food situation in the country shows that exports, which level- and dynamism-oriented prices in world markets, were one of the triggers of the most recent price surge in the domestic food market and the deterioration in the food status of a large part of the Russian population.

As the change in the strategic planning model is ripe, the experience of the development of the multi-volume Integrated Science and Technology Programmer should not be forgotten its social consequences and to adapt it to contemporary conditions. In particular, the scientific principles on which the Programmer was developed remain relevant: Multi-scenario, evaluation of "bottlenecks", "growth points", risks and threats to socio-economic development, Realistic and ambitious goals, targets and their planning values; cascading decomposition

[11] On the sugar market (29 June — 3 July 2020 years). URL: https://mcx.gov.ru/upload/iblock/ a3e/a3ec04b4aef209ab6ddbd3bfceabbc4d.docx; On the sugar market (26–30 October 2020 year). URL: https://mcx.gov.ru/upload/iblock/ 383/383c177a363b3ebc53c0163e3a07b594.docx.

[12] Order of the Government of the Russian Federation from 27 February 2021 No. 497-p "Approval of a list of groups of consumer goods and services falling within the competence of the federal executive authorities for the purpose of analysing the causes of the increase in consumer prices and formulating economic regulations, aimed at achieving a balanced market for consumer goods and services". URL: http://www.consultant.ru/document/cons_doc_LAW_378654/.

of objectives, mutual harmonization of programmer indicators in various aspects and directions (technological, economic, social development); justification of the practical tools used to achieve the stated goals and objectives.

REFERENCES

1. Ivanov V. V. Methodological aspects of strategic planning in the context of global transformations. *Ekonomicheskoe vozrozhdenie Rossii = The Economic Revival of Russia.* 2020;(1):6–14. (In Russ.).
2. Bobryshev I. S., Vedernikova A. V., Voronin V. V., Erina N. V., Tyupyshev D. A. Forecasting and strategic goal-setting mechanisms of social-economic development of the Russian Federation. *Mir novoi ekonomiki = The World of New Economy.* 2020;14(1):88–100. (In Russ.). DOI: 10.26794/2220–6469–2020–14–1–88–100
3. Kirichenko I. A., Gumerov R. R. Realization of national goals and strategic planning: Risk management factor. *Rossiiskii ekonomicheskii zhurnal = Russian Economic Journal.* 2019;(6):52–62. (In Russ.). DOI: 10.33983/0130–9757–2019–6–52–62
4. Gumerov R. R. Unlearned lessons of food price spikes. *Rossiiskii ekonomicheskii zhurnal = Russian Economic Journal.* 2021;(3):25–45. (In Russ.). DOI: 10.33983/0130–9757–2021–3–25–45
5. De Sousa A., Diamon J. The five hotspots where food prices are getting people worried. Bloomberg Wealth. Feb. 28, 2021. URL: https://www.bloomberg.com/news/articles/2021–02–28/the-five-hotspots-where-food-prices-are-getting-people-worried?srnd=premium-europe&sref=Y 0jVLcFo
6. Kalugina Z. I. Economic accessibility of food: Regional and social differences. *EKO: vserossiiskii ekonomicheskii zhurnal = ECO Journal.* 2021;(2):165–175. (In Russ.). DOI: 10.30680/ECO0131–7652–2021–2–165–175
7. Khayrullina O. I. Assessing the financial affordability of food: Foreign and domestic experience. *Prodovol'stvennaya politika i bezopasnost' = Food Policy and Security.* 2021;8(2):107–118. (In Russ.). DOI: 10.18334/ppib.8.2.112043
8. Lenchuk E. B., Voitolovskii F. G., Kuvalin D. B. Strategic planning in public administration: Experience, opportunities and prospects. *Studies on Russian Economic Development.* 2020;31(6):621–628. DOI: 10.1134/S 1075700720060106 (In Russ.: *Problemy prognozirovaniya.* 2020;(6):46–55. DOI: 10.47711/0868–6351–183–46–55).
9. Silvestrov S. N., Krupnov Yu. A., Starovoitov V. G. Determination and implementation of national development goals in Russian strategic planning. *Rossiiskii ekonomicheskii zhurnal = Russian Economic Journal.* 2021;(1):32–44. (In Russ.). DOI: 10.33983/0130–9757–2021–1–32–44
10. Vissarionov A. B., Gumerov R. R. Concerning the use of indicators' marginal (threshold) values of Russian Federation economic security. *Upravlencheskie nauki = Management Sciences in Russia.* 2017;7(3):12–20. (In Russ.).

ABOUT THE AUTHORS

Rustam R. Gumerov — Cand. Sci. (Econ.), Leading Researcher at the Centre for Development of Target-Programming Management of the Russian Academy of Foreign Trade, Ministry of Economic Development of the Russian Federation, Moscow, Russia
gumerovrr@mail.ru

Irina A. Kirichenko — Cand. Sci. (Econ.), Associate Professor, Head of the Centre for State Regulation, Investment and Institutional Development of the Institute for Macroeconomic Research of the All-Russian Academy of Foreign Trade, Ministry of Economic Development of Russia, Moscow, Russia
94522@bk.ru

The article was received on 01.07.2021; revised on 26.07.2021 and accepted for publication on 20.08.2021.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-48-57
UDC 339.923(045)
JEL F45

Transformations in the Monetary and Financial Policy of the European Union under the Influence of COVID-19

V. Ya. Pishchik[a], P.V. Alekseev[b]
Financial University, Moscow, Russia
[a] http://orcid.org/0000-0002-9013-767; [b] http://orcid.org/0000-0003-4479-890X

ABSTRACT

The article analyses institutional changes in monetary and financial policy mechanisms, including the temporary "freezing" of the Stability and Growth Pact as an extraordinary anti-crisis policy measure under the influence of the COVID-19 pandemic. We considered the anti-crisis instruments of the operational mechanism of the unified monetary policy and their impact on the "inflation" of the ECB balance sheet. Trends and directions of strengthening the regulatory role of the ECB and the general budget of the EU in the integration processes in the European Union are analyzed. We based our research on dialectical, systemic and institutional approaches. Also, we used methods of comparative and statistical analysis. Based on our study, we revealed the features of the new approaches of the European Central Bank to the broad interpretation of the monetary policy strategy. Further, we identified transformations in the operating mechanism and tools of the unified monetary policy under the influence of the COVID-19 pandemic. Finally, we determined and assessed the priority orientation of the EU general budget expenditures for 2021–2027 and new collective funds to tackle the crisis to promote innovation and improve the competitiveness of the European economy.

Keywords: financial and economic crisis; European Economic and Monetary Union; Stability and Growth Pact; European Central Bank; Euro; ECB monetary policy reform; the general EU budget; Next Generation European Union Foundation

For citation: **Pishchik V. Ya., Alekseev P.V. Transformations in the monetary and financial policy of the European Union under the influence of COVID-19. *The World of New Economy*. 2021;15(4):48-57. DOI: 10.26794/2220-6469-2021-15-4-48-57**

INTRODUCTION

In the history function of the European Economic and Monetary Union (EMU), comprising a little over 20 years old, frequent problems and risks of the project have arisen due to the unfinished two previous institutional projects of European monetary integration.[1] Take a policy decisions and activities of the institutions being established they are often inconsistent with the postulates of the theory and methodology of economic and monetary integration, which developed, in particular in the research of R. Mundell [1], J. Frankel and A. Stone [2], and famous Russian economists: Ya. A. Borko [3], L. I. Glukharev [4], Yu. V. Shishkov [5], V. G. Shemyatenkov [6] and others. In theory, the initial establishment of a full-fledged economic union of the integrated countries is the basic criterion of the optimality of a monetary union. In practice, since the launch of the EMU project in 1999, the focus has been on the priority development of monetary integration, while addressing the gaps in the single domestic market has remained on the back burner. In recent years, to adapt to changes in the internal and external operating environment of the EMU and the increasing international role of the euro has seen significant changes in the activities of the European Central Bank and other regulatory institutions, in the forms and methods of monetary and financial policies. [7–9]

In 2020, the COVID-19 pandemic worsened the financial and economic crisis in the European Union, as elsewhere in the world. Already in the first half of the past year, the euro area's recession was 15.3% compared to the same period in 2019 Overall, GDP of European Economic and Monetary Union (EMU) countries declined by 6.6% in 2020.[2] To counteract the deepening crisis in the EU since spring 2020, extensive tax breaks were granted to businesses, and preferential loans were granted to enterprises and households, and substantial financial support for quasi-employment was provided, along with the ECB's large-scale emergency liquidity injection programmers to offset massive enterprise failures. The total of 2020 year, state loan guarantees for large companies and small and medium-sized enterprises is estimated by the European Commission at 17% of GDP.[3] As a result, fiscal deficits in the euro area have sharply worsened, rising from 0.6% of GDP in 2019 to 8% of GDP in 2020, almost triple the Stability and Growth Pact deficit limit of 3% of GDP. The sovereign debt burden on euro area budgets as a whole for the region increased from 83.9% of GDP in 2019 to 98.4% in 2020, also well above the Pact limit (60% of GDP). A number of unprecedented measures have been taken to counter the financial and economic impact of the COVID-19 pandemic, including: freezing of compliance with the strict criteria of the Stability and Growth Pact; changes in the operating mechanism and strategy of the ECB's unified monetary policy; reorienting the EU budget and creating new financial mechanisms to stimulate innovation and improve the competitiveness of the European economy.

"FREEZING" OF THE STABILITY AND GROWTH PACT AS AN EXTRAORDINARY MEASURE OF THE ANTI-CRISIS POLICY OF THE EUROPEAN UNION AUTHORITIES IN THE CONTEXT OF THE COVID-19 PANDEMIC

A feature of the EU's anti-crisis response since the beginning of 2020 has been the unprecedented EMU legal rejection

[1] Werner Plan (1971–1980), European Monetary System (1979–1998), European Economic and Monetary Union (from1999 to present).

[2] ECB Annual Report 2020. P. 11. URL: https://www.ecb.europa.eu/pub/annual/html/ar2020~4960fb81ae.en.html.

[3] The European Commission's Autumn 2020 Economic Forecast. URL: http://www.ec.europa.eu/info/business-economy-euro/economic-performance-and-forecasts/economic-forecasts/autumn-2020-economic-forecast_en.

from severe quantitative restrictions on macroeconomic and financial discipline in EU countries. In the face of uncertainty in the region, the EU Council for Economics and Finance (ECOFIN) approved on 20 March 2020 (for the first time since the EMU became operational in 1999) proposal by the European Commission to suspend the Stability and Growth Pact as the basic framework for macroeconomic stability in the region.[4] Negative Impact of the COVID-19 Pandemic for the European Union, the unfinished business of previous years productivity decline, and respectively, competitiveness of European EMU economies. In the context of the corona-crisis, unit labor costs increased from 1.9% in 2019 to 4.6% in 2020 as a result of the widespread use of artificial employment financing schemes, with lower actual hours and output.

Freezing the stringent requirements of the Stability and Growth Pact under the influence of the COVID-19 pandemic gave the "green light" to increase since spring 2020 large-scale extraordinary anti-crisis measures in the sphere of monetary and fiscal policy of the European Union. The new approaches relate not only to quantitative but also to qualitative policy changes in the ECB and the European Union (see *figure*).

TRANSFORMATIONS IN THE UNITED MONETARY POLICY OPERATING MECHANISM AND INFLATING THE ECB'S BALANCE

Since March 2020, the ECB Governing Council, along with the launch of Targeted Long Term Refinancing Operations III (TLTRO III), Approved an interim net asset purchase programmer for 120 billion euros until the end of 2020 under the ECB's Asset Purchase Program (APP), and launched a new temporary financial support facility — Pandemic emergency purchase programmer (PEPP) with a total package of 750 billion euros. All categories of assets that are subject to the APP programmer are considered eligible for purchase, as well as weak non-financial commercial corporate sector securities and Greek Government debt securities. From June to December 2020, the PEPP Emergency Asset Purchase Package was gradually increased to 1,850 billion euros. In addition, the ECB Board of Governors announced an extension until June 2022, when be conducted 3 additional operations of TLTRO III. And the total amount of ECB counterparties' borrowing increases from 50% to 55% of ECB's categorized loans for various categories of borrowers. Terms of the ECB's soft collateral requirements increased until June 2022.

Since the beginning of 2021, the ECB has continued to adhere to the basic tenets of its "super-soft" monetary policy. There remains consensus in the Board of Governors on the relevance of the PEPP programmer, the pace of its implementation and the avoidance of premature tightening of funding conditions for all sectors of the economy.[5]

The adoption and implementation of large-scale non-standard monetary policy measures in the context of the COVID-19 pandemic led to a rapid expansion of the ECB's balance sheet the quality of assurance of its operations. In 2020, the ECB's balance sheet increased by 2.3 trillion euros (49% compared to 2019) and reached a historical peak of 7 trillion euros at the beginning of 2021. The ECB's share of monetary policy-related assets increased from 70% in 2019 to 79% at the end of 2020 (or 5.5 trillion

[4] The ECOFIN Council justifies this decision on the grounds that "the coronavirus pandemic has led to the largest economic shock, which causes serious economic damage to the European Union". URL: https://tass.ru/ekonomika/8058395).

[5] K. Lagarde, President of the ECB, in a press conference following the March 2021 Board of Governors meeting, stressed that the ECB is not tied to a certain amount of support for business and households in the program PEPP. URL: https://www.teletrade.ru/analytics/news/3664862-glava-ecb-kristin-lagard-my-poka-ne.

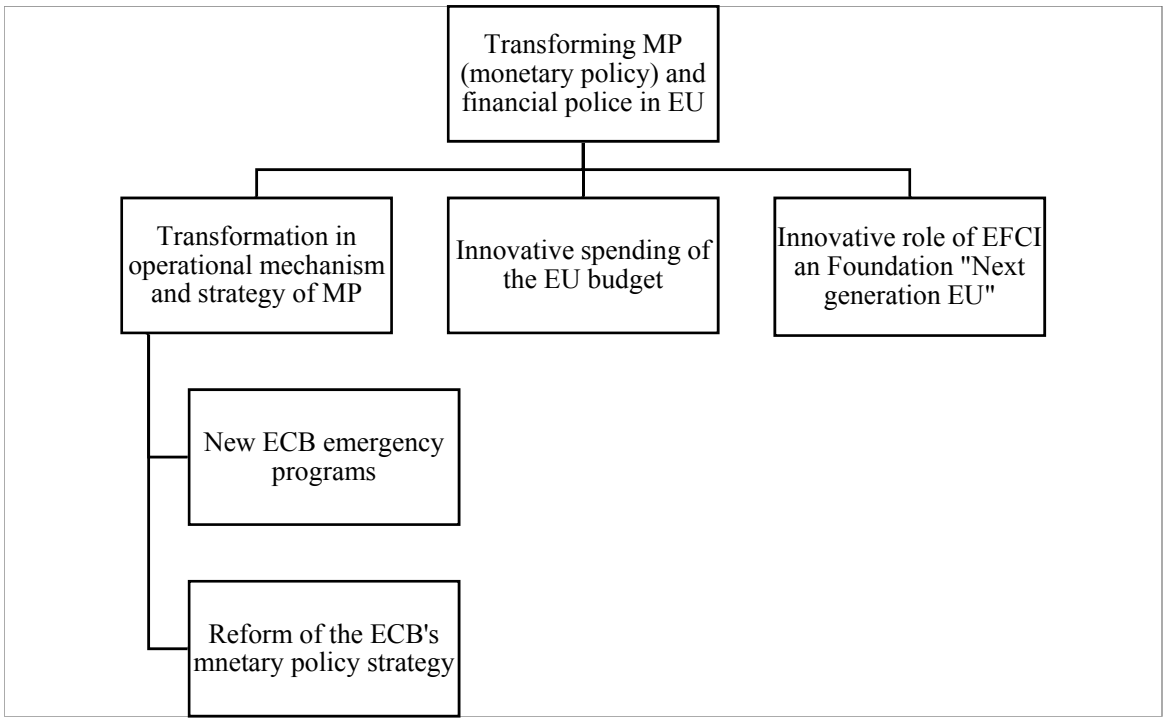


Fig. **Systematization of directions and transformations in the mechanisms of the monetary and financial policy of the European Union**

Source: compiled by the authors.

euros) in total.[6] The ECB selected assets for non-standard transactions, subject to relaxation of collateral requirements, increased by 1,493 billion euros in 2020 (or to10%) and at the beginning of 2021 year — 15 657 billion euros. Of this amount, only 8,385 billion euros is held by central government securities. Other classes of ECB-issued assets include unsecured bank bonds, corporate bonds and other market assets.[7]

Rapid quantitative growth and weakening of the quality of the ECB's anti-crisis monetary policy, stimulated by the removal of the severe constraints of the Stability and Growth Pact, pushes monetary authorities to reconsider the monetary policy strategy itself as an "anchor" to achieve a key statutory goal — ensuring price stability to maintain macroeconomic sustainability in the region.

REFORMING THE MONETARY POLICY STRATEGY OF THE EUROPEAN SYSTEM OF CENTRAL BANKS (ESCB)

The main objective of ESCB monetary policy is defined by the Treaty on the Functioning of the European Union and is to ensure price stability. This objective is realized through a two-pronged monetary policy strategy approved by the ESCB Board of Governors in 1998 on the eve of the introduction of the united European currency.[8]

The EU monetary authority is currently focusing on MP strategy reform. This is

[6] ECB Annual Report 2020. URL: https://www.ecb.europa.eu/pub/annual/html/ar2020~4960fb81ae.en.html.

[7] Ibid.

[8] The first basic element of the ECB's monetary policy strategy is the quantification of price stability, which means an "annual increase of no more than 2% in the Harmonised Consumer Price Index (HCPI) within the Eurozone". The second key element of the ECB MP strategy is a sound assessment by the Board of Governors of all necessary information and analysis for decisions on monetary policy prospects. URL: https://www.ecb.europa.eu/ pub/pdf/other/monetarypolicy2004ru.pdf.

due to the fact that under the influence of globalization, the destructive effects of the global financial crisis 2007–2009, digitization, changes in the age structure of the population during the last decade have reduced inflation and increased the risks of deflation. Even the global financial crisis and the COVID-19 pandemic accelerated the build-up of public debt and the ECB's "bloated" balance sheet, did not increase significantly inflation, which remained at a record low until early 2021. [10] In September 2021, with inflation accelerating in a number of developed economies, including the USA, consumer price growth in the euro area remained at 1.9% year on year, that below the ECB target of 2.0%. Facilitative role of the Central Bank's standard instruments in softening of monetary policies and promoting economic growth has been recognized by the EU monetary authorities as insufficient.[9] This forces the ECB, along with the expansion of non-standard monetary policy measures, to change the inflation methodology and the MP strategy.

The review of the analytical and methodological part of the strategy, which began in January 2020, has focused on a thorough study and discussion of its elements, such as: optimal methods for measuring contemporary inflation; effectiveness of ECB MP instruments; quantification of the objective of price stability; transparency and objectivity of information on factors and nature of inflation. The main question becomes to what extent and under what conditions the processes in the real economy are reflected in the methods and instruments of monetary policy. Monetary authorities' broader interpretation of the role of monetary policy in the economy now includes the interaction of the MP with fiscal policy, macro-prudential, economic and even environmental policies of the European Union.

In order to study the whole range of problems, related to the revision of the MP strategy, 13 working groups established and functioning under the ECB, where representatives of the ECB and national central banks work closely together to develop coordinated proposals to the ECB Board of Governors for meaningful changes to the ECB's current strategy. During 2020, academics, financial market and central banking community stakeholders, as well as the European Parliament, participated in a wide range of discussions related to the reform of the MP strategy.[10]

Independent experts draw attention to the fact that the subject matter of individual working groups on updating the OST strategy is not directly related to the ECB's mandate and direct focus of its activities. For example, the "Employment" group investigates the relationship between the unemployment rate and the results of monetary policy. "The Climate Change" group examines climate change risks and how they can be addressed in the monetary policy framework. The ECB has also established a Climate Change Centre, which shapes the climate agenda and analyses the ECB's place and role in its implementation. Green bonds become increasingly important in ECB asset purchase programs, new types of climate finance are closely monitored. According to J. P. Ferry, an employee of the renowned "Brugel" research center, the ECB's management policy is "to promote green asset transactions, is a departure from the principle of market neutrality,

[9] According to European Central Bank Head K. Lagarde, the ECB's key goal in the medium term is to promote "positive demand, which could push inflation to our 2% target for a long time". URL: https://www.finam.ru/international/newsitem/ecb-ne-dolzhen-chrezmerno-reagirovat-na-vremennyiy-skachok-inflyacii-20210928–162456.

[10] Based on a discussion of 4 thous. citizens, a report was prepared and submitted to the ECB Governing Council that addressed not only price stability but also social inequality, economic prospects and the environment.

which maximizes the effectiveness of monetary policy". The ECB's direct financial support for the EU's social, economic and environmental policies means "crossing the red line", related to the abandonment of its mandate to prioritize the maintenance of price stability in the region. [11] Risks of expansive monetary interpretation of the ECB's new strategy, which closely links monetary policy objectives to financial, socio-economic and environmental policies, can be realized if contradictory trade-offs are made in weakening the policy credibility not only of the European financial regulator as the sole supranational governance institution, but of the EU as a whole.

ORIENTATION OF THE BUDGET EU IN 2021–2027 ON PROMOTING INNOVATION AND COMPETITIVENESS OF THE EUROPEAN ECONOMY

In recent years, the EU has seen growing disparities in economic development between groups of more and less developed euro-zone countries. The EU again, as it did ten years ago during the 2011–2012 sovereign debt crisis, a strategic choice dilemma between the EU's "Divided Union" paradigm with the risk of breaking up the chains of connections developed over many years within the single European market and the model "Consolidated European Union", based on strengthening the regulatory role of the budget, financial institutions and funds in overcoming the crisis and deepening the EU integration process. The reaction of the European Union authorities to events in recent years confirms the choice of a model for institutional consolidation of integration processes. "Recently, — notes O. V. Butorina, — market fundamentalism and monetarism are receding, and the role of supranational bodies in the economic governance of the EMU is clearly increasing". [7]

A feature of the modern approach of the European Union authorities to the development of international competitiveness and the technological modernization of the European economy is the emphasis on stronger inter-State financial regulation and more active, than before integration of the EU common budget, as well as joint development funds, in this process. The new seven-year EU budget, 2021–2027, amounting to 1,074.3 billion euros (referred to as the European Modernization Budget), envisages a significant restructuring of its expenditure with the priority of financing European Union modernization projects and sustainable development of the European economy after the COVID-19 pandemic, increased investment in research, innovation and digital transformation, combating climate change, protecting biodiversity, curbing the decline of biodiversity in nature.

For the first time in the history of the adoption of the EU General Budgets, the share of innovative and strategic priority projects in financing the expenditure for 2021–2027 is the highest — 31.9%.[11] In contrast, the EU general budget for agricultural subsidies has been reduced to 30.9%, compared to 47% in the 2000–2006 budget.

THE ROLE OF NEW FINANCIAL MECHANISMS IN STIMULATING INNOVATIVE DEVELOPMENT AND ENHANCING THE COMPETITIVENESS OF THE EUROPEAN ECONOMY

The European Strategic Investment Fund (ESIF), established in 2015, and the Next Generation European Union Fund (Next Generation EU), which started to function in 2021, have a special expectation of the EU authorities. The strategic objective of the European Strategic Investment Fund, as a key institutional framework for the

[11] A modernised EU long-term budget, powered by NextGenerationEU. URL: https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021–2027/whats-new_en

emerging EU capital market union, is to facilitate infrastructure and innovation projects in the EU in the energy, transport, digital transformation, development of innovative, clean technologies. The Fund's own funds are 21 billion euros, including 16 billion euros — from the EU budget and 5 billion euros — from the European Investment Bank. Originally planned to raise ESIF funds to 500 billion euros. As at 31 March 2021, the amount of funds raised was 540.3 billion euros and the number of projects approved was 102.1 billion euros.[12]

The Next Generation European Union Foundation (Next Generation EU) with 750 billion euros is considered as a qualitatively new collective financial instrument for stimulating and deepening regional monetary and financial integration. The Fund's financial policy toolkit was considered by experts to have achieved some results in the medium term, but it did not address the risks of recession and low employment in the short term.[12]

The Next Generation European Union Reconstruction Fund attracts funds from member countries contributions and issuance of securities, and its activities are characterized by the linkage of the generation mechanism and use of resources to finance projects with a relevant European Union climate agenda. The Fund serves as a transitional financial instrument for the recovery of the European economy following the COVID-19 pandemic. The Fund provides grants (390 billion euros) and loans (360 billion euros) to countries. Repayment of securities for 30 years after issuance to attract resources will be covered by the EU budget from emissions trading for greenhouse gases, as well as a consolidated corporate tax, other new sources of expenditure financing. The majority of resources are allocated to 2021–2023. Project funding from the Fund amounting to 672.5 billion euros (or 90% of the total) is provided through a special programmer (instrument) for recovery and resilience facility (RRF). The programme is aimed at stimulating public investment in the economy, financial support, above all, projects of "green" and digital transformation in EU countries. Euro 150 billion, or 20% of the total, is planned to be spent on the development of the digital economy of Europe from the EU Reconstruction Fund alone. Nevertheless, representatives of donor countries (Finland, Germany) often have pessimistic assessments of the prospects for the Recovery Fund. Germany resisted the creation of the Common Fund for many years and changed its position only sharply in April 2020 at the height of the COVID-19 pandemic. In the expert community, the Fund is seen not as a mechanism for European Union modernization, but as an additional financial instrument to support — chronically indebted countries like Italy. At the end of 2020, Italy's public debt was estimated by the ECB at 2.6 trillion euros, or 155% of GDP. Only the interest on the Italian public debt is set at 50 billion euros in 2020. Italy will receive 80 billion euros from the Reconstruction Fund. According to K.-G. Bakholm, "the Recovery Fund is too small in size and is being established late to bring Europe out of crisis". [13]

Provision of RRF funds to countries conditional on their development and approval by the European Commission of national recovery and sustainable development plans. A special condition for receiving funds from the Fund is the conformity of the recipient economies with the procedures of the European Semester, which closely monitors compliance with the requirements and recommendations of EU financial and economic policies. Rules and requirements for EU countries in the context of the European Semester are an annual cycle of coordination and monitoring

[12] EIB Group figures as of 31/03/2021. URL: https://www.eib.org/en/efsi/index.htm.

of the implementation of the financial and economic policies of individual states by the European Union authorities with annual reports of the EU Commission on the state of the economy, risk prevention mechanisms and the employment market in each EU State. The reports provide specific recommendations and suggestions to individual countries to ensure the sustainability of public finances and prevent large macroeconomic imbalances, implementing structural reforms, promoting economic growth, employment and investment in EU countries.

CONCLUSION

The current financial and economic crisis in the European Union is characterized, first, by its exogenous nature, which is not directly related to finance, as was the case during the 2011–2012 sovereign debt crisis, which in 2013–2014 became a European banking crisis. Secondly, the current crisis is characterized by its profound depth, pervasiveness and uncertain timing.

The unfolding unpredictability of the crisis forced the European Union to abandon some of its traditional macroeconomic and fiscal discipline requirements (including the temporary "freeze" of compliance by euro area countries with the strict quantitative parameters of the Stability and Growth Pact in terms of the size of budget deficits and public debt) and, by contrast, significantly expand non-standard monetary and financial policy measures to counter the crisis.

The ECB's 2020 step-by-step package of extraordinary, large-scale anti-crisis measures in the European Union has made it possible to mitigate in part the negative impact of the rapid extension of the corona-crises on the ECB's transmission mechanism of monetary policy. The downside has been a growing distrust of financial markets and businesses of the quality and predictability of monetary policy pursued by the ECB. The ECB's balance is being "inflated" and the reliability of the assets used by the bank to conduct the MP is being reduced. The ECB's balance sheet increased by 49% in 2020 compared to 2019 and reached a historical peak of 7 trillion euros at the beginning of 2021.

The COVID-19 pandemic revealed the depth and scope of structural problems in the euro area and forced the European Union authorities to rethink traditional approaches to monetary and financial policy. In particular, the monetary authorities of the European Union initiated a reform of the ECB's monetary policy strategy in early 2020, focusing on the multi-pronged objectives of the MP. The ECB Governing Council's broader interpretation of the role of monetary policy in the European economy is no longer limited to maintaining price stability in the euro area, a includes addressing economic priorities through the interaction of the MP with fiscal, fiscal, financial, macro-prudential and even environmental policies.

A peculiarity of the modern approach of the European Union authorities to the implementation of anti-crisis measures and post-pandemic recovery development, increasing international competitiveness and technological modernization of the European economy is a focus on strengthening inter-State regulation through joint investment and financial institutions, such as the European Strategic Investment Fund, the Interim Recovery Fund, as well as the EU's overall budget, with an emphasis on innovative spending.

There has been a qualitative shift in the approach of EU authorities and ECB leadership to the role of monetary and fiscal policy in the European economic recovery and crisis management system. The EU modernization budget for 2021–2027 was adopted and the Foundation "Next Generation European Union" was established. The ECB Climate Change Centre analyses emerging risks, examines

the ECB's place and role in implementing EU environmental policy. A significant increase in the proportion of "green bonds" is expected (with up to 30% of the budget and recovery fund allocated to finance various forms of adaptation to climate change), new types of climate finance instruments, related to climate change, in the ECB's portfolio, to be taken into account in the conduct of monetary policy.

Targeting of funds earmarked for, from the general budget and the reconstruction fund, and the requirement to develop national recovery plans, according to the expert community, do not guarantee that if the financial situation worsens, they will not be redirected to the current tasks of mitigating new crisis impacts on the economies of individual countries and the European Union as a whole.

ACKNOWLEDGEMENTS

The article was prepared on the results of research carried out at the expense of budget funds according to the state contract of the Financial University under the Government of the Russian Federation.

REFERENCES

1. Mundell R. A. A reconsideration of the twentieth century. *American Economic Review.* 2000;90(3):327–340. DOI: 10.1257/aer.90.3.327
2. Frankel J. A., Rose A. K. The endogeneity of the optimum currency area criteria. *The Economic Journal*. 1998;108(449):1009–1025. URL: http://faculty.haas.berkeley.edu/arose/ocaej.pdf
3. Borko Yu. A. From a European idea to a united Europe. Moscow: Delovaya literatura; 2003. 463 p. (In Russ.).
4. Glukharev L. I., ed. Europe of change: Concepts and strategies of integration processes. Moscow: Kraft+; 2006. 352 p. (In Russ.).
5. Shishkov Yu. V. Integration processes on the threshold of the XXI century. Moscow: III tysyacheletie; 2001. 480 p. (In Russ.).
6. Shemyatenkov V. G. Euro: Two sides of the same coin. Moscow: Ekonomika; 1998. 346 p. (In Russ.).
7. Butorina O. V. Economic history of the euro. Moscow: Ves' Mir; 2020. 576 p. (In Russ.).
8. Pishchik V. Ya., Kuznetsov A. V., Alekseev P. V. European Economic and Monetary Union: 20 years after. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2019;63(9):76–85. (In Russ.). DOI: 10.20542/0131–2227–2019–63–9–76–85
9. Bazhan A. I., Gusev K. N. European Central Bank amid the financial crisis. *Sovremennaya Evropa = Contemporary Europe*. 2016;(3):93–103. (In Russ.). DOI: 10.15211/soveurope32016100110
10. Dabrowski, M. Monetary arithmetic and inflation risk. Bruegel. Sept. 28, 2021. URL: https://www.bruegel.org/2021/09/monetary-arithmetic-and-inflation-risk
11. Pisanni-Ferry J. Central banking's brave new world. Bruegel. Feb. 24, 2021. URL: https://www.bruegel.org/2021/02/central-bankings-brave-new-world/
12. Claeys G., Darvas Z., Demertzis M., Wolff G. The great COVID-19 divergence: Managing a sustainable and equitable recovery in the European Union. *Policy Contribution*. 2021;(11). URL: https://www.bruegel.org/wp-content/uploads/2021/05/PC-2021–11-ecofin-210521–1.pdf
13. Backholm K.-G. The Recovery Fund will not save Europe. InoSMI.ru. Aug. 18, 2020. URL: https://inosmi.ru/economic/20200818/247949915.html (In Russ.).

ABOUT THE AUTHORS

Viktor Ya. Pischik — DSc in Economics, Professor, Department of the Global Finance, Financial University, Moscow, Russia
pv915@mail.ru

Peter V. Alekseev — Cand. Sci. (Econ.), Leading Researcher of the Institute of the Global Economy and International Finance, Financial University, Moscow, Russia
apv31@mail.ru

The article was received on 01.09.2021; revised on 20.09.2021 and accepted for publication on 30.09.2021.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-58-73
UDC 330.552:338.45+330.356.7+330.342.173(045)
JEL N14, C32, L60, O43

Analysis of Factors of High-tech Industries Growth: A Case Study of the Late USSR*

D.V. Didenko[a], N.V. Grineva[b]
[a] Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia;
[b] Financial University, Moscow, Russia, Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia
[a] http://orcid.org/0000-0001-5295-2538; [b] http://orcid.org/0000-0001-7647-5967

ABSTRACT

Explanation of the role high-tech industries play in ensuring sustainable economic growth is significant in the contemporary environment. Also, it is relevant in theoretical discourses of modernization, neo-industrialization, and industrial policy that are similar in their structure. The purpose of the study is to assess the factors of dynamics of the most high-tech industries and the entire Soviet industry when having faced economic growth slowdown, with emphasis on institutional and technological components. The key hypothesis is that in the high-tech industries in the 1960s and 1980s, the institutional environment appeared to be a more significant factor than the technological level. The variety of the sources utilized includes calculations and estimates from the research literature and selected indicators from the official statistics. The econometric analysis of the data is based on an exogenous growth model in the form of the Cobb-Douglas production function, augmented with human capital in Mankiw, Romer, Weil (1992), modified in Didenko, Grineva (2020) by introducing variables that proxy for institutional and general technological dynamics. In this paper, we test it using lagged variables in per capita and rate-of-change terms. The marginal rate of technical substitution of physical by human capital, measured in such a way and indicating the flexibility of management of factors of production, exposed a stable level both in the entire industry of the USSR and its high-tech branches. At the same time, our key hypothesis found weak support.

Keywords: planned economy; industrial development; production function; human capital; institutional environment; technological level

For citation: **Didenko D.V., Grineva N.V. Analysis of factors of high-tech industries growth: A case study of the late USSR. *The World of New Economy*. 2021;15(4):58-73. DOI: 10.26794/2220-6469-2021-15-4-58-73**

* The study was carried out with the financial support of the Russian Foundation for Basic Research within the framework of scientific project No. 19–010–00680, "A research into the institutional mechanism of interaction between academic research and economic management in the USSR (the mid-1950s — late 1980s) in light of strategic planning development in the public sector of Russia's economy".

INTRODUCTION

The issue of the role of high-technology sectors of the new economy in ensuring sustainable growth is particularly important in the context of contemporary challenges from the external environment and the need for the Russian economy to emerge from the stagnation trap. It has been updated in the closely structured theoretical discourses of modernization, neo-industrialization, and industrial policy [1], recognizing the need for active and proactive measures by the state to catch up with the economically developed countries. Interaction between the institutional and technological aspects of the modernization of the high-technology sectors of the Russian economy is important. [2]

In this regard, it is relevant to study the experience of the development of such industries in the USSR, which had successfully achieved catching-up industrial development by the beginning of the period under review, but in the 1970s lost the dynamism. Falling behind the developed countries in terms of key indicators of economic and social development had led to the systemic economic and political crisis towards the end of the period under study.

In the development economics paradigm, slowdown is seen as a phenomenon common to many countries as catching-up industrialization is completed and the "structural bonus" is exhausted. [3] This is associated with lower returns of production factors (physical, human capital) under the neoclassical approach. On the other hand, it is at this stage that high-technology industries and services are becoming increasingly important, using human capital intensively and creating the conditions for the transition to an innovative knowledge-based economy.[4]

In an institutional perspective, the slowdown in growth in the late Soviet period is due to, on the one hand, the initial drawbacks of the "extractive" institutions of state coercion, on the other hand, the deterioration of the "quality of institutions" that demonstrated comparative efficiency at the stage of catching-up development. [5–7] The monograph [8] shows the influence of the institutional environment specific to the planned economy of the USSR on the nature of the accumulation of physical capital (preference of new construction instead of replacement of the retiring elements of production capacities). However, while the neoclassical versions have been widely tested by econometric methods, the institutional ones are mostly based on narrative evidence, expert estimates using descriptive quantitative statistics.

In line with the approaches formulated by the authors for the econometric study of the economy of the USSR from a cross-country perspective [9], these phenomena are studied in the article on the Soviet chemicals and machinery. These industries, at the beginning of the period, were the closest to the world technological frontier, determined the competitiveness of the USSR economy and created the basis for the implementation of the geopolitical priorities of its leadership.

We test our *key hypothesis*: in the 1960–1980s, the institutional environment for industrial production in high-technology industries was more important than its technological level. Another hypothesis to be tested is that human capital was a more important growth factor in high-technology industries than in total industry.

DATA AND METHODS OF ANALYSIS

The main *data sources* are as follows:

- Value added growth rates reconstructed in the literature for selected industries [10], calculation and estimation of the level of human capital and wages of workers and employees in total industry.[11]
- Official statistics on the labor force in the industrial branches of the USSR and wages of its categories, published by the

Soviet supreme statistical offices (generally in topical publications: "Industry of the USSR", "Labor in the USSR", and also in the annual and anniversary compilations "National economy of the USSR").

From the data set attached to the preprint of the article by S. N. Smirnov [10] we selected industrial value-added growth indices estimated by L. Kurzweg[1] and M. Suhara.[2] These data cover the longest period of time and have consistent estimates for the industrial sector as a whole and for individual industries. Industrial growth, according to the CIA analyst team leader L. Kurzweg, was much faster than as of M. Suhara's estimate. Criticisms of the former are to be found in [12] which states that, while the CIA analysts' estimates are positioned below the apparently inflated reports of the official statistics, they did not fully account for hidden inflation and deterioration of the quality of production in most branches of the Soviet economy in the second half of the 1970s — the first half of the 1980s. Comparison with alternative calculation results from the works [13–15] for the shorter period available and with the GDP dynamics shows that long series by M. Suchara are closer to them (*fig. 1*).

The amount of physical capital in constant prices (in Geary-Khamis international dollars of 1990 purchasing power parity) was calculated on the basis of data on its total value in the national economy of the USSR in the same units [11] and the share of the industry in fixed assets according to the Soviet official statistics.

A similar operation for human capital is problematic (due to the inconsistency of this theory with the methodology of the official statistics, there were no corresponding data in value units). Therefore, the volume was determined on the basis of the average duration of education in the system of its organized forms, which in turn can be calculated on the basis of official data on the number of industrial and productive personnel with a certain level of education and data on average duration of education for the USSR as a whole.[11] This indicator can be applied both directly (which is commonly practiced in econometric studies), and as indexes derived from the rate of return on education of different durations (that has recently been applied in intercountry comparisons).[3]

Institutional environment is proxied by industrial wage pay differentials: white-collar (office and technical personnel, including engineers) versus blue-collar workers. This differential is a proxy-indicator for a combination of public policies that promote the accumulation of human capital, the motivation of those employed in the industries and the redistribution of income. In econometric analysis, this differential can be applied both directly and in relation to the difference in duration of institutionalized education, i.e. in term of 1 year return.

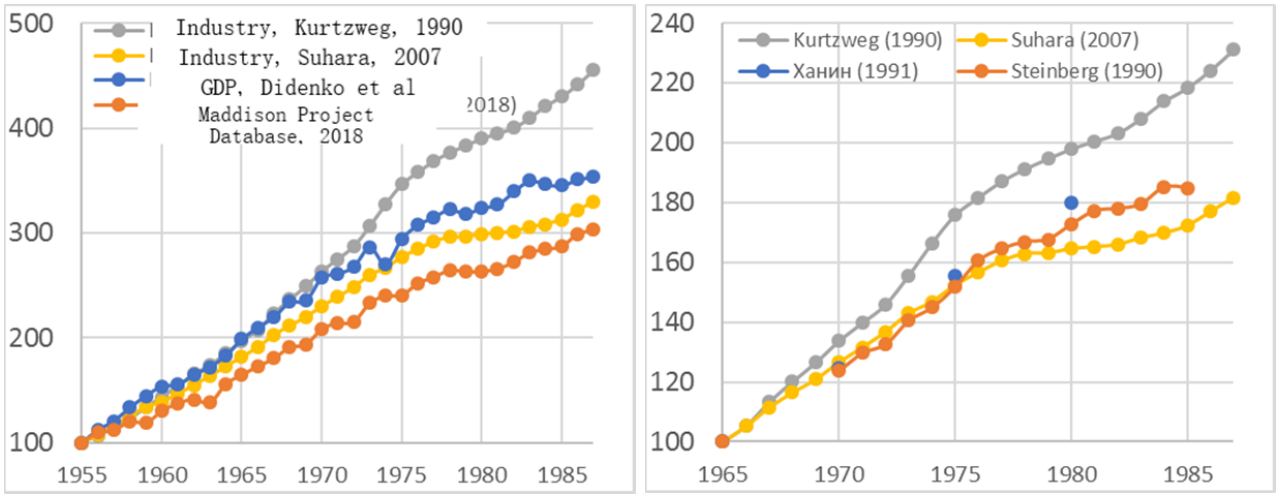
The results of the calculations by S. Y. Glaziev are used as proxy-indicator of technological level relevant for the industrial economy.[16] They are based on a cross-country analysis of the main directions of technological progress, reflecting the diffusion of the most important consolidated technologies, the aggregate of which forms the technological mode (then — TM) of individual branches and total industry. They reflect technological changes in the electric power[4] and chemical industries

[1] Measures of Soviet Gross National Product in 1982 Prices. A Study Prepared for the Use of the Joint Economic Committee. URL: https://www.jec.senate.gov/reports/101st%20Congress/Measures%20of%20Soviet%20Gross%20 National%20Product%20in%201982%20Prices%20(1530).pdf.

[2] An Estimation of Production Indexes for Soviet Industry: 1913–1990. URL: http://www.eco.nihon-u.ac.jp/center/economic/publication/pdf/07–01suhara.pdf.

[3] In particular, in Penn World Tables and based on them in [9].

[4] For total industry, we chose the overall level of development of the electric power branch, which determines the level of industrial development of an economy.



A) Industry and GDP (1955-1987 years; 1955 – 100%) B) Industry (1965-1987 years; 1965 – 100%)

Fig. 1. **Alternative estimates of the growth of value-added in the USSR industry and GDP**

Source: URL: https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2018; [10–12, 15].

resulting from the development of the second TM, and machinery — as a result of the development of the third TM related to the computerization of the economy.

As a reference base, measurement of the technological level takes into account the actual level achieved in the most technically advanced countries in the relevant field, which defined the world technological frontier (USA, West Germany, Japan). The actual distance is the number of years since, when the reference level of technological development was in line with the current level in the country — USSR. [16]

Thus, input data (other than physical capital) for the analysis in each industry had 2 series of alternative estimates. Their relative performance in the total industry is shown in *fig. 2*.

The period to be analysed is limited to 1961–1987 due to the lack of data from the above sources. Missing values[5] were reconstructed through inter-, retro- and extrapolation. To reconstruct wage differentials in industries through linear regression, a more complete series of the same indicator in industry was used. Between 1987 and 1988, the trend towards labor force growth reversed, making extrapolation irrelevant.

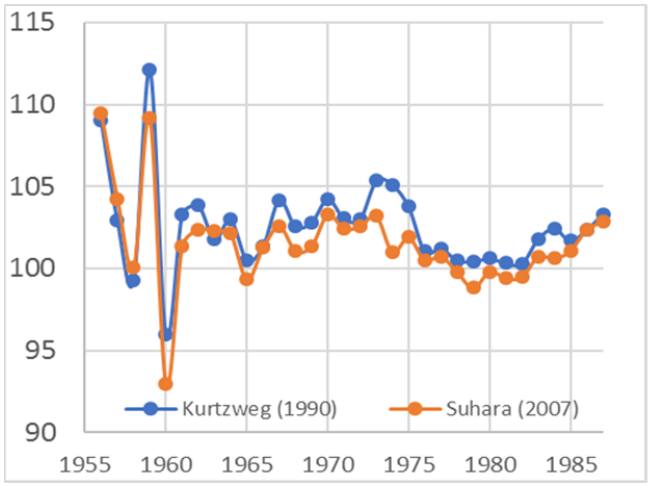
Methodology for the analysis

The basis of the analysis in this article is the exogenous growth model in the form of a production function (then — PF), augmented with physical and human capital in [17, 18], modified by the introduction of variables proxying for institutional and general technological dynamics [9]. In the article it is applied per 1 employee, in terms of rate of change, also taking into account the delayed impact of independent variables on value added (lags).[6]

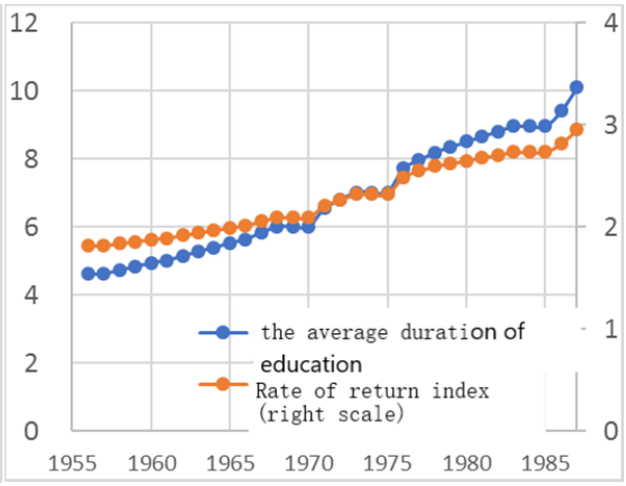
Among commonly cited works that used the PF methodological apparatus for the entire national economy of the USSR, some were dedicated separately to the Soviet industry. Most significant in this respect for the literature of the Soviet period were those published in the late 1960s by A.I. Anchishkin [19] and Y.V. Yaremenko. [20] In addition, for

[5] The largest gaps were in the indicators of wage differentials in industries; the actual distance of the USSR from the reference countries (the USA and Germany) by level of technological development in the electric power industry and the chemical industry.

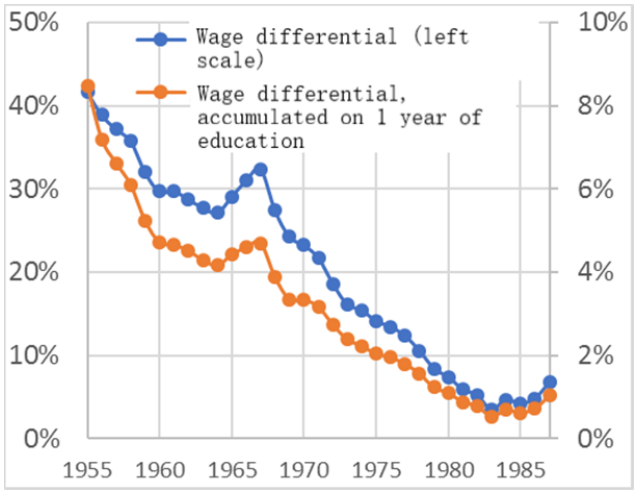
[6] Based on the cross-correlation function.



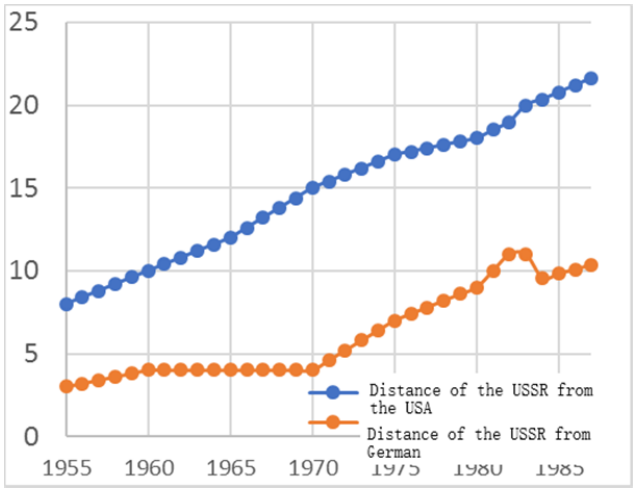
A) Dynamics of value added



B) Level of human capital



C) Wage differential



D) Summary of the actual distance of the USSR from the reference countries by level of technological development of the electric power industry

Fig. 2. **Alternative series of indicators in the Soviet industry**

Source: Authors' calculations based on [10, 11, 16].

Soviet literature, the key problem was the ratio of extensive ("accumulation of factors of production" in modern terminology) to intensive ("aggregate productivity") growth factors with consensus on the primary role of their first group.

In foreign literature most notable are the 1970–1980s works by M. Weitzman, A. Bergson, S. Gomulka, S. Rosefielde and C. Lovell, P. Desai. [21–27] After the collapse of the USSR, Soviet industrial growth was analyzed in a widely quoted paper by W. Easterly and S. Fischer [28] and in one of I. B. Voskoboynikov's recent works. [29] One of the most important issues in foreign literature was the elasticity of capital and labor substitution, which was assessed by consensus as low. For example, S. Gechert and coauthors noted that empirical studies in many countries have established ranges of substitution elasticity from 0 to 1.5. [30] The value

of 0.3 is the average after a series of adjustments. Another problem was the relative importance of diminishing returns as physical capital was accumulating and technological progress was slowing down.

To our best knowledge, the works cited above were limited in using only traditional factors of production (capital and labor) and did not include the human capital variable (except [28, 31], where it was assigned to the national economy and was not distributed between its sectors and industries), leaving aside the institutional environment and the technological level.

The institutional environment as part of "institutional capital" was introduced into the PF by researcher works affiliated with the World Bank.[7] However, in the literature known to us attempts to quantify the institutional environment of the late Soviet economy [7, 8, 32] did not contain econometric analysis with application of the PF techniques.

Model specification

The model argued by the authors of the article in work [9] is taken as the starting point:

$$Y_t = A_0 K_t^{\alpha} H_t^{\beta} I_t^{\mu 1} T_t^{\mu 2} + u(t), \qquad (1)$$

where: Y — value added; A_0 — free term; K – physical capital stock; H –human capital stock; I — proxy-indicator of institutional environment; T — proxy-indicator of technological level; α — coefficient of physical capital; β — coefficient of human capital; μ_1 — coefficient of proxy-indicator of institutional environment; μ_2 — coefficient of proxy-indicator of technological level; u — residuals.

[7] Hamilton K., Ruta G., Bolt K., Markandya A., Pedroso-Galinato S., Silva P., Ordoubadi M.S., Lange G.-M., Tajibaeva L. Where is the wealth of nations? Measuring capital for the 21st century. URL: http://documents.worldbank.org/curated/en/287171468323724180/Where-is-the-wealth-of-nations-measuring-capital-for-the-21st-century.

To achieve the research objective, it has been transformed into the following model variants:

A) Expressed in annual rates of change of linearized production factors and proxy-indicators *(differential model):*

$$\ln\frac{y_t}{y_{t-1}} = \ln A_0 + \alpha \ln\left(\frac{k_t^*}{k_{t-1}^*}\right) + \beta \ln\left(\frac{h_t^*}{h_{t-1}^*}\right) + \mu_1 \ln\left(\frac{I_t}{I_{t-1}}\right) + \mu_2 \ln\left(\frac{T_t}{T_{t-1}}\right) + u_t. \qquad (2)$$

B) Expressed in annual rates of change of linearized production factors and in levels of proxy-indicators (blended model):

$$\ln\frac{y_t}{y_{t-1}} = \ln A_0 + \alpha \ln\left(\frac{k_t^*}{k_{t-1}^*}\right) + \beta \ln\left(\frac{h_t^*}{h_{t-1}^*}\right) + \mu_1 \ln I_t + \mu_2 \ln T_t + u_t, \qquad (3)$$

where: y — value added per 1 employee (= labor productivity); k –physical capital stock at replacement cost per 1 employee (= capital intensity of labor); h –human capital stock per 1 employee (= average duration of institutionalized education, years).

After partial historical data reconstructions, more than 100 combinations of 4 independent variables were tested for significance in t-statistics, including both production factors (physical and human capital) and both proxy-indicators (institutional environment and one of two dimensions of technological distance in series levels or in their rate of change). In case when both production factors and only one proxy-indicator were significant (with other proxy-indicator insignificant), the model was additionally tested with 3 independent variables that appeared to be significant.

RESULTS

Since variables *y, h, I, T* (i.e. all but *k*) had alternative historical series (see *fig. 2*), that

testing was conducted for each series. As a result, in the area of human capital, the transfer of the education rate assumption from the global to the domestic level has not been adequately supported. Thus, wage differential rescaled to 1 year of education approximated the institutional environment to a lesser extent than without such conversion.

Twelve models with a sufficient set of 3 or 4 relevant variables were selected after testing (on a level no worse than 0.05): both production factors (physical and human capital) and at least 1 proxy-indicator (either institutions or technologies in any way). Their indicator assessments are provided in *table 1*.

The selected models were tested on the fulfilment of conditions of the Gauss-Markov theorem on the equality of the residuals expectation value to zero. The absence of heteroscedasticity is confirmed by the Goldfeld-Quandt tests. Since coefficients of correlation of independent variables in pairs did not in any case exceed module value 0.7, then it can be argued that there is no multicollinearity. As the regressions used lagged variables and key variables in terms of the rate of change, there was no autocorrelation of residuals.

Among the regressions selected, the number of blended (7 models) prevails over the number of differential (5 models). In the branches under consideration, the rate of growth is more related to the levels of proxy-indicators than to their rate of change. At the same time, in the total industry growth rates are more dependent on the rate of change of proxy-indicators.

The variables in the differential models assume a sufficient level of significance and a high coefficient of determination only at $A_0 = 0$ (if the coefficient is not significant). At the same time, blended models have a coefficient of determination above the average but significant set of key independent variables at $A_0 \neq 0$. Also, all constructed models have low (less than 1%) values of mean approximation error.

Of the 2 available series of the dependent variable, both are (y_1 and y_2) found in 2 types of models, but y_1 more often: in the differential models — in 3 out of 5; in blended — in 4 out of 7 models. While the accumulated total of industrial growth measured by y_2 (estimated by M. Suhara; 5 out of 12 were applied in our models) appears to be more consistent with GDP growth rates in the USSR (*fig. 1*), rate of growth y_1 (estimated by L. Kurzweg; 7 out of 12 were applied in our models) slightly more adequately reflects the annual fluctuations than y_2.

Of the 12 regressions selected, the institutional environment proxy-indicators are present in 4 models, the technology level in 10 models, with only 2 regressions including both proxy-indicators (institutions and technologies). The recent regressions relate to machinery and total industry.

Thus, proxy-indicators of technology-level were more likely to be a significant variable than proxy-indicators of institutional-level. The latter generally had a worse level of significance and never reached 0.01. They were in 1 out of 2 regressions in industry, 1 out of 2 in machinery and 2 out of 7 in the chemical industry.

The largest number of significant regressions were in the chemical industry, which was several times smaller in terms of value added and employment than the machinery.

To compare estimates of the influence of factors relative to each other and their contribution to the dynamics of a dependent variable, the regression coefficients from *table 1* (*a*) were used to calculate elasticities coefficient $Э_j$ and beta coefficients $\hat{\beta}_j$:

$$E_j = a_j \cdot \frac{\bar{x}_j}{\bar{y}},$$

Table 1

Indicators of the models of production functions of the Soviet industry and its hi-tech branches (1961–1987)

	Source	R^2	MAE	*F* Significance	A_0	α	β	μ_1	μ_2	μ_3
	y					***k***	***h***	***l***	T_1	T_2
Differential models										
Industry										
Coefficients	y_1	0.9999	0.304	5.0875E-53	0	0.3225***	0.4545***	0.0719**		0.1496**
Standard error						0.1025	0.1017	0.0332		0.0644
t-statistic						3.1469	4.4706	2.1669		2.3245
Coefficients	y_2	0.9999	0.257	3.1477E-57	0	0.3302***	0.5722***			0.0925*
Standard error						0.0781	0.0802			0.0508
t- statistic						4.2256	7.1329			1.8234
Chemical										
Coefficients	y_1	0.9999	0.443	1.7631E-52	0	0.7697***	–0.442**		0.6681***	
Standard error						0.1774	0.1823		0.1163	
t– statistic						4.3402	–2.4241		5.7440	
Coefficients	y_1	0.9999	0.577	2.4524E-49	0	0.9838***	–0.5654*			0.5749**
Standard error						0.2346	0.3040			0.2277
t– statistic						4.1928	–1.8603			2.5246
Coefficients	y_2	0.9999	0.424	2.5218E-52	0	0.6731***	–0.3295*		0.6528***	
Standard error						0.1801	0.1851		0.1181	
t– statistic						3.7378	–1.7799		5.5271	
Blended models (a number of independent variables – in series levels)										
Machinery										
Coefficients	y_1	0.9999	0.365	4.5520E-54	0	0.2287**	0.7682***		0.0023*	

Table 1 (continued)

	Source	R^2	MAE	*F* Significance	A_0	α	β	μ_1	μ_2	μ_3
	y					***k***	***h***	***l***	T_1	T_2
Standard error						0.0953	0.0958		0.0013	
t– statistic						2.4002	8.0200		1.7220	
Coefficients	y_1	0.9999	0.312	1.1488E-52	0	0.2738***	0.7178***	–0.0096**		–0.0031***
Standard error						0.0799	0.0804	0.0040		0.0010
t– statistic						3.4277	8.9311	–2.3696		–3.0395
Chemical										
Coefficients	y_1	0.6156	0.483	5.3305E-05	10.5665***	0.6135**	–1.872***			–0.0456*
Standard error					2.1136	0.2509	0.4165			0.0258
t– statistic					4.9994	2.4451	–4.4948			–1.7676
Coefficients	y_1	0.6376	0.471	2.7464E-05	10.839***	0.6016**	–1.937***	0.0278**		
Standard error					2.0407	0.2303	0.4067	0.0128		
t– statistic					5.3114	2.6117	–4.7623	2.1708		
Coefficients	y_2	0.6230	0.444	4.2905E-05	10.8451***	0.443**	–1.7444***		–0.0716**	
Standard error					1.9232	0.2335	0.3879		0.0309	
t– statistic					5.6391	1.8970	–4.4975		–2.3183	
Coefficients	y_2	0.6106	0.444	6.1665E-05	10.9528***	0.4674**	–1.8049***			–0.0517**
Standard error					2.0037	0.2379	0.3948			0.0245
t– statistic					5.4662	1.9652	–4.5714			–2.1148
Coefficients	y_2	0.6070	0.449	6.8392E-05	10.6995***	0.5609**	–1.866***	0.0283*		
Standard error					1.9692	0.2135	0.3996	0.0138		
t– statistic					5.4335	2.6269	–4.6697	2.0543		

Notes: Mean Approximation Error (%); *** $p < 0{,}01$; ** $p < 0{,}05$; * $p < 0{,}1$; y_1 — estimates of L. Kurtzweg (1990), y_2 — estimates of M. Suhara (2007).
Source: calculated by the authors.

Table 2

Values of Standardized Coefficients of the Soviet Industry and its Branches (1961–1987)

Coefficient	Source	α	β	μ_1	μ_2	μ_3
	y	***k***	***h***	***l***	T_1	T_2
Differential models						
Industry						
E_j	y_1	**0.3245**	**0.4550**	**0.0704**		0.1501
$\hat{\beta}_j$		0.6828	0.8046	0.6147		0.5905
Δ_j		0.1626	0.1389	0.1505		–0.1025
E_j	y_2	0.3329	0.5741			0.0930
$\hat{\beta}_j$		0.8180	1.1687			0.4226
Δ_j		0.1225	0.4981			–0.0334
Chemicals						
E_j	y_1	0.7738	–0.4408		0.6671	
$\hat{\beta}_j$		0.5529	–0.1430		0.5700	
Δ_j		0.2709	0.0589		0.3616	
E_j	y_1	0.9890	–0.5640			0.5750
$\hat{\beta}_j$		0.7067	–0.1829			0.3588
Δ_j		0.3462	0.0753			0.0692
E_j	y_2	0.6768	–0.3288		0.6520	
$\hat{\beta}_j$		0.5133	–0.1132		0.5913	
Δ_j		0.2289	0.0492		0.3702	
Blended models (l, T_1, T_2 – level in a number)						
Machinery						
E_j	y_1	0.2304	0.7695		0.0002	
$\hat{\beta}_j$		0.4291	0.5300		0.3273	
Δ_j		0.1803	0.1089		0.0988	
E_j	y_1	**0.2758**	**0.7190**	**0.0044**		0.0007
$\hat{\beta}_j$		0.5137	0.4953	–0.3917		–0.5040
Δ_j		0.2159	0.1018	0.0041		0.2231
Chemical						
E_j	y_1	0.6167	–1.8671			–0.0268

Table 2 (continued)

Coefficient	Source	α	β	μ_1	μ_2	μ_3
	y	*k*	*h*	*l*	T_1	T_2
$\hat{\beta}_j$		0.4406	−0.6055			−0.3147
Δ_j		0.3507	0.4051			0.2442
E_j	y_1	**0.6047**	**−1.9319**	**−0.0087**		
$\hat{\beta}_j$		0.4321	−0.6265	0.3583		
Δ_j		0.3320	0.4047	0.2633		
E_j	y_2	0.4454	−1.7403		−0.0430	
$\hat{\beta}_j$		0.3378	−0.5990		−0.4033	
Δ_j		0.2418	0.4178		0.3403	
E_j	y_2	0.4700	−1.8007			−0.0304
$\hat{\beta}_j$		0.3565	−0.6198			−0.3790
Δ_j		0.3414	1.2846			0.0408
E_j	y_2	0.5640	−1.8616	−0.0089		
$\hat{\beta}_j$		0.4278	−0.6408	0.3336		
Δ_j		0.3143	0.4587	0.2270		

Note: y_1 — estimates of L. Kurtzweg (1990); y_2 — estimates of M. Suhara (2007);
The authors' estimates are based on the variables under logarithms.
Source: calculated by the authors.

$$\hat{\beta}_j = \hat{a}_j \cdot \frac{S_{xj}}{S_y}.$$

The share of the factor in their total influence on the dependent variable was estimated by delta coefficients Δ_j:

$$\Delta_j = r_{y,x_j} \cdot \frac{\hat{\beta}_j}{R^2}.$$

In the table 2 shows the results of the calculation of the respective standardized coefficients.

For the 3 most important models (shown in bold in *table 2*)[8] in *fig. 3* we present marginal rate of technical substitution in physical capital to human.[9] The downward trend identified in work [9] for the USSR economy, interpreted as diminishing flexibility in factor management, measured in this work in per capita and in rate of change terms was not observed in the branches analyzed or in the total industry.

[8] For 1 for each analyzed category; models for industry and machinery include all 4 independent variables, in the chemicals proxy-indicators of institutions is the most significant.

[9] Then — MRTS.

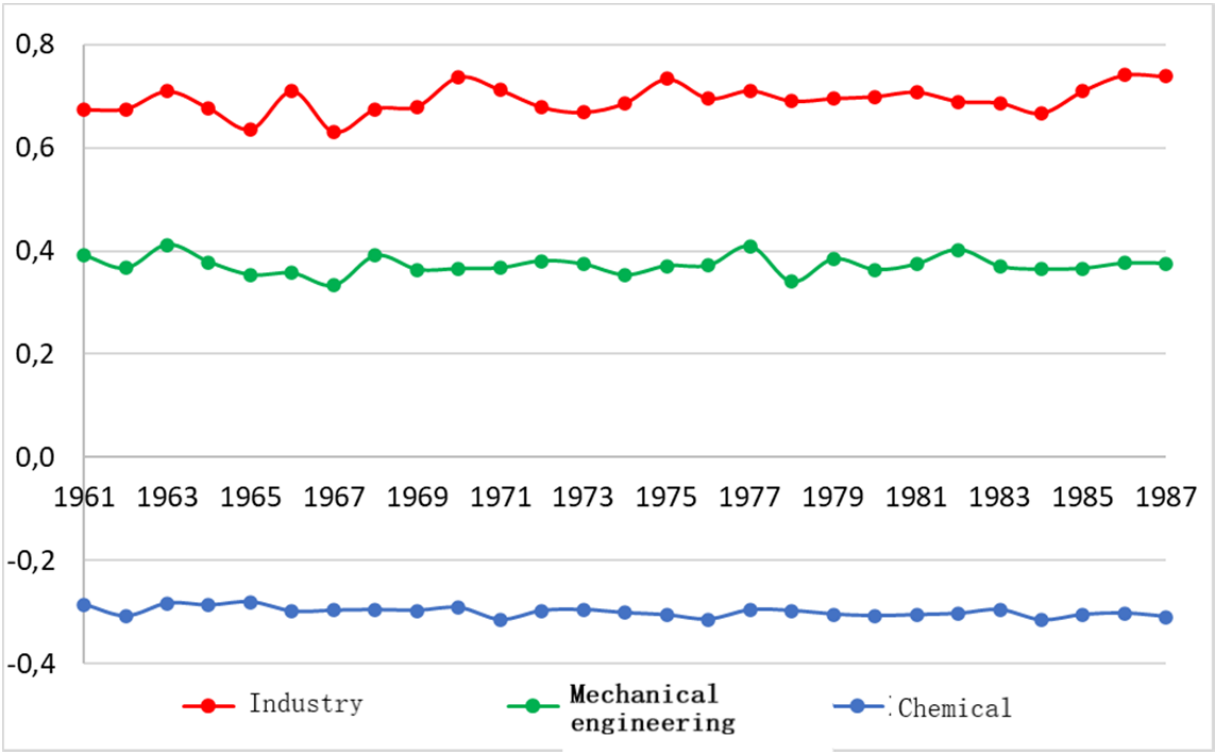


Fig. 3. **Dynamics of the marginal rate of substitution (MRTS) of physical capital by human capital in hi–tech industries of the USSR**

Note: Marginal Rate of Technical Substitution.

Source: calculated by the authors.

However, the cross-sectoral differences in this indicator cannot be interpreted as clearly as the dynamics in one industry. A negative value in the chemical industry follows from a negative correlation between the rate of growth of its value added and the rate of accumulation of its human capital.

DISCUSSION OF RESULTS

The most important factor in the industrial growth of the late USSR was the accumulation of factors of production (physical and human capital).

The positive values of the coefficients of physical capital in all the selected models show the important role of its accumulation in the growth of the USSR industry and its most hi-tech branches. The effects of increases in physical capital were particularly strong in the chemical industry, where in one of the 3 differential models the value of the respective regression rate was close to 1.

The negative values of the coefficients of human capital index, which participates in our regressions, in the chemical industry are worthy of being noted[10] (versus positive values in machinery and total industry). This may be due to the effects of over-accumulation in some years (especially in mid-1960 years). It is likely that such process in a small (as compared to machinery) branch was reinforced by unbalanced impulses from the part of the state.[11] Consequently,

[10] As the lag y and h increase, the correlation ratio becomes positive, but its module drops and the coefficients of variables in all the tested regressions become insignificant.

[11] According to the official statistics, in 1965 employment in the chemical industry was about 4.6% of the total industry (compared to about 36.1% in machinery), and in 1985–5.2% and 43.0% respectively. According to data in [15], its share of industrial value added was between 3.0 and 3.7% in 1965 (compared with 24.6 to 26.3% in machinery), 6.6 to 7.9% and 33.5 to 34.3%, respectively, in 1985. Therefore, regular unbalanced fluctuations in the labor force (leading to the hiring of skilled personnel) could have a greater impact on the dynamics of the chemical industry.

the increase in the rate of growth of the educational level of the labor force was accompanied by a decline in the rate of growth of value added.

Predominance of positive values in the coefficients of the institution proxy-indicators used, which is interpreted as a slowdown in growth due to the narrowing of wage differentials while the higher growth is associated with them (blended models) or slower growth due to slowdown in narrowing wage differentials (differential models). The exception is machinery, where the wage differential was lower than in total industry, and the contribution of the differential to the growth rate was the least compared to total industry and the chemical branch.

Opposite signs of technology level proxy-indicators used in different models require more detailed discussion. On the one hand, the slowdown in industrial growth has been accompanied by a slowdown in the rate of technological catch-up even as it was widening. Positive coefficient values in differential models indicate just this. On the other hand, in blended models, signs at proxy-indicators of technological level are, in most cases, negative. This means that aggravation of the technological lagging behind (in years) was expected to have a negative impact on growth. The exception to this background (with a positive sign of a technology level proxy-indicator) is 1 out of 2 blended models in machinery that does not include proxy-indicator of institutions. However, the significance of proxy-indicators of the technology-level in this model (0.05) is worse than the significance of the physical (0.01) and human (0.001) capital measures used in the article. This relates to the actual distance of technological development of machinery in the USSR and Japan. The comments by the author of the relevant calculations, S. Y. Glaziev, should be taken into account [16]: source data of the Central Statistical Administration of the USSR and statistical services of reference countries are rated by him as least comparable relative to other industries. Consequently, the resulting assessments of the role of the technological level in the machinery are less reliable than others.

Among significant proxy-indicators of technological level T_2 (6 models) with the Western German reference point is somewhat more common, as compared to T_1 (4 models) with the United States and Japan as reference. In addition, a full set of variables proved relevant T_2, i.e, West Germany was a slightly more relevant base for comparison of technological level in machinery and in the total industry.

The values of the standardized coefficients show that the impact of the institutional environment and the technological level on industrial growth was relatively comparable.

Thus, the results of the econometric analysis do not strongly support the key hypothesis of the research: a more important factor in slowing the growth of high-technology industries was their technological level rather than their institutional environment.

Such results show that institutions "matter", but not just them and often — not the most important thing. They add empirical evidence to the critical understanding of the "pan-institutionalist" narrative, which has been widely disseminated in the historical and economic literature, and support the theoretical arguments given in the paper. [33]

While the importance of human capital accumulation in the industrial growth of the USSR was comparable to the accumulation of physical capital (in some regressions may even have exceeded), another hypothesis — is refuted, that human capital was a more important factor in the growth of high-tech industries than the Soviet industry as a whole.

CONCLUSION

In the article we tested the hypothesis of the importance of the institutional environment and its contribution to slowing the growth of the Soviet industry and its most high-technology branches. This hypothesis is poorly confirmed: factor accumulation played a major role in the industrial growth of the late USSR; during the period under review, it slowed, leading to a slowdown in growth rates; widening technological gap with the advanced economies also played an important role in slowing growth. The institutional environment, proxied by wage differentials, played a comparable but generally less important role than the technological lagging behind.

In analyzing the role of institutions in economic growth, any study is limited by the availability of reliable data. We assume an explanatory power from other proxy-indicators of institutional environment. Reconstruction of relevant historical data (including as industry statistics are declassified) and testing them as alternative series using the proposed toolkit are promising areas for future research.

REFERENCES

1. Tolkachev S.A. Network industrial policy in the age of the new industrial revolution. *Zhurnal Novoi ekonomicheskoi assotsiatsii = Journal of the New Economic Association*. 2018;(3):155–161. (In Russ.). DOI: 10.31737/2221–2264–2018–39–3–9
2. Abdikeev N.M., ed. Institutional support for technological modernization of sectors of the Russian economy. Moscow: RuScience; 2020. 270 p. (In Russ.).
3. Timmer M.P., Szirmai A. Productivity growth in Asian manufacturing: The structural bonus hypothesis examined. *Structural Change and Economic Dynamics*. 2000;11(4):371–392. DOI: 10.1016/S 0954–349X(00)00023–0
4. Krasil'shchikov V.A., Belousov A.R., Gutnik V.P., Klepach A.N., Kuznetsov V.I. Modernization: Foreign experience and Russia. Moscow: Infomart; 1994. 115 p. (In Russ.).
5. North D.C. Institutions, institutional change and economic performance. Cambridge: Cambridge University Press; 1990. 159 p. (Russ. ed.: North D. Instituty, institutsional'nye izmeneniya i funktsionirovanie ekonomiki. Moscow: Fund of the economic book "Nachala"; 1997. 190 p.).
6. Acemoglu D., Robinson J.A. Why nations fail: The origins of power, prosperity, and poverty. New York: Crown Business; 2013. 544 p. (Russ. ed.: Acemoglu D., Robinson J.A. Pochemu odni strany bogatye, a drugie bednye: proiskhozhdenie vlasti, protsvetaniya i nishchety. Moscow: AST; 2015. 693 p.).
7. Popov V. Life cycle of the centrally planned economy: Why Soviet growth rates peaked in the 1950s. In: Estrin S., Kolodko G.W., Uvalic M., eds. Transition and beyond: Studies in economic transition. London: Palgrave Macmillan; 2007:35–57. DOI: 10.1057/9780230590328_3
8. Popov V. Mixed Fortunes: An Economic History of China, Russia, and the West. New York: Oxford University Press; 2014. 191 p.
9. Didenko D.V., Grineva N.V. Analysis of the role of institutions and technologies in economic growth of the late USSR in a cross-country comparison. *Mir novoi ekonomiki = The World of New Economy*. 2020;14(4):81–95. (In Russ.). DOI: 10.26794/2220–6469–2020–14–4–81–95
10. Smirnov S. Industrial output in the USSR and Russia, 1861–2012. Part I. Reconstruction of basic time–series. *Voprosy ekonomiki*. 2013;(6):59–83. (In Russ.). DOI: 10.32609/0042–8736–2013–6–59–83
11. Didenko D., Földvári P., Van Leeuwen B. The spread of human capital in the former Soviet Union area in a comparative perspective: Exploring a new dataset. *Journal of Eurasian Studies*. 2013;4(2):123–135. DOI: 10.1016/j.euras.2013.03.002
12. Khanin G.I. Soviet economic growth: Analysis of Western estimates. Novosibirsk: EKOR; 1991. 150 p. (In Russ.).

13. Khanin G.I. Dynamics of economic development of the USSR. Novosibirsk: Nauka; 1991. 270 p. (In Russ.).
14. Khanin G.I. Economic history of Russia in modern times (in 2 vols.). Vol. 1: Economy of the USSR in the late 30s — 1987. Novosibirsk: Novosibirsk State Technical University; 2008. 516 p. (In Russ.).
15. Steinberg D. The Soviet economy 1970–1990: A statistical analysis. San Francisco: International Trade Press; 1990. 338 p.
16. Glaz'ev S. Yu. Economic theory of technical development. Moscow: Nauka; 1990. 232 p. (In Russ.).
17. Solow R.M. Technical change and the aggregate production function. *The Review of Economics and Statistics*. 1957;39(3):312–320. DOI: 10.2307/1926047
18. Mankiw N.G., Romer D., Weil D.N. A contribution to the empirics of economic growth. *The Quarterly Journal of Economics*. 1992;107(2):407–437. DOI: 10.2307/2118477
19. Anchishkin A.I. Forecasting the rates and factors of economic growth. Moscow: MAKS Press; 2003. 300 p. (In Russ.).
20. Yaremenko Yu.V. Theory and methodology of researching a multilevel economy. Bk. 1. Moscow: Nauka; 2000. 400 p. (In Russ.).
21. Weitzman M.L. Soviet postwar economic growth and capital–labor substitution. *The American Economic Review*. 1970;60(4):676–692.
22. Weitzman M.L. Industrial production. In: Bergson A., Levine H.S., eds. The Soviet economy: Toward the year 2000. London: George Allen & Unwin; 1983:179–190.
23. Gomulka S. Slowdown in Soviet industrial growth 1947–1975 reconsidered. *European Economic Review*. 1977;10(1):37–49.
24. Rosefielde S., Lovell C.A.K. The impact of adjusted factor cost valuation on the CES interpretation of postwar Soviet economic growth. *Economica*. 1977;44(176):381–392. DOI: 10.2307/2553571
25. Desai P. The production function and technical change in postwar Soviet industry: A reexamination. *The American Economic Review*. 1976;66(3):372–381.
26. Desai P. Total factor productivity in postwar Soviet industry and its branches. *Journal of Comparative Economics*. 1985;9(1):1–23. DOI: 10.1016/0147–5967(85)90002–2
27. Bergson A. Notes on the production function in Soviet postwar industrial growth. *Journal of Comparative Economics*. 1979;3(2):116–126. DOI: 10.1016/0147–5967(79)90010–6
28. Easterly W., Fischer S. The Soviet economic decline: Historical and Republican data. *The World Bank Economic Review*. 1995;9(3):341–371.
29. Voskoboynikov I.B. Accounting for growth in the USSR and Russia, 1950–2012. *Journal of Economic Surveys*. 2021;35(3):870–894. DOI: 10.1111/joes.12426
30. Gechert S., Havranek T., Irsova Z., Kolcunova D. Measuring capital–labor substitution: The importance of method choices and publication bias. *Review of Economic Dynamics*. 2021. In Press. DOI: 10.1016/j.red.2021.05.003
31. Van Leeuwen B., Didenko D., Földvári P. Inspiration vs. perspiration in the economic development of the former Soviet Union and China (ca. 1920–2010). *Economics of Transition*. 2015;23(1):213–246. DOI: 10.1111/ecot.12060
32. Nureev R., Latov Yu. Between 'real socialism' and 'oriental despotism': The labyrinths of institutional economic development in Soviet Russia. *Mir Rossii. Sotsiologiya. Etnologiya = Universe of Russia. Sociology. Ethnology*. 2014;23(3):6–45. (In Russ.).
33. Kapeliushnikov R.I. Contra pan-institutionalism. Part I. *Voprosy ekonomiki*. 2019;(7):119–146. (In Russ.). DOI: 10.32609/0042–8736–2019–7–119–146
34. Kapeliushnikov R.I. Contra pan-institutionalism. Part II. *Voprosy ekonomiki*. 2019;(8):98–126. (In Russ.). DOI: 10.32609/0042–8736–2019–8–98–126

ABOUT THE AUTHORS

Dmitry V. Didenko — DSc (Econ.), Cand. Sci. (Hist.), Leading Researcher, Professor, Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia
didenko–dv@ranepa.ru

Natalia V. Grineva — Cand. Sci. (Econ.), Associate Professor, Financial University, Moscow, Russia; Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia
NGrineva@fa.ru

The article was received on 06.09.2021; revised on 20.09.2021 and accepted for publication on 01.10.2021.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-74-87
UDC 338.1;339.1(045)
JEL E25, F01, F02, F63

Inequality of World Development as a Global Challenge: "Response" Models

V.M. Matyushok[a], S.A. Balashova[b]
RUDN University, Moscow, Russia
[a] https://orcid.org/0000-0002-7759-6047; [b] https://orcid.org/0000-0003-1797-8825

ABSTRACT

The inequality of world development as a global "challenge" creates instability of the world economy, leads to an increase in social tension, and along with the threat of climate change, is a priority problem for humankind. The study aims to reveal the parameters and dynamics of global inequality, show its direction, tendencies, and assess the Western and Chinese models ("responses") to this challenge, which is a highly urgent scientific and practical task. The research methods are based on developing the concept of inequality in world development using quantitative and qualitative analysis following the "challenge-response" law. For quantitative analysis, we used modern methods of statistical analysis, in particular, quantile regressions. Based on the received results, we concluded and substantiated that the main challenge of our time is the inequality of world development, which has increased under the influence of the pandemic. We have shown that despite the decrease in the share of high-income countries (notably the G7 countries) in world GDP, the trend towards an increase in the gap in per capita income between high and middle-income countries has continued. We also revealed the indicator of labour share in GDP for high and middle-income countries, confirms the hypothesis of increasing inequality between capital owners and workers in several countries over the past 20 years, particularly the United States. We have shown that the Western model of the world order is not focused on solving inequality. The results obtained can be used to develop concepts and models for reducing global inequality.

Keywords: inequality of world development; uneven growth rates; the share of labour in GDP; inclusive development; the "great reset" model; homeostasis in the economy; "communities of the common destiny of mankind"

For citation: **Matyushok V.M., Balashova S.A. Inequality of world development as a global challenge: "Response" models. *The World of New Economy*. 2021;15(4):74-87. DOI: 10.26794/2220-6469-2021-15-4-74-87**

INTRODUCTION

Inequality in world development as a global challenge to humanity has long been rejected by Western theorists. Moreover, it was considered normal for an economy based on a system of universal competition. For the first time, Thomas Malthus raised the question of the derivative nature of inequality from the scarcity of resources in the world. As a result, individuals are constantly competing with individuals within societies and, and globally, nations are competing with nations [1]. Starting from the sociological doctrine of T. Malthus, Ch. Darwin came to understand biological evolution, which was the natural scientific basis for the idea of universal competition and inequality between individuals and peoples.

Develop on these ideas, I. Wallerstein elaborated a model of a single world system that consists of a center — located on the top floor of the world order, semiperipheries — on the middle floor and periphery occupying the lower floor. The West, with its material and political preferences, was positioned as the center. According to I. Wallerstein, it is almost impossible to change a country's position in the system, i.e. inequality between countries is constant. [2]

In a report to the Rome Club in 1972 year "The Limits to growth" (Dennis Meadows et al.) in all 12 scenarios of human development, it was in fact argued that the principle of equality on a global scale is unrealistic, as the Earth's resources are not sufficient for this purpose. On this basis, the Western elite proclaimed the scenario of "limited growth" and strict birth control, and inequality between countries was entrenched as a status-quo. "Excess consumption — for some, limited — for others, minimal — for third". [3] Thus, despite the new economic order proclaimed by the United Nations in 1974, the model of unequal access to resources for different countries has been legitimized.

By the beginning of the third decade of the 21st century, the world had established a solid list of global challenges and threats [4], which have become mega-trends and require adequate responses.[1] These include not only inequality in world development, but also socio-demographic challenges; scarcity of food, clean water, energy; instability of the global financial system; challenges and threats related to the growth of cyberattacks, the irresponsible use of artificial intelligence and biotechnology; militarization of space, climate change due to global warming, degradation and destruction of natural ecosystems, loss of biodiversity, etc. However, without minimizing the importance of each of these challenges, most researchers have come to agree that the main one is *economic inequality*.

Long before the pandemic, IMF experts had come to this conclusion, stating that rising income inequality was rampant and a major contemporary challenge.[4] According to Nobel Prize winner J. Stiglitz, "all social, political, economic problems and their tragic consequences are rooted in inequality".[5]

The importance and seriousness of the problem of economic inequality is also pointed out by Russian scientists, who have identified "the trends of increasing inequality in the distribution of income and wealth in the largest national economies and in the world economy as a whole over the last 40 years". [6] The danger of geopolitical inequality and inequality within the country is discussed in the work of S.V. Kazantsev. [7]

Staff of the Laboratory of Global Inequality established with the Paris School of Economics, in its Report on World Inequality — 2018, based on data collected and processed by more than 100 researchers from five continents, agreeing that "economic inequality is widespread, multifaceted and, to some extent, unavoidable", concluded

[1] The prominent English scientist Arnold Toynbee (1889–1975) defined the "challenge" as the build-up of contradictions between the existing state of society and the need for real change requiring society to respond adequately due to growing uncertainty, anxiety and volatility. The law of "challenge-and-answer", in his opinion, has a decisive influence on the fate of world civilizations.

that since the 1980s 20th century, the gap in income of the population, and therefore in the capacity to meet needs, has widened in all regions of the world. "If inequality is not properly monitored and shall not be dealt with accordingly, it can lead to a wide range of political, economic and social catastrophes". [8]

According to the UN, 7 out of every 10 people in the world live in countries where income inequality is only increasing. Many of them have no education, no access to health care, no way out of poverty, which affects the quality of human capital and is one of the reasons for the economic slowdown.[2]

The pandemic has exacerbated all the challenges of the world economy, but has been particularly reflected in the inequality of world development and economic growth. The fall in world GDP in 2020, according to the UN report, was 4.3%.[3] This has never happened since the Great Depression. During the financial crisis of 2009, the decline in global GDP was 2.5 times smaller, at only 1.7%. According to the IMF, the fall in GDP in PPPs in 2020 was 8.8% in the UK, in France — 7.1%, in Mexico — 7.1%, in India — 6.9%, in South Africa — 5.8%, in Germany — 3.8%, in Japan — 3.7%, in Brazil — 2.9%, in the USA — 2.3%, in Russia — 1.9%. Of the top-20 economies (G20 group), only China's GDP growth was positive, at +3.5%.[4] Developing countries and the poorest segments of the population were hit hardest by the pandemic. Thus, while unemployment in OECD countries increased to 9%, in developing countries it ranged from 13 to 27%. Quarantine measures affected 80% of the world's economically active population, and the global number of people living in poverty, which had been declining for almost 10 years, had risen dramatically by 131 million people. According to the Credit Suisse Bank Research Institute, the worldwide impact of the COVID-19 pandemic has resulted in widespread inequality of well-being. As a result, 1.1% of the world's adult population owns 191.6 trillion dollars or 45.8% of global wealth. Together with 11.1% of adults in the upper middle class, they own 84.9% of the world's wealth, while 55% of adults — own only 1.3%.[5]

Increasing economic inequality and other global challenges have led to increased social tensions and volatility in the world economy, and have led a number of experts to argue that the world has entered a *bifurcation point*. It is clear that a long period of *chaos* ahead, or the system will go to a new state of *orderliness*. In these conditions, request for the development of adequate models ("responses") of society on the inequality of world development and other global challenges becomes more relevant than ever.

INEQUALITIES IN WORLD DEVELOPMENT: CHARACTERISTICS, DIRECTION AND TRENDS

By inequality of world development, we will mean differences in the world's GDP growth rates and in their share of world GDP; differences in per capita GDP as well as — in levels of well-being between different population groups.

Uneven growth rates and displacement of the center of business activity

Analysis of economic growth over the last two decades (before the pandemic), for countries with high, middle and low per capita incomes,[6] shows that in high-income countries, the average growth rate for the

[2] The challenge of inequality in a rapidly changing world [Internet]. URL: https://www.un.org/development/desa/dspd/world-social-report/2020–2.html

[3] UN Report "World Economic Situation and Prospects, 2021". URL: https://finance.rambler.ru/markets/45755221-v-oon-podveli-ekonomicheskie-itogi-2020-goda/

[4] Calculated from: https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases#sort=%40imfdate%20descending.

[5] URL: https://www.wsws.org/ru/articles/2021/06/24/ineq-j24.html.

[6] More on the income classification of the World Bank of Countries: https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020–2021

Table 1

Growth rates of GDP and GDP per capita for groups of countries with different income levels

Countries/Indicator	Average GDP growth rate, %			PPP per capita GDP (thous. inter. dollars 2017)			Average growth rate of per capita GDP, %		
	1991–2000	2001–2010	2011–2020	2000	2010	2020	1991–2000	2001–2010	2011–2020
High-income countries,	2.72	1.74	1.13	39.5	44.30	47.80	2.26	1.16	0.68
of which USA	3.75	1.82	1.69	50.10	54.30	60.20	2.60	0.90	1.10
Middle income countries,	3.50	6.20	3.80	5.30	8.50	11.40	1.70	5.00	2.80
of which China	10.53	10.80	6.53	3.50	8.90	16.40	9.40	10.20	6.00
Low-income countries	0.46	6.18	3.80	н\д	н\д	н\д			
World	2.94	2.94	2.05	11.10	13.90	16.20	1.60	2.40	1.40

Source: compiled by the authors based on the World Bank. URL: https://databank.worldbank.org/source/world-development-indicators.

period 2011–2020 fell of 2.4 times, including in the USA — of 2.2 times compared to the last decade of the 20th century. At the same time, middle-income countries have not only maintained their growth rate but have even increased slightly (*table 1*).

This led to a shift in the center of business from the West to China, India, Indonesia, Turkey, etc. — the so-called periphery. For example, the share of EU countries (including The UK) in world GDP fluctuated between 37% and 33% in the period 1960–1980, ofthe USA — from 28 to 24%, and the rest of the world, including China, India, and other economies, accounted for 35 to 43% of world GDP (*fig. 1*), From the late 1980s China began to play more and more important role in the world economy, displacing the USA and European countries. The share of high-income countries in world GDP declined from 80% in the second half of the 20th century to 63% in 2019–2020. At the same time, low-income countries account for less than 1% of world GDP. Note that the vast majority of countries in the world (*The rest of the world* in *fig. 1*), excluding the US, China, and the EU, since the 1980s 20th century has

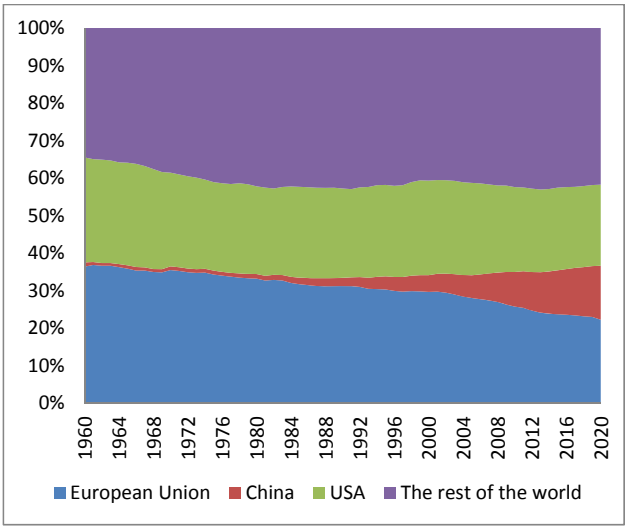


Fig. 1. **Share in world GDP of the USA, China and the EU countries (including the UK)**

Source: compiled by the authors based on the World Bank. URL: https://databank.worldbank.org/source/world-development-indicators.

accounted for 42–43% of world GDP, and this share remains the same in the 21st century.

The evolution of the share of countries in world GDP can be seen in more detail in a sample of G20 and G7 countries (*table 2*). The share of G7 countries in world GDP declined

Table 2

Change in the share of the G20 and G7 countries in world GDP (PPP), %

Country/Year	1990	2000	2020
Australia	1.176	1.103	1.010
Australia	0.839	0.852	0.715
Brazil	3.641	3.148	2.395
UK	3.610	3.134	2.248
Germany	5.876	4.773	3.416
India	3.495	4.029	6.765
Indonesia	1.933	1.964	2.508
Italy	4.190	3.309	1.870
Canada	2.050	1.825	1.405
China	4.032	7.277	18.338
South Korea	1.175	1.570	1.755
Mexico	2.664	2.528	1.857
Russia	4.844	3.061	3.112
USA	21.644	20.380	15.900
Saudi Arabia	1.891	1.638	1.236
Turkey	1.444	1.394	1.934
France	4.041	3.344	2.278
South Africa	0.857	0.690	0.545
Japan	9.106	6.918	4.036
Including G7 countries	50.517	43.683	31.153

Source: compiled by the authors based on the International Monetary Fund (IMF). URL: https://www.imf.org/en/Publications/WEO/weo-database/2021/April

1.6 times over 30 years, to less than a third. The shares of Italy and Japan fell more than 2 times, France and Germany –more than 1.7 times, the UK –1.6 times, and the USA — almost 1.4 times. At the same time, China's share increased more than 4.5 times, India — almost 2 times, South Korea — 1.5 times, Indonesia — 1.3 times.

However, the relatively slow growth of per capita GDP on average worldwide does not allow for rapid change in inequality in average per capita incomes. As of 2000, PPP per capita GDP in developed countries[7] was 3.6 times higher then the global average, in 2010–3.2 times, in 2020 — almost 3 times. When comparing high-income countries with middle-income countries, while there is a downward trend in inequality, the gap is wide. In 2000 it was almost 7.5 times, in 2010–5.2

[7] In 2016, the World Bank removed from its terminology the concepts of "developed" and "developing" countries. We will, however, follow, where appropriate, the terms "developed countries" and "emerging and developing economies" based on the IMF classification.

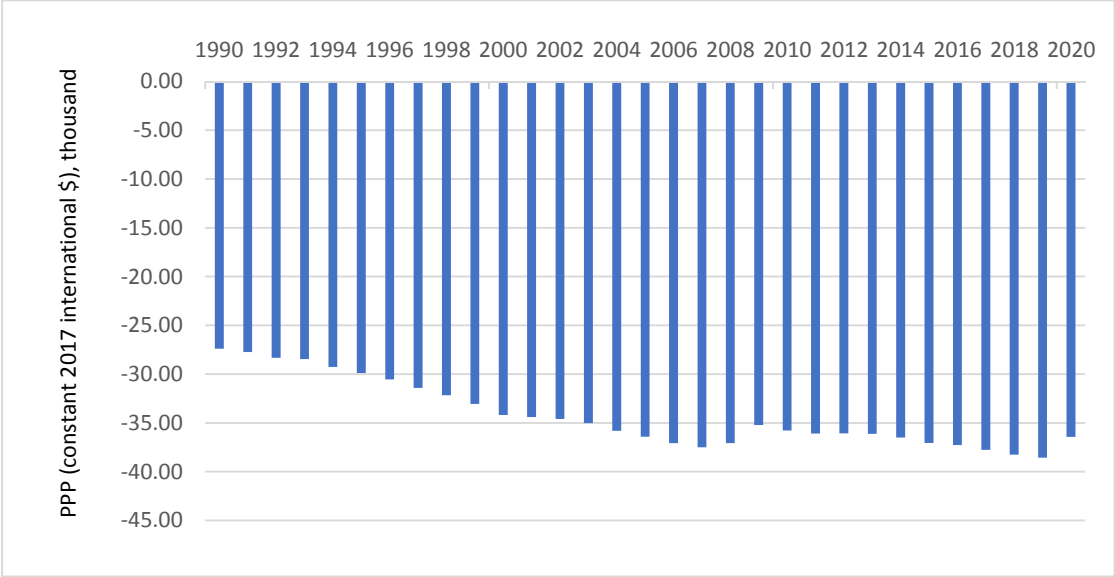


Fig. 2. **The gap between GDP per capita in high- and middle-income countries**

Source: compiled by the authors based on the World Bank. URL: https://databank.worldbank.org/source/world-development-indicators

times, in 2020–4.2 times. In absolute figures, the gap has not only not narrowed over the past 30 years but has tended to increase (*fig. 2*).

China plays major role in the relative decline in GDP per capita inequality. Before 1978, i.e. before the reforms and the policy of openness, 95% of the population was in absolute poverty. Thanks to a well-thought-out long-term strategy developed by the PRC leadership, 800 million Chinese have been lifted out of poverty in 40 years. In the last 20 years alone, China has been able to quadruple real GDP per capita in PPPs.

Closing the gap between high- and middle-income countries in 2020 (*fig. 2*) China also has a major role. As noted, it maintained positive growth rates of GDP and GDP per capita in 2020.

While maintaining average per capita GDP and GDP growth at the level of the last decade for major groups of countries by 2050, China will produce nearly half of world GDP, and China's per capita GDP will be higher than that of the USA. However, low-income countries, despite relatively high growth in aggregate GDP, will not be able to occupy a more prominent place in the world economy and will continue to produce about 1% of world GDP. This crude calculation does not take into account many factors, but provides guidance on the established development direction, which increases inter-country differentiation and leads to increased global social tensions and world conflicts, but, on the other hand, highlights the threat of losing global economic leadership to the USA and other Western countries. In these conditions, the USA is declaring Russia and China, not the real challenges, as the main threats. Competition for markets and factors of production, information and even effective vaccines is becoming an economic and information confrontation.

Inequality between capital income and labor income

One important indicator of the trend towards greater inequality is the share of wages in GDP. This is the inequality in the distribution of income between labor and capital. Capital plays a crucial role in intensifying economic development. Capital income dominates GDP in developing countries [9], which makes it possible to raise the savings rate and finance further capital investment. In developed countries, the share of labour income in GDP

Table 3

Descriptive statistics for Labour share in GDP

Group of countries/ indicator	Average rate of group and period research/ Median	Standard deviation	Coefficient of variation, %	Number of observations
High-income countries	51.0 / 54.0	11.4	22	867
Middle income countries	46.6 / 78.2	11.1	24	1154
All	48.5 / 50.9	11.4	23.5	2021

Source: compiled by the authors based on The Total Economy Database. URL: https://conference-board.org/data/economydatabase.

has increased in the last decades of the last century, contributing to the growth in the size and well-being of the middle class.

However, in the 21st century, there has been a downward trend in the share of wages in gross income in developed countries, seen as a threat of increasing inequality between workers and owners of capital.[8] Capital tends to be more concentrated, reducing the share of labor compensation in output reduces household consumption, and also affects macroeconomic indicators such as private sector investment, public expenditure and others. [10]

Objective of further analysis — to identify a trend inLabour share in GDP for high- and middle-income countries in the past 20 years. The source data for our research is the TED database (The Total Economy Database[9]). Statistics provided by TED are based on the proportion of compensation of workers (including the self-employed) to nominal GDP at market prices. Since for most low-income countries the measurement of labor compensation is based on indirect methods, these countries are not included in further analysis. A number of middle-income countries for which data are not available are also excluded. Thus, the (unbalanced) panel contains 2021 observations for the period from 1990 to 2019 for 99 countries worldwide.

Descriptive statistics of indicator *Share of labor share in GDP* are shown in *table 3*. In high-income countries, the average value of this indicator is 51% and varies considerably between countries and over time. Average for middle-income group slightly lower, statistically and economically different from value in high-income group. The statistical significance of the differences is confirmed by the Student's Test (t-test) and Welch (Welch t-test) (the corresponding test statistics are 9.03 and 9.13 respectively).

Standard linear regression was evaluated in the first step to identify the dynamics for variable *Share of labor in GDP* (marked on *fig. 3* as *L_SHARE*). The regression equation contains a trend component (*@Trend*), a dummy variable to account for the impact of the global financial and economic crisis (*D 2009*). The specification also includes the dependence on previous values *L_SHARE*(–1) to account for the stability of this variable over time (previously it was considered that the labor share in income is constant). This regression serves as a starting point for further analysis, and the estimated parameters of quantile regression will be compared with its coefficients. The coefficient of the dummy variable shows a shift in the level of labor compensation since the global crisis 2008–2009. The values of these coefficients are given in *fig. 3* (a horizontal line on each graph shows the value of the corresponding OLS-coefficient).

OLS-regression shows that with a fairly stable relation of current values *L_SHARE* with its previous values, there is no general trend in the compensation of labor input in GDP (the corresponding coefficients of OLS-estimation are statistically insignificant at 5%).

[8] OECD. The Labour Share in G20 Economies. 2015.

[9] The Conference Board Total Economy Database™. URL: https://conference-board.org/data/economydatabase

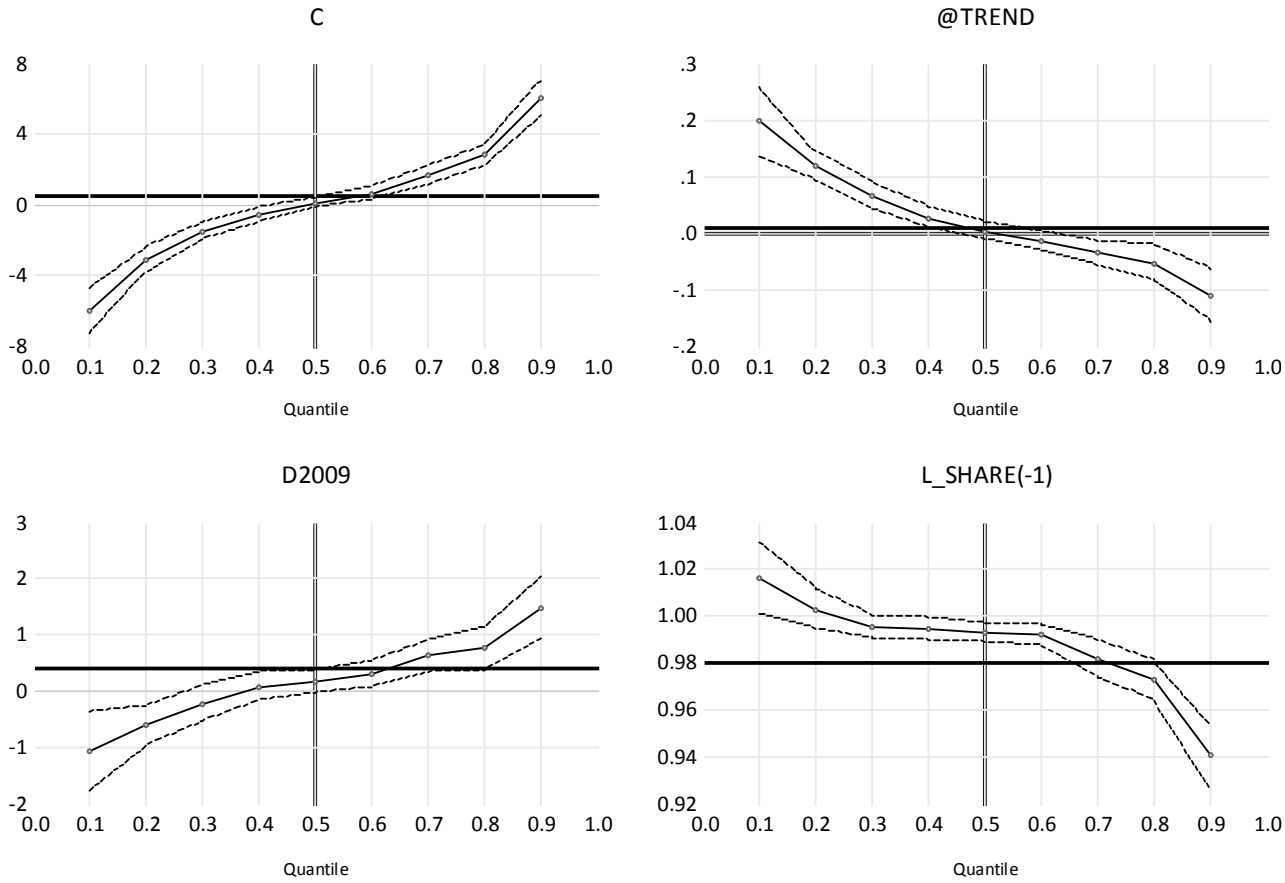


Fig. 3. **Quantile progress estimates**

Source: compiled by the authors.

Note: Bold line — OLS estimate, dotted line — 95% confidence interval quantile estimates.

Quantile regressions were evaluated in the next step.[11] In quantile regressions, the central issue is the heterogeneity of the effect (in this case a trend in change of *L_SHARE*) for different range of probability distribution. The purpose of usingquantile regressions was to identify for which level of *L_SHARE* there were trends towards increasing/decreasing share of labour in output and for which there were no trends.

In order to interpret the results presented in *fig. 3*, the following should be taken into account. For 70% of observations the coefficient at *L_SHARE(–1)* is slightly different from 1. This allows to rewrite the autoregression model in the form determining the deviation of *L_SHARE*. Then the coefficient *C* is an estimate of the permanent deviation, but the coefficient at *@TREND* estimates the time-varying part of the deviation. The results show that for countries with *L_SHARE* values below the median, there is a negative deviation that is gradually decreasing in absolute value (positive trend weakening with the increase of *L_SHARE*). At the same time, there was a general downward shift for these same countries following the global financial and economic crisis. And for countries with high value of L_SHARE (such as the USA, Canada, Australia) a statistically significant negative trend is detected, i.e. a decrease in *L_SHARE* growth over the last 20 years.

Note that the low value of labour compensation as a share of GDP does not in itself indicate a high degree of inequality in income distribution. Norway, for example, which adheres to the principles of building a social State [12], has*L_SHARE* value below median for the analyzed data pool. However, the

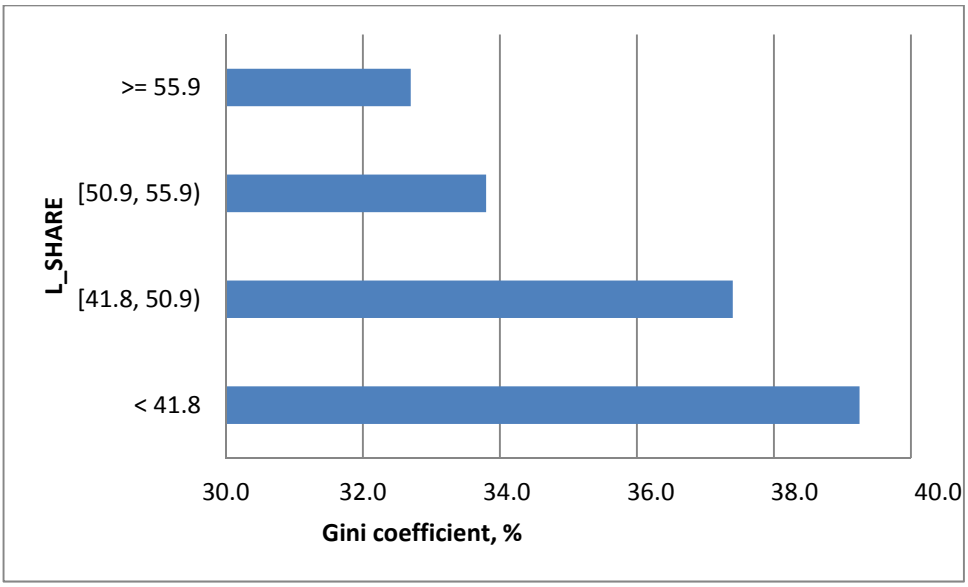


Fig. 4. **Median Gini coefficient versus *L_SHARE* values**

Source: compiled by the authors based on The World Bank Database and The Total Economy Database. URL: https://conference-board.org/data/economydatabase.

Gini-coefficient is one of the lowest (according to the World Bank). But on average the following correlation is observed: the smaller the *L_SHARE*, then the larger the median of the Gini-coefficient (*fig. 4*), and that means more inequality in income distribution.

Redistribution of income in favour of capital and "compression" of the middle class in the USA and some other countries provokes an increase in social tensions in modern society. The pandemic crisis only exacerbates the contradictions between labour and capital and, without a change in the development model, will lead to a global structural crisis.

"THE GREAT RESET" — INCLUSIVE DEVELOPMENT OR INCREASING GLOBAL INEQUALITY?

Growing global inequality and the threat of climate change are global and priority challenges to humanity and are of concern to the global elite. Reflecting on the causes of inequality, the North American economist D. Acemoglu, together with the British political scientist J. A. Robinson, formulated a thesis "the preference for centralization (State)... and institutional pluralism in the form of inclusive development". [13]

At the center of the concept of inclusive development is the human being, with the need to improve his or her quality of life and personal development. Economic growth is driven mainly by scientific and technological progress. In 2017, a new indicator was presented in the framework of the WEF in Davos to assess countries' levels of development — Inclusive Development Index (IDI), as "GDP per capita" does not adequately reflect the level of development of different countries, especially as growth and development are not the same.[10] While experts differ on IDI, the concept of inclusive development is generally considered to be "a very successful attempt to conceptualize a global priority as the basis for productive and equitable development of States". [14]

[10] The inclusive development index consists of three groups of indicators: growth and development — GDP per capita, GDP per worker, life expectancy, employment; intergenerational continuity and sustainable development — adjusted net saving, Greenhouse intensity of GDP, public debt, demographic burden coefficient; inclusiveness — poverty level, median income, income-stratification coefficient of the society by wealth distribution..

In response to these challenges and the priority needs of intellectuals, the Western elite, represented by the founder and permanent leader of the WEF in Davos Klaus Schwab, put forward the idea "The Great Reset" (then — GR) in the summer of 2020, which became the main theme of the WEF, held in January 2021 in online format. GR is a model for the global restructuring of the world economy based on digitalisation and clean energy. In fact, it is a development of the model of limited growth, as it proclaims in the long run the abandonment of the pursuit of profit. The goal of GR is to save capitalism by making it "inclusive". But capitalism and inclusive development are incompatible concepts. According to the World Bank analysts, "inclusive growth (IG) implies employment growth, not income redistribution ... But IG does not aim at job creation or income distribution — these are only possible outcomes".[11]

GR ideas overlap with economic policies and business practices of international organizations, governments, companies. Thus, in 2015, the UN adopted a set of 17 global goals and 169 related sustainable development goals for the period up to 2030.

In December 2019, the European Commission adopted the *European Green Deal* to achieve EU-member States zero greenhouse gas emissions by 2050. To implement this course, legislative measures, subsidies, targeted investments are envisaged. Economic measures have been developed for the transition of EU industry to environmental standards, including protection from cheap imports with additional customs duties, and the use of greenhouse gas emission quotas. "The Green Deal" calls for a fundamental reform of the European energy system. [15, 16]

At the end of March 2021, the new USA administration announced a nearly 2 trillion dollars strategic plan to shift national infrastructure and power engineering to clean energy. Fossil fuel licenses will be discontinued and decarbonization projects will be launched, away from fossil energy sources, which now provide nearly two-thirds of the USA electricity [17], in favor of renewable. Active development of marine wind, solar and other renewable generation is planned for the next 15 years, developing appropriate national standards for its use, moving towards widespread use of electric vehicles, setting up of about 500 thous. electricity stations at the expense of federal budget. The plan envisages the creation of 19 million high-tech jobs in the new "green" economy.

The ideas of "The Great Reset" are supported by IMF, the heads of the world's largest companies. For example, Toyota announced that it would cease production of cars with an internal combustion engine from 2025, Volvo — from 2030, General Motors — from 2035.

In May 2021, the International Energy Agency presented a detailed plan for the transition to "green" energy and climate neutrality by the middle of this century called "Net Zero by 2050".[12] By 2050, two thirds of the world's energy must come from RES and part from nuclear power. Inefficient coal stations should be closed by 2030 and all remaining coal stations by 2040. Incidentally, Germany has already declared all coal-fired power plants to be closed by 2038. It is proposed to increase the share of electric vehicles in sales from 5% to 60%, the number of charging stations for electric vehicles from 1 million to 40 million. Since 2035 Germany plans to stop selling new cars with internal combustion engines. Energy efficiency is expected to grow by 4% annually in this decade alone, almost three times faster than previously planned. Of course, this will require a major investment. For hydrocarbon-exporting developing countries this is a formidable challenge, as by the middle of the 21st century, revenues from oil and natural gas exports will fall as prices and demand fall by almost 2 times. This plan has been prepared for the 26th UN Climate Change Conference to be

[11] URL: https://zen.yandex.ru/media/freeconomy/inkliuzivnyi-rost-triuk-neokolonializma-5cab71e3643d2800af133042.

[12] A Roadmap for the Global Energy Sector. URL: https://www.iea.org/reports/net-zero-by-205.

held in Glasgow from 1 to 12 November 2021. The decisions of the conference will be binding on all participants in the Paris Agreement, including Russia and China.

In his new book "Stakeholder Capitalism" Klaus Schwab proposes a model of capitalism in which it is necessary to abandon the current economic system, driven by "selfish values, such as maximizing short-term profits, evading taxes and regulations, or externalizing environmental damage. *Instead, we need a society, an economy and an international community that cares for all individuals and the planet*". [18]

It should be noted that behind these seemingly attractive ideas of "reboot" and concern about climate change hide the interests of capital and the world elite, that will be equipped with climate weapons and total digital control technologies. There will be a redistribution of world wealth through fines and carbon taxesand lower revenues from traditional energy exports, increased costs of digital and green technologies, cleaner vehicles.

Behind the idea of "sustainability" lies the true meaning of the "reset", which consists of a coordinated change in the rules of the game in global markets, in the redistribution of national investment according to plans prescribed by the WEF and developed countries to build the "green economy". In his earlier work, Klaus Schwab spoke of freeing capital from the costs of social transfers due to the development of online platforms, the spread of robotics, and algorithms that drive people out of production. He is a proponent of the convergence of "technologies in physical, digital and biological worlds".

By becoming involved in "the Great Reset" projects, national economies will become more dependent on global institutions and global TNCs, who will have more power and more money and citizens — less freedom and more control. It is obvious that such a model, working for a million people or even for the "golden billion", is by definition unsustainable.[13]

[13] Transcript of V.V. Putin's speech in EEF in Davos, January 2021 r. URL: http://prezident.org/tekst/stenogramma-vystuplenija-putina-na-onlain-forume-davosskaja-povestka-dnja-2021–27–01–2021.html.

While the Biarritz Summit in 2019 stressed the importance of combating inequality and the need to reconsider (with this in mind) the goal of international cooperation [19], at the summit in June 2021 in the United Kingdom, it was announced that G7 countries would achieve carbon neutrality no later than 2050 and move to largely decarbonized energy and zero CO_2 emissions transport.

Thus, the model GR is not a spontaneous initiative by the WEF leaders. The Western elite, in the midst of concern for the environment and climate change, is seeking to reshape the world economy, with global geopolitical implications and increasing global inequality.

IN SEARCH OF AN ALTERNATIVE MODEL OF "ANSWER" TO GROWING WORLD INEQUALITY

It is clear that the world needs developing models and strategies that channel efforts and resources, new technologies and concern for the environment and climate change to overcome global inequalities and improve the standard of living and quality of life of people not only in developed but also in developing countries. The basis for developing such models and strategies can be the idea of the "common destiny" of mankind in the works of Russian scientists and politicians; the experience of the Soviet project with its declaration "on the need to unite mankind to make the transition to new resource paradigms" [3]; a new theory of economic systems, based on the "system paradigm" is being actively developed in Russia and the world in recent decades; concept of inclusive development and ideas of Chinese school scientists and Chinese leader Xi Jinping on "community of the common destiny of mankind". [20]

Reflections on the "common destiny" of mankind are found in the works of V.O. Klychevsky, N.Y. Danilevsky, V.I. Vernadsky, D.I. Mendeleev, L.I. Abalkin, A.K. Adamov and etc., in the book of Marxism-Leninism classics and the Chinese school.[21] Thus, according to the opinion of V.I. Vernadsky, the idea of the

common house of mankind "went beyond the limits of individuals ... and became the engine of life and everyday life of the masses or state entities".[3]

Technology transfer plays an important role in bridging global inequalities. One of the main conclusions of the new economic theory is: " Gemeostasis in the economy will occur if every economic system, with a particular resource in surplus, was facilitate the transfer of the resource to one or more systems for which it is scarce".[22] But in the world, technology transfer is used by developed countries to maximize their profits and is not in the national interest of developing countries. That is why, as early as 2007, China had set itself the goal of transforming the country into an endogenous, innovative development with a high-quality workforce of up to 180 million people, which is seen in the USA as a threat to their technological dominance.[14]

The essence of the concept of the "community of the common destiny of mankind" is the realization of the principle of mutual benefit for all nations and cultures. China has consistently pursued this concept, developing both its own economy and international economic cooperation.

Thus, as a result of the 13th Five-Year Plan, a "moderately prosperous society" was built in China. China reached middle-income country level. Extreme poverty practically eradicated.[14] However, income inequality in China is a pressing issue, as it remains one of the highest in the world.

China's new 14th five-year plan 2021–2025 provides for the continuation of two strategic objectives: become the *world's largest economy* in the current decade and *high-income* society. To protect themselves from external challenges related to falling demand for Chinese exports, the USA sanctions, financial risks, etc., China has developed a "double circulation strategy" that relies on domestic production and demand while maintaining and further developing foreign trade and external economic relations. These two contours, external and internal, must support each other and ensure the sustainability of economic development.

The enormous potential of the domestic market will enable China, even as the world economy slows down, to ensure the sustainable development of its own economy and protect it from external risks.

The Chinese model places special emphasis on the *quality* of development that can be achieved through unique own technologies and innovations while increasing the share of high-tech and knowledge-intensive industries in the economy [23], and by orienting the economy towards more environmentally friendly "green" technologies. Successively implementing the import substitution program "Made in China — 2025" adopted in 2015, China's new five-year plan provides for an annual growth rate of 7% in research and development spending, with the expectation that it will spend the most on research and development in the world in 2025– 580 billion dollars.

Without the orientation of the economy to more environmentally friendly "green" technologies it is impossible to improve the quality of life of the population, as the country is the first in the world in terms of carbon dioxide emissions and its volume is twice that of the USA. Over the five-year period, it is planned to reduce the energy intensity of GDP by 13.5%, actively develop renewable and nuclear energy, increase the area of forests and, by 2060, switch completely to carbon-free energy.

Despite the shift in emphasis to the domestic market, China has not abandoned the expansion of foreign economic relations. China announced and implemented project "One Belt — One Road" (now "Road and Belt") is a gigantic set of projects aimed at integrating regions, countries and people with steel and concrete infrastructure, digital networks [24] and, more generally, the instruments that generate flows within and outside the country. By focusing on

[14] The poverty line of the People's Republic of China is $ 1 per person per day (approx. 6.9–7.2 yuan) or 214–223 yuan per month. Over the years of reform in China, more than 800 million people have been lifted out of poverty.

the "left-out" globalization of China's western and central provinces, and then beyond in Central Asia and Africa, China's policies echo global concerns about growing inequality.

China's high growth rate and high-tech production share will provide huge opportunities for China's trading partners, including Russia, and help reduce global inequality.

CONCLUSION

The analysis shows that thanks to the efforts of the international community and national Governments (primarily China), relative inequality between high- and middle-income countries has declined in recent decades, but in absolute terms it has increased. Along with climate-related threats, this is a major human challenge.

The model of the "great reset of capitalism" proposed by Western elites against the backdrop of concern for the environment and climate change aims at reformatting the world economy. Its implementation will have global geopolitical implications and will increase global inequality.

The world is searching for alternative models of development. China's economic model supports two strategic objectives: become the world's largest economy and high-income society in the current decade, as well as reduce domestic inequality and extend the benefits of globalisation to all countries, in response to global concerns about growing inequality.

ACKNOWLEDGMENTS

This paper has been supported by the RUDN University Strategic Academic Leadership Program.

REFERENCES

1. Malthus T.R. An essay on the principle of population. Oxford, New York: Oxford University Press; 2008. 172 p. (Oxford World's Classics Series). (Russ. ed.: Malthus T. Opyt o zakone narodonaseleniya. Moscow: Direct-Media; 2014. 204 p.).
2. Wallerstein I.M. World-system analysis: An introduction. Durham, London: Duke University Press; 2004. 109 p.
3. Bagdasaryan V, Sulakshin S. Superiority, appropriation, inequality. Moscow: Nauchnyi ekspert; 2013. 304 p. (In Russ.).
4. Dabla-Norris E., Kochhar K., Suphaphiphat N., Ricka F., Tsounta E. Causes and consequences of income inequality: A global perspective. IMF Staff Discussion Note. 2015;(13). URL: https://www.imf.org/external/pubs/ft/sdn/2015/sdn1513.pdf
5. Stiglitz J.E. The price of inequality: How today's divided society endangers our future. New York, London: W.W. Norton & Company; 2012. 560 p.
6. Klinov V.G., Sidorov A.A. World trends in the distribution of national income and problems of economic and social development. *Voprosy ekonomiki*. 2018;(7):30–44. (In Russ.). DOI: 10.32609/0042–8736–2018–7–30–44
7. Kazantsev S.V. The danger of social-economic inequality. *Mir novoi ekonomiki = The World of New Economy*. 2016;(4):51–61. (In Russ.).
8. Alvaredo F., Chancel L., Piketty T., Saez E., Zucman G. World inequality report 2018. Paris: World Inequality Lab; 2017. 298 p. URL: https://wir2018.wid.world/files/download/wir2018-full-report-english.pdf
9. Klinov V. Trends in the distribution of income between labor and capital: Factors, consequences and problems of adjustment. *Voprosy ekonomiki*. 2016;(7):64–77. DOI: 10.32609/0042–8736–2016–7–64–77
10. Piketty T. Capital in the twenty-first century. Cambridge, MA: The Belknap Press of Harvard University Press; 2014. 685 p.
11. Koenker R., Hallock K.F. Quantile regression. *Journal of Economic Perspectives*. 2001;15(4):143–156. DOI: 10.1257/jep.15.4.143
12. Balashova S.A., Abramova A.A. Innovation and productivity: The case of Nordic countries. *Vestnik Rossiiskogo universiteta druzhby narodov. Seriya: Ekonomika = RUDN Journal of Economics*. 2021;29(1):88–98. DOI: 10.22363/2313–2329–2021–29–1–88–98

13. Acemoglu D., Robinson J.A. Why nations fail: The origins of power, prosperity, and poverty. New York: Crown Business; 2012. 546 p.
14. Biryukov A. Inclusive development in the context of global revolutions. *Ekonomicheskie strategii = Economic Strategies*. 2011;13(12):80–87. (In Russ.).
15. Leonard M., Pisani-Ferry J., Shapiro J., Tagliapietra S., Wolff G. Geopolitics of the European Green Deal. Russia in Global Affairs. Feb. 02, 2021. (In Russ.).
16. Sekacheva A.B. Crisis phenomena in the European Union economy at the present stage of its development. *Mir novoi ekonomiki = The World of New Economy*. 2021;15(1):91–99. (In Russ.). DOI: 10.26794/2220–6469–2021–15–1–91–99
17. Balashova S., Ratner S., Gomonov K., Berezin A. Modeling consumer and industry reaction to renewable support schemes: Empirical evidence from the USA and applications for Russia. *International Journal of Energy Economics and Policy*. 2020;10(3):158–167. DOI: 10.32479/ijeep.8961
18. Schwab K., Vanham P. Stakeholder capitalism: A global economy that works for progress, people and planet. Hoboken, NJ: John Wiley & Sons, Inc.; 2021. 304 p.
19. Postel-Vinay K. Globalization 4.0 and new modes of international cooperation. *International Organisations Research Journal*. 2020;15(2):60–67. DOI: 10.17323/1996–7845–2020–02–04 (In Russ.: *Vestnik mezhdunarodnykh organizatsii: obrazovanie, nauka, novaya ekonomika.* 2020;15(2):82–92. DOI: 10.17323/1996–7845–2020–02–04).
20. Cui Q., Sun J. Community of one destiny. *Belaruskaya dumka.* 2017;(5):68–74. (In Russ.).
21. Boyarkina A.V. Xi Jinping's concept of a "community with a shared future for mankind" and ideas on "common destiny" in works of the Russian scholars and politicians. *Diskurs-Pi = Discourse-P*. 2020;(4):112–132. (In Russ.). DOI: 10.24411/1817–9568–2020–10408
22. Kleiner GB. A new theory of economic systems and its applications. *Herald of the Russian Academy of Sciences*. 2011;81(5):516–532. (In Russ.: *Vestnik Rossiiskoi akademii nauk.* 2011;81(9):794–811).
23. Reshetnikova M.S. China's AI experience: Industrial digitalization. *Vestnik Rossiiskogo universiteta druzhby narodov. Seriya: Ekonomika = RUDN Journal of Economics*. 2020;28(3):536–546. (In Russ.). DOI: 10.22363/2313–2329–2020–28–3–536–546
24. Yiju L., Avdokushin E.F. Forming the foundations of the "Digital Silk Road." *Mir novoi ekonomiki = The World of New Economy*. 2019;13(4):62–71. (In Russ.). DOI: 10.26794/2220–6469–2019–13–4–62–71

ABOUT THE AUTHORS

Vladimir Mikhailovich Matyushok — DSc in Economics, Professor, Professor-Consultant of the Department of Economic and Mathematical Modelling of the Faculty of Economics, RUDN University, Moscow, Russia
vmatyushok@mail.ru

Svetlana Alekseevna Balashova — Cand. Sci. (Phys.-math.), Associate Professor, Head of the Department of Economic and Mathematical Modelling, Faculty of Economics, RUDN University, Moscow, Russia
balashova-sa@rudn.ru

The article was received on 03.09.2021; revised on 20.09.2021 and accepted for publication on 30.10.2021. The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-88-99
UDC 629.7:338.45(045)
JEL G34, L19, L93, O33, O57

High-Tech and Knowledge-Intensive Industries: Transformation of the Asset Management System and New Business Strategies (on the Example of State Corporation Rostech)

L.I. Lugacheva
Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia
https://orcid.org/0000-0002-9675-1567

ABSTRACT

In the Russian Federation, restoring the financial solvency of defence industry companies (DIC) only through systematic debt coverage without a pool of the state institutional efforts and business entities is unlikely. It is indicated by the continuing instability of the global economic system and uncertainty about the prospects for its development, combined with a reduction in the resources available to the state, low profitability of defence industries, and a high level of debt load. In these conditions, the reform of the asset management system in state-owned corporations (SC) of the defence industry, the search for new development models in their clusters and holdings become uncontested. The article shows the directions of transformation of the management system using the example of the state corporation "Rostech": gradual further consolidation of disparate assets by industry within several years and changes in their management structure (formation of unified control centres and design bureaus, specialization centres, competence centres, the introduction of a divisional structure for managing production assets, etc.). The study contains an analysis of the key components of the business strategy of The State Corporation "Rostech" formation of "national champions"; the transition from «point» import substitution to export-oriented; the development of effective cooperation and the creation of national production chains; the servitization of high-tech and knowledge-intensive industries.

Keywords: high-tech and knowledge-intensive industries; military-industrial complex (MIC); defence industry; integrated structures; transformation; asset management system; business strategy; "national champions"; servitization; "Rostech" state corporation

For citation: **Lugacheva L.I. High-Tech and knowledge-intensive industries: Transformation of the asset management system and new business strategies (on the example of state corporation Rostech).** ***The World of New Economy*****. 2021;15(4):88-99. DOI: 10.26794/2220-6469-2021-15-4-88-99**

INTRODUCTION

Russian military-industrial companies make a huge contribution to the development of the high-tech sector of the economy. MIC products are a source of innovation in energy, automotive, vehicle manufacturing, medical equipment, etc.

About 1.281 organizations with an average of over 2 million people on the list were included in the consolidated register of MIC organizations in 2020. More than 70% of Russian MICs are integrated into 40 integrated structures.[1]

Massive financial support for the Russian MIC in the last decade was provided within the framework of the State programmers of the Russian Federation "Development of the military-industrial complex": for the period 2010–2020 in the amount of 21.2 trillion rub.; current 2018–2027–21.7 trillion rub.[2] They included both system-wide and sector-specific financial support, including through the provision of various types of incentive subsidies, State guarantees to MIC organizations. The new state program of the Russian Federation "Development of the military-industrial complex" until 2035 is expected to be supported at the level of not less than 21–22 trillion rub., despite the difficulties and peculiarities of the economic situation in the country.

The Covid crisis has had a major impact the distribution of budget flows: in order to stabilize the financial economy, the budget of the federal budget was reallocated to the reserve fund of the Government of the Russian Federation in 2020. According to information on the implementation of the federal budget of the Ministry of Finance of the Russian Federation, as a result of recombination of cash flows, funding for State programmer activities was reduced by 14% "Development of the military-industrial complex" to perform a state defense order (SDO).[3]

At the same time, the tasks of state defense order aimed at the implementation of the current State weapons programmer were kept in full. Funding for implementation of DSO intend to implement a bank credit account by authorities. Over a three-year period, it is planned to attract 360 billion rub.

The development of Russian MIC companies is constrained by a number of financial problems that the authorities have been systematically trying to resolve for many years. [1] Some of these problems include: inconsistency of financial interests of SDO clients and implementers; exorbitant credit burdens on MIC companies; lack of flexibility in the conduct of financial activities due to new amendments in Federal Act No.275 "On a state defense order" in 2018; loss of adequate pricing mechanism, very low prices of MIC products. In 2020, loans owed by MIC enterprises amounted to about 2 trillion rub., defense companies spent about 200 billion rub. annually on interest payments. [1] According to experts, "the main thing of the loan will never be repaid". In fact, this means that MIC companies are not even able to pay interest on loans from commercial banks.

However, overcoming the chronic financial problems in the MIC became impossible without transforming the governance system and business models of its public corporations. Restoring the financial solvency of MIC companies only by systematically covering the debts of companies without a pool of institutional

[1] Official website of the Ministry of Industry and Trade of the Russian Federation. Basic State Policy for the Development of the MIC. URL: https://minpromtorg.gov.ru/ activities/industry/siszadachi/oboronprom/.

[2] State programme of the Russian Federation "Development of the military-industrial complex", approved by the Government of the Russian Federation Resolution of 13.03.2020 No. 268–12. URL: http://docs.cntd.ru/document/420356175.

[3] At least 21 trillion roubles will be allocated for the new State weapons programme. URL: https://rg.ru/2021/04/13/na-novuiu-gosprogrammu-vooruzhenij-vydeliat-ne-menee-21-trilliona-rublej.html.

measures on the part of the State and economic agents is unlikely. [2, 3]

DYNAMIC CHARACTERISTICS "ROSTEC" STATE CORPORATION IN STRUCTURE MIC

The Russian MIC is represented by a relatively small number of large corporations that are wholly state-controlled. [4] The top three-government companies account for 59% of the market, their shares in total MIC revenue in 2018 are given on the *table 1*, and their financial situation cannot be called perfect.

For the past 15 years, MIC has traditionally faced a systematic lack of funding in the creation and launching of products. It was formed by the low margin of SDO contracts in MIC companies; its shourtage of own funds to move from prototype to production; limited debt financing due to regulatory requirements and potential sanctions risks from financial institutions. [5] Only "Rostec" State Corporation, continuing the strategy of consolidation of assets of companies, showed positive financial results of operational activities in 2016–2020 (*table 2*).

According to the annual report "Rostec"[4] State Corporation in 2020, despite the limitations associated with the pandemic, consolidated revenues have been significantly increased (on 6% higher than in 2019). According to S. Chemezov's estimates, the consolidated revenue of the state corporation in 2021 will exceed 2 trillion rub.[5]

The increase in revenues from the sale of civilian products in 2020 (it was 636 bln. rubles) made it possible to increase the financial sustainability of "Rostec" State Corporation and to reduce direct dependence on SDOs. The share of civil production in gross output in 2020 reached 33.9%. The increase in import substitution in medical products and pharmaceuticals has contributed to this situation.

During the years of its existence "Rostec" State Corporation has become a giant, aggressively collecting all kinds of assets and managing practically all the science-intensive industry of the Russian Federation.

Today the assets of SC "Rostec" are combined by a complex management structure: they are divided into clusters, clusters into holdings (9 defense and 6 civilian), holdings — into sub-holdings and individual companies. In the offices, the management of SC "Rostech" includes 806 organizations, including 10 infrastructure subsidiaries, 70 direct subsidiaries in 2020.

The development strategy of SC "Rostech" assumes that by 2035 the corporation will reach the level of revenues of the largest industrial corporations in the world (to the level Samsung, General Electric, Siemens and Boeing), EBITDA margin will increase to the top 25 of the world's analog companies. [6–8] However, the Russian corporation is significantly lower in terms of operational efficiency (profit margins on net profit, revenue per employee). Although in 2016–2020 the revenue growth was almost 26%, net profit increased the trend in the number of employees continued (by 30%). Analysts estimate that reaching 100 billion dollars by 2035 is a challenge with a growth rate of 10% and established performance (*table 3*). Despite the COVID-19 pandemic, foreign companies are likely to continue to grow at a slower rate after a while, but the large gap will remain. [9, 10]

The general approach to the realization of the leadership plans of SC "Rostec" assumes as a driver of the development of the products of the 4th Industrial Revolution: "smart" civil production — production of robotics, LEDs and composites,

[4] Official name: State Corporation for the promotion of the development, production and export of high-technology industrial products. "Rostec".

[5] Meeting of Mikhail Mishustin with the General Director of the SC "Rostec" Sergei Chemezov. URL: http://government.ru/news/41284/.

Table 1

Consolidation of defence sector enterprises

Government corporation MIC	Share of revenue in 2018, %	Number of the employed in 2019, thous. person	Number of part structure, units
Rostec	42	590	about 800
USC	9	95	40
Roskosmos	8	191*	70
Total	59	876	@

Source: Butrin D. How much do they reforge swords. URL: https//www.kommersant.ru/doc/4127841?query=ОПК; Annual report of "Rostech" State Corporation for 2019. URL: https//rostec.ru/investors; Annual Report United Shipbuilding Corporation (USC) for 2019. URL: https//www.aoosk.ru/upload/iblock/3ce/Godovoy_otchet_USC_2019; Annual report of the State Corporation for Space Activities "Roscosmos" for 2019. URL: https//www.roscosmos.ru/22444.

Table 2

Dynamics of financial indicators of SC "Rostech" in 2016–2020

Indicator	2016	2017	2018	2019	2020
Consolidated revenue, bln. rub.	1266	1589	1643	1771.6	1878
EBITDA margin, %	-	-	17.9	20.2	15.1
EBITDA	268	305	294	359	283
Net profit, billion rub.	88	179	128	179	111.2
Average annual staff, person	453	512	529	590.6	589.2

Source: Annual report of the state corporation "Rostech" for 2017. URL: http://report2017.rostec.ru; Annual report of the State Corporation "Rostech" for 2018. URL: https://rostec.ru/upload/iblock/587/587257de247709537226335c9b40b76a.pdf; Annual report of the state corporation "Rostech" for 2020. URL: https://rostec.ru/upload/iblock/f16/p9uys0xhnyvgqhyfvmvqb9430t4lifk8.pdf.

telecommunication equipment. [11] This approach has become an alternative against the backdrop of the emergence of a new track — the desire of traditional buyer-States for national autonomy in military production (China, India).

Accelerated, catching-up growth is certainly possible, but this variant of development from SC "Rostech" will require optimization of its structure (in various projections), privatization of certain assets and large-scale investments. According to preliminary estimates carried out at SC "Rostech", the amount of necessary investment is 4.3 trillion rubles, which in the context of falling federal revenues from hydrocarbons, clearly requires the attraction of private capital.

TRANSFORMATION OF ASSET MANAGEMENT SYSTEM AND BUSINESS STRATEGY CONTOURS OF SC "ROSTEC"

Continuing sanctions and the development of a new technological system required the

Table 3

Comparative characteristics of SC "Rostech" and foreign defence companies

Company	Revenue, billions of dollars	Profit, billions of dollars	Number of employees, thous. persons
Rostec	18.9	1.3	453
Samsung (South Korea)	180.9	20.4	399
Siemens (German)	88	6.2	351
Boeng (USA)	94.6	4.9	148
General Electric (USA)	111.5	17.5	295
Nothrop Grumman (USA)	24.5	3.2	67
Leonardo (Italy)	13.2	0.6	46

Source: Khazbiev A. Rostec — UAC: winged megalomania. URL: https://expert.ru/2018/08/7/rosteh-oak-kryilataya-megalomaniya.

SC "Rostech" to transform the management of the holding and complex, finding new business models for them to develop, restructure established high-technology clusters, and otherwise streamline production chains. [12]

In the Covid period the need to solve the financial sustainability issues of SC "Rostech", increasing the competitiveness of Russian military industries, meet the growing demand of Russia's national producers and population for high-tech products, a systemic reform of its asset management system has been updated.

Among the main factors in the search for a new management system SC "Rostech" we will mention three, in our opinion, dominant.

Low labor productivity compared to the world's largest defense companies, which affects the price of products and their competitiveness.[6] World trend — reduced number of firms, which designing and series producing high-tech products in one market niche. The high resource intensity of parallel designs forces the world's largest corporations to combine disparate assets, and the concentration of resources makes it possible to adapt the latest products to the technologies of the 4th Industrial Revolution more quickly.

Ongoing sanctions risks, this includes — deficiency of foreign components. Total denial or unreliability of supplies may affect the entire production chain and may violate the contractual discipline for the delivery of the final product of Russian producers.

The digital economy and the emergence of technology platforms and

[6] Labour productivity in Russia's MIC: "the main eyes do not see". URL: https://vpk.name/news /203738_proizvoditelnost_truda_v_opk_rossii_glavnogo_glazami_ne_uvidish.html.

"ecosystems" in MIC. In 2019 as part of a federal project "Digital technologies" was defined the development of cross-cutting digital technologies and responsible for each of them. As a result of SC "Rostec" became responsible for quantum sensors, blockchain, internet of things, wireless communication technologies 5G (with "Rostelecom"). SC "Rostec" has set up a Competence Center for this purpose, responsible for the development of technology initiative. [13, 14] Thus, SC "Rostec" became the coordinator of activities of all other actors ready to participate in its development (development institutes, companies, universities, research institutes, individual citizens).[7]

The beginning of the transformation of the management system into SC "Rostec" assumes a step-by-step over several years the further consolidation of disparate assets by branch and the change in their management structure. Examples of such integration include the establishment of the United Corporate Aircraft Centre; United National Helicopter Operations Centre (NHC); new holding "Ruselectronics", which merged the enterprises of the radio-electronic cluster SC "Rostec" under the management of JSC "United Instrument-Making Corporation", past technology audits, etc.

B In the new consolidated units SC "Rostec" eliminate duplicate production, are formed United Design Bureau Centre, centers of specialization, centers of competence, divisional structure of management of productive assets, etc. This will certainly improve their functioning in the short term. Thus, according to SC "Rostec", the combined effect of the integration of the aviation design bureau will save about 130 billion rubles. Aggregation of design offices and program directorates at the site of "United Aircraft Corporation" means the transition from a three-tier control system to a two-tiered system, which is practiced in most of the holdings belonging to SC "Rostec".[8]

Currently, the key elements of SC "Rostec" business strategy are:

Formation of "national champions" based on further consolidation, integration of own assets as well as use of PPP mechanisms (public-private partnerships) (*table 4*).

Transition from "point" import substitution to export-oriented. It is especially relief is beginning to be sold in electronics and machine-tool industry.

Under the sanctions regime, State holdings of radio-electronic cluster (REC) SC "Rostec" and large private companies continued to increase their electronics innovation output. Small and medium-sized enterprises were formed in the subjects of the Russian Federation with a developed machine-building complex, which production innovative high-tech electronics things that are demand on the world market. [15] Accumulated «critical mass» of innovative-active manufacturers allowed SC "Rostec" to form a plan of modernization of electronic production "New generations of microelectronics and creation of electronic component database". Its implementation in practice, however, implies investment of 798 billion rubles to 2024, the rejection of foreign suppliers and an increase in the volume of new generation Russian microelectronics exports. [16]

Using partnership with Russian leading companies with state support through consolidated order, pioneering directions in electronics development can be quickly realized. In 2021, public and private

[7] Vasily Brovko about new technological development schemes in the national project "Digital Economy". "Information Technologies". URL: https://www.kommersant.ru/doc/4187705.

[8] Creation of a single aviation engineering cluster UAC will save up to 130 billion rubles. "Rostec". URL: https://www.finanz.ru/novosti/aktsii/sozdanie-edinogo-aviacionno-inzhenernogo-klastera-oak-sekonomit-do-130-mlrd-rub-rostekh-1030222539.

Table 4

Examples of the formation of "national champions" in the SC "Rostech" business model

Industry	Goal	Company
Aviation industry, updated aviation cluster SC "Rostec". Creating a United Corporate Aviation Center, consolidating the management of aircraft programs and other assets "UAC" (2021)	• Integration of the assets of the aviation cluster SC "Rostec" and the assets "UAC", their reformatting on the basis of the new industrial model and creation of synergistic effect. • SC "Rostec" will be able to manage not only the manufacturers of components for the aviation industry, but also the factories producing the aircraft. • Production volumes of "UAC" will allow SC "Rostec" to enter into the five largest machine building holdings in the world along with Boeing and General Electric	SC "Rostec" unites the company "Suhoi", "MiG" and "UAC", which includes "Ilyushin", "Tupolev" and "Irkut". The holding company is involved in production cooperation "Helicopters of Russia", "United Engine Building Corporation", "TechnoDynamics", Concern "Radio-Electronic Technologies" (CRET) etc. producing about 70% of components for "UAC"
Machine tool, creation of a new holding company (2021)	• Merge machine tool assets of GC. • Replace imports of foreign machines. • Occupy 50% of the Russian heavy manufacturing equipment market. • Become an international exporter	Most of the holding will consist of subsidiaries and machine tool assets of the state corporation: BelZAN and "Stankoprom", "Niti Progress" (multi-processor machines, heavy machines, metal working tools and machine components)
Telecommunications, the company "Spectr" will be a "national vendor" equipment for communication networks 4G, 5G and 6G (2021)	• Wide import substitution: Russian communication operators have been obliged to buy Russian equipment for 4G since 2023, but their networks now operate on ZTE, Nokia, Huawei and Ericsson solutions. • Formation of technical and production cooperation of manufacturers of communication networks equipment	Russian companies — producing communication network equipment
Radio-electronics, National Multi-vendor, operating under the brand "Ruselectronics" (2021)	• Building corporate analog-model Siemens and Nokia. • Construction of modern communication networks 5G, security systems (including cyber threats). • Support for integrated infrastructure projects	The head structure of the superholding "United Instrument Building Corporation" integrated 124 enterprises of SC "Rostec"
Microelectronics, group of companies "Element" — leader of microelectronics in Russia. The group's total revenue for 2020 exceeded 23 billion rubles (2020)	• Integration of private and public micro-electronic assets with PPPs under unified management. • Building cooperation with hull manufacturers and with the developers of the electronic-component base (ECB)	The companies, belonging to SC "Rostec" and to Joint Stock Financial Corporation "Sistema", Research Institute of Precision Machine Manufacturing (RIPMM, development of means of production for microelectronics)

Source: compiled by the author based on the materials of the official website of "Rostec" State Corporation. URL: https://rostec.ru.

consortia emerged in the electronics market. So, "Rostelecom", "Rostec" и JFC "Sistema" created a radio-electronic consortium ANO "Telecommunication Technologies". Consortium "Computer Engineering" (with the support of the Ministry of Industrial Development of Russia) formed leading Russian companies — delopers and producer computer engineering: LLC "PC Aquarius", JSC "Kraftway Corporation PLC", LLC "Electronics Depot", LLC "Delovoy Office" (iRU), LLC "NT", LLC "KNC Group" (YADRO), companies LLC "Element" and LLC "Bulat". [14]

Established new machine tool holding, SC "Rostec" plans to occupy about half of the national market for metal cutting machines, including high-precision equipment segments. In order to develop new engineering products, it will be necessary to invest in 10 billion rubles, with investment in R&D amounting to 4.4 billion rubles. The volume of the Russian market of machine tools was estimated at 70 billion rubles and the share of domestic equipment on it was less than 10% in 2021. In the medium term, about 30 types of machines will be launched into Russian production, which will replace 25 analogues of foreign companies, and Russian equipment will start supplying foreign markets. The priority directions in import substitution will be the production of multi-processor machines, heavy machinery, metal working tool and machine components.[9]

DEVELOPMENT OF EFFECTIVE COOPERATION AND ESTABLISH OF NATIONAL PRODUCTION CHAINS[10] [17]

In the post-covid period effective production chains began to form between:

- Established organizational units SC "Rostec". Thus, the holding "Schwabe" and the concern "Uralwagonzavod" signed an agreement on cooperation in the sphere of transformation of crane farm and energy-efficient environmental monitoring and safety technologies. Main objective of the partnership — Development and implementation of innovative high-tech products, technologies and digital services to modernize the company's crane farm and realization of the national development goals of the Russian Federation within the framework of the projects "Ecology" and "Safe City". Production cooperation involves equipping industrial enterprises with modern and efficient equipment, including to meet the challenges of improving energy efficiency and working conditions.[11] Another example: launch of a new aircraft upgrade programmer «Superjet» (SSJ New), focused on import-substituting components for Russian has led to the existence of new cooperative links between the UAC and the aviation cluster holding companies (replacement of SaM146 engine with new Russian PD-8, domestic avionics systems etc.).
- SC "Rostec" and other GC MIC, for example with GC "Rosatom", when creating new materials and composites for the aviation construction cluster under conditions of sanctions and import substitution.
- SC "Rostec" and private companies in the real economy. New national production chains formed in framework of established in 2021 SC "Rostec" equipment consortium for fifth generation communication networks (5G). It forms the technological cooperation of Russian production companies: 10 leading Russian private producer-companies (after technology audit) have confirmed their readiness to participate in cooperation. Cooperative collaboration will involve the

[9] "Rostec" will create a new holding with a market in 140 billion rubles. URL: https://www.rbc.ru/business/10/09/2021/6139d8b29a7947db151314b5?utm_source=telegram&utm_medium=messenger2020/12/09.

[10] Success without cooperation is impossible. URL: https://rostec.ru/news/4517919.

[11] "Schwabe" and "Uralwagonzavod" agreed on cooperation. URL: https://www.kp.ru/ daily/28322/4464944/.

use of private specifications to develop individual elements of an integrated solution for the deployment of 5G networks, integrating the component providers of these private companies into a single chain. In the business model of the new machine tool holding SC "Rostec" it is planned to establish new cooperative links with other Russian enterprises of the branch and to create a large project office.[12]

SERVICING OF HIGH-TECHNOLOGY AND KNOWLEDGE-INTENSIVE INDUSTRIES, WHICH MILITARY AND CIVILIAN PRODUCTION

Servicing has now become a key business strategy, especially in knowledge-intensive industries in developed countries.[18] Sales of manufactures alone increasingly fail to achieve the desired level of profitability of industrial corporations in developed countries. As a result, there is a way to move up value chains, towards higher value, integrating the cost of goods and services. Statistical sources show the increasing role of machine-engineering services in transnational value chains: in recent years, their share of world exports, both as direct exports of services and as part of exports of manufacture products, — is constantly growing.[18]

The transition in the units of SC "Rostec" to business-strategies with the optimal model range of products according to the needs of both state customers and private operators has become complemented by the developed system of after-sales service, an engineering and repair system.

For example, consumers of civil products "UAC", thanks to manufacturers' investments in the after-sales service system, almost stopped suffering from shortage of spare parts. In addition, as a result of the servicing, the level of serviceability of the "Superjet" increased by 10% and the average flight rate of the aircraft increased to a level comparable to foreign competitors.[13] It seems that without a developed after-sales service system SC "Rostec" can only meet the needs of customers in "truncated" format. At the same time, it is necessary in its companies to carry out scientific and technical work, allowing to carry out timely modernization of existing machines and equipment, to extend their service life and to improve their functionality.

In recent years SC "Rostec" actively uses for servicing production of own Center of additive technologies. At the same time, 3D-technologies are being improved, and in the near future they may be replaced by more developed Russian economical 5D-printers, allowing to significantly reduce the price of printed products. Russia is currently printing large-scale parts for a new liner MC-21, K-226 and others. Using a 3D printer saves a lot of money on raw materials to make parts, they get easier, and they get cleaner. One of the advantages of this method is certainly the rapid speed of production. The launch of own 3D printers in Russia allowed to create two directions in the Center of additive technologies: printing unique parts for new products and repairing worn parts.[14]

Centers of integrated logistics support (ILS) on repair of helicopter engines JSC "UEC-Klimov" already work in Peru, in Vietnam. They can be opened in China, Ethiopia and the United Arab Emirates. Their purpose is to carry out an average repair of ВК-2500/ТВ3–117 engines installed on МИ-8/17 and КА-32. The emergence of logistic support centers abroad is envisaged

[12] SC "Rostec" creates a consortium of 5G equipment manufacturers. URL: https://ria.ru/ 20210201/rostekh-1595506433.html.

[13] Financial support for the programmer was provided in the form of State guarantees for the production of 59 SSJ-100 aircraft in 2020–2021.

[14] 3D-printers in the Russian Federation produce the concern "Kalashnikov" (SC "Rostec") and LLC "NC Centrotech", city Novouralsk, (SC "Rosatom").

in the goals of the national project "International Cooperation and Export".[15]

CONCLUSION

As we overcome the coronavirus crisis, in the domestic economy is overcome, the performance of new business models and flexible approaches in asset management in high-technology and knowledge-intensive industries will be influenced by a set of institutional initiatives on the part of the State, safety banks of MIC, business associations and development institutions.

Forthcoming MIC product pricing reform and withdrawal of civil proceedings military-industrial enterprises from excessive control. In 2021, the profitability of contracts the state defense order did not exceed 3–4%, which also hampered civil diversification projects. The Russian Business Association (RBA) proposes to lay down rules for the indexation of prices of MIC products in the transfer of the state defense order and to lift the limit on the boundary of the index for the head performers of the contract (now it cannot exceed 5%, while prices of suppliers' products can be 1.5–2 times higher). The new pricing order can certainly improve the financial conditions of military industries.[16]

Increased protectionist measures in support of MIC enterprises as part of import substitution and diversification policies. In 2019–2020, the Government of the Russian Federation introduced a number of protectionist measures in public procurement (Russian suppliers were given an unconditional advantage). In addition to these measures, in 2021 federal authorities obliged the largest state companies to use the products of the Russian radio-electronics industry (REI) in their activities. This include the government companies, for which the introduction of Russian radio-electronic products becomes mandatory,— "Rosseti", "Rosselhozbank", VTB, "Aeroflot", "Rosneft", "Rusgidro" etc. These measures will stimulate REI companies and allow them to lock up a large part of a large domestic market (according to the Ministry of Economic Development of the Russian Federation, its volume in 2019 was 2.879 trillion robles). Seems, these measures are particularly timely in the context of the reformatting of global value chains in microelectronics, arise institutional constraints in national markets of traditional suppliers, persistent shortages of selected microelectronics products (e.g., chips).[17]

To date, there are no macroeconomic barriers to the positive development of new business models of high-tech and knowledge-intensive MIC industries. Accelerated development of military industries with massive institutional and investment support from the State will create tens and hundreds of thousands of new high-tech and high-paying jobs. Their products will not only fill the domestic market, but will also occupy worthy niches on the world market, which will allow the Russian economy to get rid of raw materials.

[15] Russian helicopter repair centers in China and Ethiopia. URL: https://news.rambler.ru/other/42732028/?utm_content=news_media&utm_medium=read_more&utm_source=copylink.

[16] Review of public administration 29–30 July 2021. URL: https://vs.tpprf.ru/ru.

[17] The authorities will require a State company to purchase Russian radio electronics. URL: https://vpk.name/news/537393_vlasti_obyazhut_goskompanii_zakupat_rossiiskuyu_radioelektroniku.html.

ACKNOWLEDGEMENTS

The work was carried out according to the research plan of IEPP SO RAN, according to the Project 5.6.1.5. (0260–2021–0002) "Integration and interaction of industry systems and markets in Russia and its eastern regions: limitations and new opportunities".

REFERENCES

1. Lugacheva L. I., Solomennikova E. A. Financial and economic imbalances of military-industrial complex companies and functional support of the state. *Ekonomika, predprinimatel'stvo i pravo = Journal of Economics, Entrepreneurship and Law.* 2020;10(12):3249–3268. (In Russ.). DOI: 10.18334/epp.10.12.111466
2. Bochkarev O. I., Tyulin A. E., Asanova E. A. Life cycle of the military-industrial complex organizations: The shift from fiscal to motivational economy. *Ekonomicheskie strategii = Economic Strategies.* 2019;21(7):6–25. (In Russ.). DOI: 10.33917/es-7.165.2019.6–25
3. Varshavskii A. E., Makarova Yu. A. Improving performance indicators of the military-industrial complex by expanding the civilian production. *Ekonomicheskii analiz: teoriya i praktika = Economic Analysis: Theory and Practice.* 2019;18(10):1826–1846. (In Russ.). DOI: 10.24891/ea.18.10.1826
4. Lugacheva L. I., Musatova M. M., Solomennikova E. A. Consolidation and restructuring of defense industry assets. *Mir ekonomiki i upravleniya = World of Economics and Management.* 2020;20(3):84–107. (In Russ.). DOI: 10.25205/2542–0429–2020–20–3–84–107
5. Dovguchits S. I., Zhurenkov D. A. Problems of diversification of the military-industrial complex and ways of their solutions. *Nauchnyi vestnik oboronno-promyshlennogo kompleksa Rossii = Scientific Bulletin of the Military-Industrial Complex of Russia.* 2017;(4):7–17. (In Russ.).
6. Soppelsa J. American strategy and the military-industrial complex (1945–1983). *Revue Française d'études américaines.* 1984;21(2):363–373.
7. Hislop D. Environmental constraints and sectoral recipes: Strategy change in Britain's military industrial base. *Journal of Management Studies.* 2000;37(5):687–703. DOI: 10.1111/1467–6486.00199
8. Perani G. Italian contrasts in regional military industrial conversion. *International Regional Science Review.* 2000;23(1):91–102. DOI: 10.1177/016001700761012549
9. Bochurov A. A., Kurbanov A. Kh., Litvinenko A. N. Comparative analysis of domestic and foreign experience of ensuring the military-industrial complex economic security. *Izvestiya Sankt-Peterburgskogo gosudarstvennogo ekonomicheskogo universiteta*. 2018;(3):99–106. (In Russ.).
10. Podberezkin A. I., ed. Strategic forecasting and planning of foreign and defense policy (in 2 vols.). Moscow: MGIMO University; 2015. 1518 p. (In Russ.).
11. Chemezov S. V. The state and high technologies. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2013;(4):39–46. (In Russ.).
12. Bakulina A. A., Sokolova E. S. Research of the global and Russian experience in the area of managing diversification processes of the MIC companies in the conditions of digital economy. *Natsional'naya bezopasnost' / nota bene = National Security / nota bene*. 2019;(5):1–9. (In Russ.). DOI: 10.7256/2454–0668.2019.5.30732
13. Bat'kovskii A.M., Bat'kovskii M.A., Kravchuk P. V., Leonov A. V., Pronin A. Yu., Sudakov V. A., Fomina A. V. Tools for managing the activities of innovatively active enterprises in the context of diversification. Moscow: OntoPrint; 2019. 268 p. (In Russ.).
14. Markova V. D. Platform models of business: Approaches to creating. *EKO: vserossiiskii ekonomicheskii zhurnal = ECO Journal*. 2019;(5):106–123. (In Russ.). DOI: 10.30680/ECO0131–7652–2019–5–106–123
15. Yusupova A. T., Khalimova S. R. High-tech business in Russian regions: Role in economy, differentiation, main development determinants. *Vestnik Sankt-Peterburgskogo universiteta. Menedzhment = Vestnik of Saint Petersburg University. Management Series*. 2020;19(1):67–91. (In Russ.). DOI: 10.21638/11701/spbu08.2020.103
16. Solomennikova E. A., Lugacheva L. I., Musatova M. M. The strengthening of economic position of Russian electronics: Mechanisms and capabilities. *Zhurnal Sibirskogo federal'nogo universiteta. Gumanitarnye*

nauki = Journal of Siberian Federal University. Humanities and Social Sciences. 2020;13(11):1840–1852. DOI: 10.17516/1997–1370–0688

17. Babenkov V. I., Guryanov A. V. Justification of the principles of adaptive management of military-economic security of the supply chains carried out by enterprises of the military-industrial complex. *Nauchnyi vestnik oboronno-promyshlennogo kompleksa Rossii = Scientific Bulletin of the Military-Industrial Complex of Russia*. 2021;(1):24–28. (In Russ.).
18. Kondratiev V. B., Kedrova G. V., Popov V. V. Servitization of industry: New evidence. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2021;65(8):22–30. (In Russ.). DOI: 10.20542/0131–2227–2021–65–8–22–30

ABOUT THE AUTHOR

Larisa I. Lugacheva — Cand. Sci. (Econ.), Leading Research Fellow, Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia
lugamus@yandex.ru

The article was received on 15.08.2021; revised on 10.09.2021 and accepted for publication on 20.09.2021.
The author read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2220-6469-2021-15-4-100-112
UDC 629.7:338.45(045)
JEL G34, L19, L93, O33, O57

New Industrial Models and Management Systems in of State Corporation "Rostec" Companies

Musatova M.M.
Institute of Economics and Industrial Production Organization of SO RAS Novosibirsk, Russia
https://orcid.org/0000-0002-5544-5539

ABSTRACT

The article aims to systematize the characteristics of new industrial models that have developed in the divisions of "Rostec" Group of Companies. The transition to new control systems and industrial models are illustrated by the ongoing changes in the aviation cluster of "Rostec" Group (Russian Helicopters Holding, United Propulsion Corporation) and the United Aircraft Corporation (UAC). The author considered the measures of massive institutional and investment support from the state for defence companies implementing new industrial models. When working on the material of the article, the author used methods of comparison and systematization. Also, the methodological apparatus of factor, structural-logical and institutional analysis was applied, proving the consistency of state policy and the activities of defence companies transforming their industrial models.

Keywords: high-tech and high-tech industries; military-industrial complex (MIC); integrated structures; transformation; industrial models; asset management; "Rostec"

For citation: **Musatova M.M. New industrial models and management systems in state corporation "Rostec" companies. *The World of New Economy*. 2021;15(4):100-112. DOI: 10.26794/2220-6469-2021-15-4-100-112**

INTRODUCTION

Russian military companies are systemically important in the country's economy. Their production supports their defence and security. Consolidation of resources in integrated structures on the most important, breakthrough projects has made it possible to create promising examples of high-tech products based on the achievements of the Fourth Industrial Revolution. According to 2020 results, the share of modern weapons, military and special equipment in the park of military equipment was 70.1%. In the short term, according to the plans of the Ministry of Defence of the Russian Federation, by the end of 2023, taking into account the economic and technological capabilities of the State, the level of advanced armaments and equipment (which will correspond to or exceed foreign analogues) should increase to 72.9% (URL: https://rg.ru/2021/04/13/na-novuiu-gosprogrammu-vooruzhenij-vydeliat-ne-menee-21-trilliona-rublej.html).

In the context of the sanctions regime and geopolitical instability, the volume of Russian exports of military and technical products showed no significant positive trend: in 2013–2014 it amounted to 13.2 billion dollars, in 2015–12.7 billion dollars, in 2016 — about 13 billion dollars, in 2019–13,7 billion dollars.[1] During the COVID-19 pandemic, arms exports from Russia were reduced by 16%, based on closed customs statistics, which include arms and military equipment, until 11.5 billion dollars (as well as the entire world arms supply in 2020).[2] National procurement cycles for military equipment, supply disruptions in changing supplier-recipient relations, non-pandemic economic conditions contributed to this trend. [1]

[1] Alarming trends in Russian arms exports. URL: https://finance.rambler.ru/ markets/43825686/?utm_content=finance_media&utm_medium=read_more&utm_source=copylinkhttps://finance.rambler.ru/markets/43825686/?utm_content=finance_media&utm_medium=read_more&utm_source=copylink.

[2] Non-combat losses. Russian exports of arms and other sensitive goods fell by 2.1 billion dollars in 2020. URL: https://www.rbc.ru/newspaper/2021/02/17/602bc2019a794731e34e6133/

Against this background, the development of the military-industrial complex (MIC) companies in the Russian Federation, along with the low-cost orientation of production activities were determinants: accelerated digitization, diversification, export-oriented import substitution, further consolidation of resources in high-technology industries with public and private capital. [2, 3] Implementation of competitive product projects aimed MIC companies to move from traditional industrial models to new ones, strengthening and restoring financial solvency of individual MIC companies, further optimization of their composition, digitization of production processes. [4, 5]

Since 2017, the transformation of the structure of the Russian economy provides a technological breakthrough in the area of digitization and the development of crosscutting technologies in MIC high-tech manufacturing. To improve the efficiency of its assets SC "Rostec" is intensively carrying out the digital restructuring of business processes. [6] Within the State Corporation's ecosystem, the main consumers of the products created are already the Corporation's own subsidiaries, which "has provided a market for a particular technology". They become investors in the capital of companies that have establish an important product for the development of the whole. Thus, it is possible for the State Corporation to form partnerships in chains of cooperation with major technology developers for the production of the final product and operators. For example, the formation of a united information system in the "United Aircraft Corporation" ("UAC"), providing all engineering and logistic support, development of customer support centers and responsible for technical condition of civil fleet on 24-hour basis, etc.

Starting from 2017, all aircraft created in "UAC" are designed using digital technologies in a single digital engineering center — "distributed design bureau (DB)", which allows

concentrating the intellectual resources of a corporation around a specific task, such as the MC-21 aircraft. For example, plans to launch it into mass production required the creation of a digital robotic production (composite wing and final assembly line), a digital platform for aircraft service and aftermarket maintenance. The SSJ-100 airplane program is developing a digital operating platform — from spare parts flow control to predictive analytics the maintenance.[3]

METRICS OF NEW INDUSTRIAL MODELS IN SC "ROSTEC"

The industrial model[4] of Russian corporations and MIC holdings up to 2017 was based on full-cycle enterprises with all changes: from blank production to final assembly and testing with minimal intra-industry cooperation. However, operating models have changed significantly over the past half century in high-technology and knowledge-intensive industries in developed countries: products have started to be produced in a wide range of specialized enterprises. [7]

Chronic financial fragility, the "tightness" of domestic air and helicopter companies has led to the irreplaceable transformation of their industrial models: it came to be seen in the context of increasing the efficiency of high-tech companies and restoring the competitiveness of Russian products on the world market. *Table 1* gives behavioral metrics of ongoing transformation below.

In new industrial models introduced in "UAC", "United Engine Corporation" (UDK) and holding "Helicopters of Russia" — they're emphasis is placed on the growth of the civil sector, through projects already in mass production and through new projects; further consolidation of assets; increase operational efficiency, develop and expand horizontal cooperation, build technology chains in line with the product life cycle, and eliminate duplicative production levels. [6, 7]

Industrial model "UAC" until recently was extremely inefficient. [8] For example in 2016, UAC revenue per employed person was approximately 71 thous. dollars: about 8–9 times less than world aviation leaders — Boeing and Airbus Group. After the takeover of UAC, the staff of the aviation cluster SC "Rostec" exceeded the total number of employees of Airbus and Boeing, however, the aggregated structure with the arithmetic of the assets has a lower level of operating efficiencies (*table. 2*).

Total bank debt "UAC" as of August 2019 was 509 bln. rubles. The receipt of a subsidy from the State in 2020 reduced the debt of the UAC to 159 bln. rubles, of which 89 bln. rubles has been restructured, reduced interest payments and thereby strengthened its investment programmer. Starting from 2017, possessing advanced engineering competencies formed by a model series of competitive products, "UAC" started to optimize the restructuring of its assets [9, 10]:

- **Optimization of production space.** The ownership of "UAC" was a giant production capacity not comparable to the number of aircraft produced. For example, the production area of "UAC" plants was over 40 mln. sq. m.,' Boeing — less 10 mln. sq. m.,' and Airbus — about 15 mln. sq. m. With American and European manufacturers producing 800 aircraft of all types each year, "UAC" produces about 150 aircraft [11];
- **Optimization of production process.** The "UAC" consists of ten enterprises engaged in the final manufacture of aircraft, some of which produce the same type of product. In their production capacity, more than one third of the workers were employed in the lowest parts of the product (foundry and blacksmithing, release of tool and equipment

[3] "We do not compete within the country, we compete on the global field". UAC President Yuri Slyusar on the prospects for civilian and military aircraft. URL: https://www.kommersant.ru/doc/ 3360057.

[4] The industrial model of the corporation — is a unified mechanism of organization of production and operational activities, including a programmer of production for a certain period, directions of cooperation of enterprises by programs (products), estimation of required resources of enterprises belonging to the corporation.

Table 1

Characteristics of industrial models

Behavioral metrics	Features of the previous model	New model	
		Distinctive features	Benefits
Principles of company management	Central management of a full-cycle enterprise	Move to distributed control chain	Expansion and development of horizontal cooperative networks
Centers of specialization and competence in both production and development	Don't exist	Establishment of centers of specialization and competence by subject; support for competences with technological advantage	Opportunity to increase productivity labor and reduce investment burden for enterprises
Human resource development. Interaction of MIC companies with leading universities in the development of new programs, design solutions and new products	Traditional approach to training, where learning has prevailed over output; monitoring and projection of human resources needs of organizations based on person-hours	Development of multi-level education at MIC, improvement of training of qualified personnel for preservation of technological cycles of production of major weapon systems*	The formation of programs, which orienting on organization-specific requirements for workers: decision-making ability in the face of uncertainty and tight lead times, work in a project environment and think flexibly
Making efficient use of investment and productive capacity	Investment allocated to enterprises	Redeployment of the investment pool: 80% of the total investment flow is directed to the formation of centers of specialization, others — to enhance productive capacities or increases capacity for leading products	Avoiding duplication of investments in the same technology allows saves investment and concentrates on priority areas. Any re-engineering projects and other programmers are implemented in the logic of programmer and project management
Aggregate assembly of final products	Don't exist	Concentration at final and aggregate assembly. Building a strong modern production base in the form of specialized enterprises — subsidiaries	Increased productivity labor
Outsourcing of non-key operations as well as low alterations. Outsourcing partners manage components and parts more effectively	Almost every final factory, including in GC, had its own low-conversion, galvanic and mechanizing industries. Almost all components and parts produced inside the company	Factories focus on key competencies: design, assembly, testing, sales and service. Significant volume transfer of non-core production, non-key operations, as well as low-level alterations to external organizations or joint ventures	Competencies that provide technological advantage (processing and welding of titanium structures, production of science-intensive composite constructions, etc..) remain within a corporation
Investment in fourth industrial revolution technologies	Don't exist	Investment in additive technologies, robotics and AI, Blockchain, IoT etc.	Significant improvement in labor productivity

Table 1 (continued)

Behavioral metrics	Features of the previous model	New model	
		Distinctive features	Benefits
Digitization and informatization	Tools to achieve tactical objectives	Tools for achieving strategic objectives are integrated into the day-to-day work of staff; A new wave of collecting and using big data from sensors, artificial intelligence to introduce cost-effective tools in production, etc.	Ability to use and process information to improve production efficiency and the quality of the final product; overall positive technical and financial impact
Modern concepts of processing technology	No developed innovative client-oriented technologies; weak re-engineering	Unification and standardization; processes are organized as a hierarchy or network; introduction of Agile approach to high-tech business management	Meeting customer demands; improving product competitiveness; speed up the supply and entry of products in the market

Note: SC "Rostec" prepares specialists with direct participation of the corporation organizations for their needs. It launched the Rostec-classes project on the system of "fiztech-lyceum" on the basis of general education schools, as well as professional training centers for the training of multi-skilled workersx. The need to adjust more than 400 educational programmers in 200 core higher educational establishments of the corporation, which train specialists with the direct participation of the corporation's organizations, has been identified.

production), and about 40% of the total wage fund was spent on the employees [12];

• **Optimization** product range. In the opinion of the experts, it is excessively large. For example, UAC has produced seven types of military and military transport aircraft in series and is developing four more, including two fighter jets: MiG-35 and Su-57. The situation is similar for civil aviation and special aviation. [13]

The restructuring of the corporation's assets resulted in the formation of five divisions: military aviation, civil aviation, transport aviation, special aviation and service division (it is connected 16 repair plants, submitted to UAC "Oboronservis"). The divisions are structured around products created on the basis of the corresponding DB and have developed as huge *property complexes*.

Distinguishing features of modern industrial model "UAC" in the first stage — reduction in the number of final factories, updating of the product portfolio (military, civilian and transport), outsourcing of non-key competencies, establishment of centers of specialization (on directions[5]).

In 2021, according to the decision of SC "Roctec" as a majority shareholder, the second stage of restructuring of aviation assets "UAC" started: integration of the leading aviation companies ("Suhoi", "MiG", "Tupolev", "Yliushin", corporation "Irkut") into the United Corporate Aviation Centre.[14] Among its main functions:

• consolidated management of USC aircraft programs and assets. Centralization of enterprise management provides for elimination of duplicative administrative functions, expansion of production area cooperation for more efficient realization of aircraft programs. This should increase the

[5] For example, the center of specialization «Fuselage panels» was create on the production base of Ulyanovsk Aircraft Plant (Transport aviation division UAC-JSC "Aviastar-SP" in the PJSC "UAC" SC "Rostec"). It concentrates production resources for the production of fuselage panels for Il-76MD-90A, Il-112V, Il-114–300 and other civilian UAC programmers. At the same time, in order to develop cooperation links with the aircraft construction cluster SC "Rostec" (for the holding "Helicopters of Russia") it is plane to increase the production of panels in the nearest future.

Table 2

Comparative indicators in the aviation cluster of state corporation Rostec after the takeover of UAC (2017 estimate)

Company	Revenue, bln. dollars	Profit, bln. dollars	Number of employees, thous. person	Staff productivity
Boeng (USA)	93.3	8.19	114	663
Airbus SE	74.7	3.24	129	577
SC "Rostec"	27	2.06	512	53
Aviation cluster of "Rostec"	10.4	1.14	190	55
UAC	7.3	0.02	103	71
Aviation cluster "Rostec"+ UAC	17.7	1.16	293	60

Source: URL: https://expert.ru/2018/08/7/rosteh—-oak-kryilataya-megalomaniya.

competitiveness of Russian civil aircraft and cover the significant aviation mobility needs of the Russian Federation;

• Establishment of United engineering competence center for all UAC companies, comprising all aviation design bureau (DB). Consolidation of engineering capacity (in line with the world trend, but with the greatest possible degree of specificity in engineering schools and concepts) will weaken administrative costs and reduce the administrative superstructure of these organizations (administrative staff). However, in the opinion of S. Chemezov, to date no design bureau has a set of competences, enabling the development and certification of full cycle aircraft[6];

• Establishment of general-corporates competence and service, which will provide, for example, administrative and economic, and financial support to all enterprises in the "UAC". Centralization of financial resources will ensure financial transparency of operations.

According to estimates "UAC", as a result, of the change of the industrial model, savings of about 330 bln. rubles by 2025, and to 2035 — about 700 bln. rubles.[7]

The new industrial models in the aviation cluster of SC "Rostec"[8] are implemented in the United Engine Corporation (UEC) and in the holding "Helicopters of Russia".

[6] Sergey Chemezov: "On the base of the aviation cluster we create a full-fledged player of the world aviation arena". URL: https://www.vedomosti.ru/partner/characters/2021/07/12/877735-mi-sozdaem-polnotsennogo-igroka-mirovoi-aviatsionnoi-areni.

[7] Russian Aviation: Search for a New Industrial Model. URL: http://www.rosinform.ru/top/228329-rossiyskiy-aviaprom-poisk-novoy-industrialnoy-modeli/.

[8] Aviation Cluster "Rostec". It includes the holding companies "Helicopters of Russia" and "Technonodynamics", the concern "Radioelectronic technologies" (RET), as well as the United Engine Corporation (UEC).

Table 3

Examples of consolidation of specialized UEC assets

New integrated structure	Structure	Goal
JSC "UEC – Kuznetsov" (Samara)	Factory "Motorostroitel", experienced SSTC M. Kuznetsova and several defense companies	Regular supply of new production NK-32–02 engines for upgraded Tu-160M2 supersonic bombers
OJSC "UEC — Ufa Engine Manufacturing Production Enterprise"	Main production complex, Lulka Moscow UDB, Lytkarin machine-building plant and SPC "Motor"	Development and manufacture of engines for Su-27, Su-30 and Su-35
SPA "Perm motors"	JSC "UEC — Perm motors" and JSC "UEC — Aircraft engine"	Implementation of aircraft engine projects PD-14 and PD –35, PD –35 for MS-21 and others

Source: compiled by the author. URL: https://perm.rbc.ru/perm/freenews/5fab733a9a79473efe914625.

Changes in the UEC industrial model began in 2016. [15, 16] They were related to: consolidation of assets, combinations of mass production plants and design bureau for the production of a certain type of engine (entirely from domestic materials and components) (*table. 3*), import substitution, establishment of science and production complexes, with use of the logic of programmer and project management in production programmers and projects of technical re-equipment, with a map of the creation of centers of specialization.[9] [17, 18] Transformation of full-cycle enterprises into a set of specialized centers, производящих продукцию в интересах всех компаний UEC, made it possible to take full advantage of the Competence Centres in UEC — production at minimum cost in minimum times.

Chronologically the first consolidation of specialized assets within the UEC was the creation of JSC "UEC-Kuznetsov" (Samara). It allowed the transition from repairs and maintenance of previously produced engines for Russian Aerospace Forces long-range aircraft to the resumption of production of new products for strategic aviation. For this purpose, JSC "UEC-Kuznetsov" carried out large-scale modernization and technical re-equipment of production.

For example, in 2020 a **new galvanic production unit was launched**. Its facilities (more than 3 million parts per year or 350,000 cubic meters of coatings) meet the needs of JSC "UEC-Kuznetsov" as well as those of other SC "Rostec" companies in the Volga Federal District.[10] Functioning galvanic lines are used automatically to cover various parts of rocket and gas turbine engines with minimal harmful effects on the environment and health of employees.

In 2020, the combined company started to execute the order under the contract with

[9] Barkov D. UEC is establishing a scientific production complex in Perm. URL: https://fedpress-ru.turbopages.org/fedpress.ru/s/news/59/industry/2617432.

[10] JSC "UEC-Kuznetsov" continuing the modernization programme. URL: https://minprom.samregion.ru/2020/12/24/odk-kuzneczov-prodolzhaet-programmu-modernizaczii-proizvodstva/.

PJSC "Tupolev" and the Ministry of Defense of the Russian Federation on deliveries of modernized motors NK-32–02, assembled entirely from domestic materials and components. In the future, they will replace the entire NK-32 engine fleet of the 01 series.

In 2021 JSC "UEC-Kuznetsov", in collaboration with the Samara National Research University named by academic S.P. Korolev, started the project of production of complex parts for gas turbine engines (GTE) NK-36ST based on 3D printing technology.[11] [18] Design and technology solutions for all processes are being developed and implemented in the single information area. Expected results of the project: improved engine reliability, reduced cost of final product, as a number of costs associated with the introduction of new parts and components designs will not be available. The university's software and technology are expected to reduce the production lead times by more than half.

The integrated structures in the UEC were created mainly by the criterion of "geographical location". At the same time, at creation of PJSC "UEC — Ufa motor-building production association" (develops and manufactures engines for Su-27, Su-30 and Su-35; develops a new high-efficiency 25 MW gas turbine engine for Gazprom) integration processes affected, in addition to the main production complex, the Lulki Metropolitan ECB, the Lytkarin Machine Building Plant and the Motor NPP.

Transformation of industrial model UEC within PJSC "UEC — Ufa motor-building production association" led to 4 specialized production and technology centers (PTC) for the manufacture of helicopter engine assemblies, production of rotors, turbines and compressors. PTC-based Corporate Center of Specialization "Production of Parts and Assembly Units of Helicopter Engines" has been established, behind which about 33% of parts and assemblies of UEC engines are attached according to the composition of cooperation.[12]

Continuing the process of optimizing the organizational structure, in 2020 UEC formed the Unified Scientific-Production Complex "UEC — Perm Motors»" (SPC) on the basis of combining its two key assets in Perm Krai — JSC "UEC — Perm Motors" and JSC "UEC — Aircraft Engine" (production plant and design bureau). This integration of the two assets does not yet imply a mandatory legal grouping of enterprises, its objective — is to increase the efficiency of the cooperation of enterprises in the implementation of PD family engine projects (PD-14, PD-35) and import substitution.[13]

By 2022, the UEC Industrial Model features a built-in network of broad cooperation. For example, the cooperative supply chain of its leading aircraft engine manufacturing company, UEC-Klimov, includes more than 40 Russian organizations of various sizes — primarily UEC enterprises: V.V. Chernyshev Moscow Engineering Enterprise, Ufa motor-building production association, PC "Salut" etc.[14]

In the short term, as part of the further transformation of the industrial model, UEC plans to focus on the integrated digital production plan, which allows the management of the product life cycle — from design, ideas, experimental production to mass production and engine service. Among the priority digital technologies in the UEC portfolio — are creation of digital duplicates

[11] JSC "UEC-Kuznetsov"will produce industrial engine parts using additive technologies and digital duplicates. URL: https://www.uecrus.com/rus/presscenter/odk_news/? ELEMENT_ID=3466.

[12] UEC — Ufa motor-building production association has created new high-tech production complexes. URL: https://www.informdom.com/novosti/v-odk-umpo-sozdany-novye-vysokotehnologichnye-proizvodstvennye-kompleksy.html.

[13] UEC unites the two JC in Perm into one production complex. URL: https://perm.rbc.ru/perm/freenews/5fab733a9a79473efe914625.

[14] UEC is implementing a comprehensive programme to modernize production. URL: https://www.uecrus.com/rus/presscenter/odk_news/? ELEMENT_ID=3518.

of production systems, development of simulation modelling, etc. [19]

The concept of transformation of the industrial UEC puts new demands on workers and professionals based on digital production: in order to work on motorization projects, they must have four to six occupations in one specialty. In this connection, SC "Rostec" Production and Training Centre On the basis of Ufa motor-building production association in 2021 started training of workers for aviation industry mainly among students of Ufa Engineering College and Ufa Aviation Technical School on the dual system. Most of the students have entered into contracts for targeted training leading to employment at the Ufa motor-building production association, with 70% of the students taking up practice in high-tech machines, Aircraft engines used in the digital manufacturing process. The Centre will train multi-skilled professionals in several types of machine tools, minor repairs and maintenance skills in the real-time aircraft production cycle.[15]

New industrial model "Holding "Helicopters of Russia" focuses on the production of civilian helicopters,[16] renewal of their park, creation of centers of competence, centralisation of orders, efficient use of equipment, consolidation of production sites, attracting qualified investors for individual changes, partial privatization (buy-back of individual production), establishment of the National Center of Helicopter Engineering (NCHE).

According to experts, the establishment of centres of competence will reduce the area of factories by 20–30%. For example, a functioning magnesium casting centre at an enterprise in the city of Arsenev provides casting to all the holding plants on one site, and in the future, considers the possibility of increasing capacity on demand from the automotive industry. [20] In the previous industrial model all five heliports of the holding were full-cycle enterprises with own casting, mechanization, etc.

The new industrial model is based on united National Center of Helicopter Engineering (NCHE), formed by merging two companies: Moscow Helicopter Plant (MHP) named by M.L. Milja and JSC Kamova. The dominant motives for consolidation include[17]:

- optimizing the assets of companies involved in the development of helicopters: management staff, technical support structures, product promotion. Elimination of many duplicate structures: some test stands and bases were almost identical in companies, etc.;
- strengthening of Russia's position on the world market of helicopter technology: a single powerful company is able to offer unique and very high-quality products in all ranges of helicopter technology.

Integration process completed in 2022. Legal association is based on Moscow Helicopter Plant (MHP) named by M.L. Milj — a larger enterprise, both in terms of personnel and financial resources. The JSC Kamova was relocated to the NCHE area. The merger of two rotary-wing companies makes the new plant more compact and efficient.

Potentially, it is possible to create a joint model. World experience shows that it is possible to use virtual DB when one task involves geographically and economically separate resources of other helicopter companies combined by platform and IT technologies.

[15] The production and training centre "Rostec" started to train personnel for aviation building according to the new system. URL: https://www.uecrus.com/rus/presscenter/odk_news/? ELEMENT_ID=3540.

[16] General Director "Helicopters of Russia": "There is a task to increase production of civilian helicopters". URL: https://www.vedomosti.ru/business/characters/2019/04/10/798738-gendirektor-vertoletov; "Milja" and "Kamov" Design Offices will be merged into the National Helicopter Building Centre. URL: https://rostec.ru/news/konstruktorskie-byuro-milya-i-kamova-budut-obedineny-v-natsionalnyy-tsentr-vertoletostroeniya/. "Milja" and "Kamov" together. URL: https://rostec.ru/news/mil-i-kamov-vmeste/.

[17] Under a single screw. Why unite "Milja" and "Kamov". URL: http://tass.ru/ekonomika/6985399.

Transition of the holding "Helicopters of Russia" to the new industrial model with the reorientation towards the civilian segment and reduction of the share of military production by more than 40% compared to 2017 (both export and government procurement), that reduced his profits: in 2017 it was 27.5 billion rubles, in 2018–27.4 billion rubles, in 2019 — billion rubles, in 2020–12 billion rubles.[18] [21]. However, the model distinguishes profitable activity and a smooth load of most of the holding enterprises, mastering new directions of further development of the civil segment, in particular — unmanned.

An analysis of industrial models and measures to optimize the management of military and civilian rotary-wing and fixed-wing enterprises has shown the added benefit of increased production cooperation between different factories, design bureaux and from common services and centralization. It seems that SC "Rostec" units have changed to operate from a single National Helicopter Building Centre and United Corporate Aircraft Engineering Centre, it has the potential to provide financial transparency of all their operations, to identify corporate productivity, the role and place of these companies in the world market (capitalization and financial ratings).

CONCLUSION

With the Russian economy recovering from the pandemic, the effectiveness of new industrial models in MIC companies will be influenced by state support. [22] In 2021 the Ministry of Industry of the Russian Federation prepared a package of measures on such blocks as minimizing investment pauses, supporting the demand for industrial products (in conditions of open market and formation of state procurement), export promotion and import substitution.[19]

Investment support for major MIC high technology and technology-intensive projects is primarily related to civil aviation and helicopter construction. For example, it is estimated that, in the short term, the amount of funding required (from budgetary and extra budgetary sources) for the smooth and sustainable development of the civil aviation industry amounts to some 320 billion rubles. This funding is needed for major R&D projects; on the expansion of the range of services and complex solutions capable of meeting the customized demand of customers; on marketing support; for the implementation of leasing schemes and for subsidizing interest rates of leasing companies, so that the output of civil products is profitable. At the proposal of the Ministry of Finance of the Russian Federation, 60% of the necessary financing of leasing supplies will come from the National Welfare Fund (NWF), a 40% — extra budgetary sources. In the next three years, the state will allocate more than 200 billion rubles from NWF for leasing civilian aircraft.[20]

Investment promotion involves the expansion of the MIC Soft Loan Program. Access to soft loans has so far been restricted to parent companies. Since 2021, the Government of the Russian Federation has offered its subsidiaries the possibility of obtaining credits for high-tech civilian and dual-use products at a reduced rate. Small and medium-sized enterprises and startups with increased State support are often able to achieve technological breakthroughs that ensure the competitive development of Russian industries and their radical transformation. [23] Credits will be provided by "EEB.RF" and MIC reference banks. If you apply to "EEB.RF" the minimum size of the loan will be 0.5 billion rubles, the rate — from 5% per annum. Companies planning projects

[18] The pandemic cannot slow the obsolescence of technology. URL: https://www.kommersant.ru/doc/4917552.

[19] The State Council Working Group proposed additional measures to support industry. URL: https://minpromtorg.gov.ru/press-cenre/news/#!rabochaya_gruppa_gossoveta_predlozhila_dopolnitelnye_mery_podderzhki_promyshlennosti.

[20] "Superjet" takes off on support. "Aircraft engineering". URL: https://www.kommersant.ru/ doc/4907675?query=ОПК.

with a budget of 1 billion rubles can count on such conditions.[21]

Additional impetus for the development of high-tech and knowledge-intensive MIC industries Provide compensation in 2021 for R&D and product rejuvenation[22] products for foreign markets from the Ministry of Industry and the Russian Export Centre.[23] Industry will be able to offset up to 70% of costs, R&D related to the development of new competitive products or the rejuvenation of existing products to meet requirements, requirements of consumer countries (improving technical characteristics, obtaining approval from an official organization, etc.).

Supporting domestic demand for industrial products (in an open market and public procurement context) required a shift from standard public procurement to guaranteed public procurement.[24] It imposes an obligation on the contracting company to buy a certain quantity of products from the manufacturer in the future with predetermined parameters. At the same time, the variability of characteristics and price of products in a contract concluded in a competitive format (both producers and investors can participate). Virtue of the mechanism for producers — possibility to plan output volumes and necessary capacities, and for creditors or investors — transparency of the investment process (timing of project cost recovery and sources of revenue and expenditure). In contrast to the traditional public procurement system, the new mechanism allows a group of manufacturers that have so far had no "contract" products in product lines. Guaranteed civil State contract for aircraft construction is based on federal and regional requirements up to 2030.

Continued massive state support to MIC enterprises will have a significant impact on Russian aircraft and helicopter companies and enable them to fully meet the needs of the country for the renewal of the air fleet and for the aviation mobility of the population.

[21] The Government extended concessional lending to the "daughters" of enterprises MIC.URL: https://www.kommersant.ru/doc/4660923.

[22] Rejuvenation — customization of products to meet external market requirements.

[23] Support is provided in accordance with the Decree of the Government of the Russian Federation from 18 June 2021 No. 31. URL: https://gisp.gov.ru/documents/15864664/; https://minpromtorg.gov.ru/.

[24] Proposed by the reference bank SC "Rostec" — Novikombank. The developers of the mechanism state that no additional financial costs will be required: they have already been included in the 12 existing national projects at a total cost of 27 trillion rubles. The period for their implementation, as well as the PKK diversification programmer, calculated to 2030. Samiev P. Guaranteed Order and Conversion. URL: https://www.kommersant.ru/doc/4937305?query=ОПК.

ACKNOWLEDGEMENTS

The work was carried out according to the research plan of IEIE SB RAS, according to Project 5.6.1.5. (0260–2021–0002), "Integration and interaction of industry systems and markets in Russia and its eastern regions: limitations and new opportunities."

REFERENCES

1. Chemezov S.V., Goreslavsky S.S. Diversification of Russian arms exports: Venezuelan case study. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2019;63(2):29–35. (In Russ.). DOI: 10.20542/0131–2227–2019–63–2–29–35
2. Bochkarev O.I., Dovguchits S.I. Diversification of Russian defense enterprises: problems, state and prospects. *Nauchnyi vestnik oboronno-promyshlennogo kompleksa Rossii = Scientific Bulletin of the Military-Industrial Complex of Russia.* 2019;(2):5–18. (In Russ.).

3. Varshavskii A.E., Dubinina M.G. Synergy of the military and civilian production: A case study of the aircraft industries). *Natsional'nye interesy: prioritety i bezopasnost' = National Interests: Priorities and Security.* 2017;13(1):20–33. (In Russ.). DOI: 10.24891/ni.13.1.20
4. Lugacheva L.I., Musatova M.M., Solomennikova E.A. Consolidation and restructuring of defense industry assets. *Mir ekonomiki i upravleniya = World of Economics and Management.* 2020;20(3):84–107. (In Russ.). DOI: 10.25205/2542–0429–2020–20–3–84–107
5. Musatova M.M. Institutional arrangements and processes rotation of assets of defense industry corporation. *Mir ekonomiki i upravleniya = World of Economics and Management.* 2021;21(2):156–169. (In Russ.). DOI: 10.25205/2542–0429–2021–21–2–156–169
6. Markova V.D. Platform models of business: Approaches to creating. *EKO: vserossiiskii ekonomicheskii zhurnal = ECO Journal*. 2019;(5):106–123. (In Russ.). DOI: 10.30680/ECO0131–7652–2019–5–106–123
7. Bakulina A.A., Sokolova E.S. Research of the global and Russian experience in the area of managing diversification processes of the MIC companies in the conditions of digital economy. *Natsional'naya bezopasnost' / nota bene = National Security / nota bene.* 2019;(5):1–9. (In Russ.). DOI: 10.7256/2454–0668.2019.5.30732
8. Bochurov A.A., Kurbanov A.H., Litvinenko A.N. Comparative analysis of domestic and the foreign experience of ensuring the military-industrial complex economic security. *Izvestiya Sankt-Peterburgskogo gosudarstvennogo ekonomicheskogo universiteta.* 2018;(3):99–106. (In Russ.).
9. Sobolev L.B. The military-industrial complex restructuring. *Finansy i kredit = Finance and Credit*. 2016;(47):47–62. (In Russ.).
10. Bat'kovskii A.M., Bat'kovskii M.A., Kravchuk P.V., Leonov A.V., Pronin A. Yu., Sudakov V.A., Fomina A.V. Tools for managing the activities of innovatively active enterprises in the context of diversification. Moscow: OntoPrint; 2019. 268 p. (In Russ.).
11. Sitkina M. Transformation to improve competitiveness. Aviaport. Feb. 20, 2017. URL: https://www.aviaport.ru/news/2017/02/20/421489.html (In Russ.).
12. Mironenko V. Putin goes all in — betting on the restoration of our aviation industry. CONT. Oct. 27, 2018. URL: https://cont.ws/@svoboda-49/1107828 (In Russ.).
13. Khazbiev A. "Rostec" — UAC: Winged megalomania. Expert. Aug. 07, 2018. URL: https://expert.ru/2018/08/7/rosteh—-oak-kryilataya-megalomaniya (In Russ.).
14. Khodarenok M. "Sukhoi" and "MiG" are merged into a corporation. Rostec announced the structural reform of UAC. Gazeta.ru. Mar. 18, 2021. URL: https://www.gazeta.ru/army/2021/03/18/13515668.shtml?updated
15. Flck M.B., Boguslavskiy I.V., Ugnich E.A. Improvement of the organization of high-tech productions: Industrial model. *Izvestiya Samarskogo nauchnogo tsentra Rossiiskoi akademii nauk = Izvestiya of Samara Scientific Center of the Russian Academy of Sciences.* 2016;18(1–2):342–348. URL: http://www.ssc.smr.ru/media/journals/izvestia/2016/2016_1_342_348.pdf (In Russ).
16. Zavilov I.M. Joint stock company "United Engine Corporation" as the example of creation of the Russian military-industrial complex company oriented to the growth of the share value. *Rossiiskoe predprinimatel'stvo = Russian Journal of Entrepreneurship*. 2016;17(11):1335–1342. (In Russ.). DOI: 10.18334/rp.17.11.35348
17. Barkov D. UEC creates a research and production complex in Perm. Federal Press. Nov. 10, 2020. URL: https://fedpress-ru.turbopages.org/fedpress.ru/s/news/59/industry/2617432 (In Russ.).
18. Yusupova A.T., Halimova S.R. Characteristics, features of development, regional and sectoral determinants of high-tech business in Russia. *Voprosy ekonomiki.* 2017;(12):142–154. (In Russ.). DOI: 10.32609/0042–8736–2017–12–142–154
19. Adewale A.R. Import substitution industrialisation and economic growth — Evidence from the group of BRICS countries. *Future Business Journal*. 2017,3(2):138–158. DOI: 10.1016/j.fbj.2017.06.001
20. Drofa V.V. Main problems and directions of strategic development of Russian aviation industry enterprises. Analysis of the general state of the aviation industry and air transport enterprises in Russia. 3rd ed. Moscow, 2014. 816 p. (In Russ.).

21. Dovguchits S.I., Zhurenkov D.A. Problems of diversification of the military-industrial complex and ways of their solutions. *Nauchnyi vestnik oboronno-promyshlennogo kompleksa Rossii = Scientific Bulletin of the Military-Industrial Complex of Russia.* 2017;(4):7–17. (In Russ.).
22. Frolov I.E. Russian high-technology complex under low inflation and government support limitation: The condition, capacity and tendencies for development. *Studies on Russian Economic Development*. 2019;30(4):365–375. DOI: 10.1134/S 1075700719040051 (In Russ.: *Problemy prognozirovaniya*. 2019;(4):3–15).
23. Musatova M. Financing architecture and current trends in the development of Russian small and medium enterprises. In: Klonowski D., ed. Entrepreneurial finance in emerging markets exploring tools, techniques and innovative technologies. New York: Palgrave Macmillan; 2020:161–175.

ABOUT THE AUTHOR

Maria M. Musatova — Cand. Sci (Econ.), Senior Researcher, Institute of Economics and Organization of Industrial Production SB RAS, Novosibirsk, Russia
maria.musatova@gmail.com

The article was received on 20.08.2021; revised on 15.09.2021 and accepted for publication on 20.09.2021. The author read and approved the final version of the manuscript.

CONTENTS OF THE JOURNAL FOR 2021

No. 1

No. 4