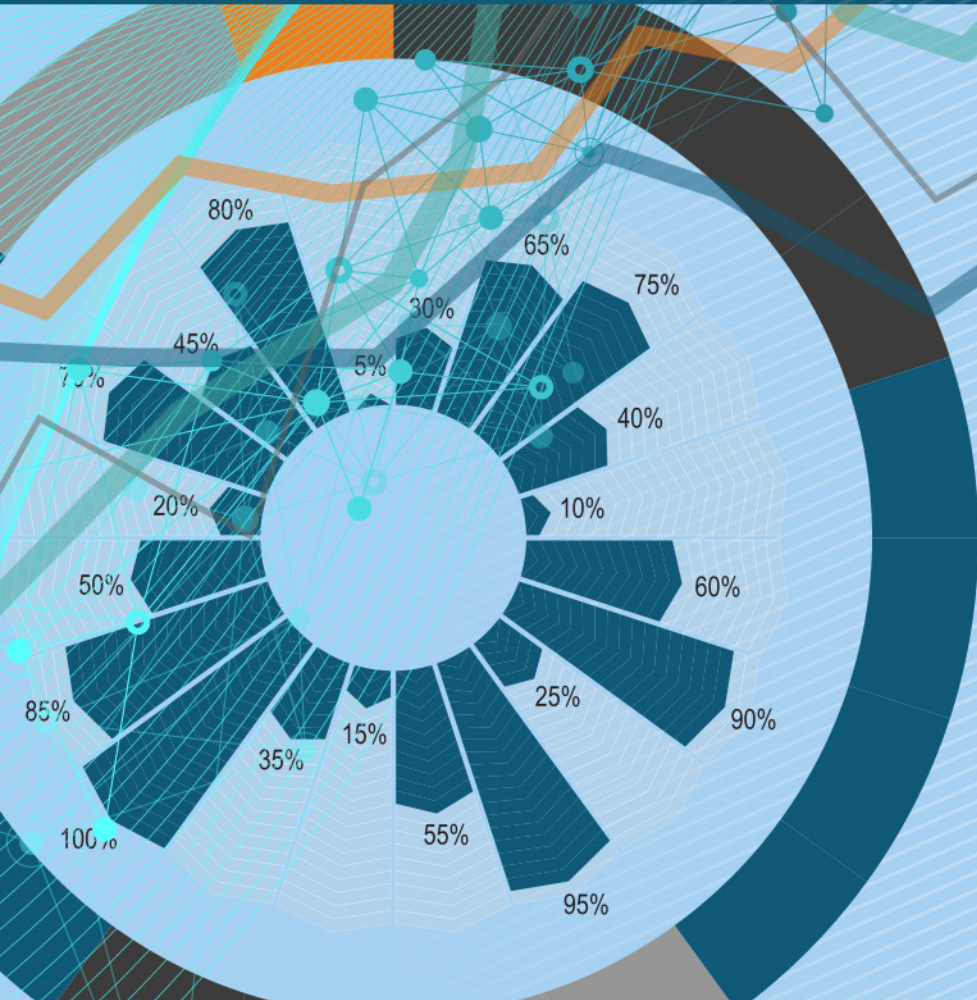


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Challenges for tech entrepreneurs in the new digital reality and among sanctions

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Abstract. The 2020s is a new stage of global digitalization, a period of a new digital «unreal» reality, and the formation of a biodigital economy, which promoted the further development of tech entrepreneurship and a new image of a businessperson – a tech mogul influenced by new information, communication, and/or digital technology, as well as new humanitarian concepts, such as transhumanism. For Russia, 2022 has become the year of the sanctions war between the West and Russia, which launched a military operation in Ukraine and the domestic policy of import substitution, which introduces its own changes to the model of a Russian tech entrepreneur. The paper demonstrates two ways of scientific and technological progress or innovation development, tech entrepreneurship and businessperson, their opposition. Thus, the digital economy contributes to consumerism and creates new leisure industry such as gaming, leading to a new inherently addictive dependence of man on computer games, rather than the quality harmonic development of man according to Florensky. To be human-centered, new technology must facilitate human interaction, transforming the individual into a more harmonious and meaningful being. The results of studying the tech entrepreneurship, confirm the authors' hypothesis of an ambiguous contradictory impact of the digital economy on the tech entrepreneur, who is forced to quickly readjust, create new business models, explore new global markets, and switch to a new format of business and simultaneously be a consumer, for example, of video games that often deform human consciousness. Not every company or businessman is able to cope with such a task, which leads to their bankruptcy.

Keywords: global digitalization, technology entrepreneurship, platform economy and transnational IT corporations, new model of businessperson – tech entrepreneur, digital technology of the Industry 4.0 (high-tech), high humanitarian technology (high-hume), man-internet, man-gamer, «hacked man».

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Introduction

Global digitalization is fundamentally changing the lives of people and humanity around the world. Startling global technological breakthroughs have occurred in most areas of human activity, in artificial intelligence (AI), robotics, nanotechnology, neurotechnology, virtual and augmented reality, and biotechnology leading to transhumanism, even promoting organ replacement. K. Schwab, the founder of the World Economic Forum in Davos, calls it The Fourth Industrial Revolution, which "In its scale, scope, and complexity, <..> will be unlike anything humankind has experienced before" (Schwab, 2016). However, the challenges of the digital economy must also be met by human beings, including entrepreneurs; their system of values must comply not only with digital morality, which sets the rules for the use of AI, big data technologies, robotics, and biotechnology, but also with universal morality, ethical principles, and human identity. Today there is a huge risk of technology outstripping society's capacity to control it. The new digital system does not need a person capable of thinking, analyzing events, creativity, it prefers a zombified subject capable of executing commands, a "hacked person". The man as a Homo sapiens is being gradually alienated from his essence.

AI cannot replace human cognitive abilities in everything, especially in creative processes, where the

creative middle class, whose numbers are declining every year, is central. There is a dramatic replacement of existing vocations, which makes a huge segment of the population unemployed. Not all people can acquire a modern profession overnight, especially young people starting their working life and elderly individuals of pre-retirement and retirement age. The format of doing business is also changing rapidly, new business models are emerging, and forms of capital are evolving. Globalization coupled with digitalization dictates new models of tech entrepreneurship and entrepreneur affected by the new information, communication, and/or digital technology, new humanitarian concepts, such as transhumanism, biodigital economy. To be successful and efficient, entrepreneurs have to do business in many countries around the world, including in value chains. However, small and medium enterprises lack the financial resources for this, and the current geopolitical problems seriously impede their promotion. The introduction of sanctions, or rather the sanctions war between the West and Russia, due to the Russian military operation in Ukraine, worsens the position of Russian business and limits its access to advanced technology. The sanctions affected exports of semiconductors, telecommunications equipment, electronic components, aircraft leasing, etc. The credit rating of Russia has also been downgraded. All this causes significant damage not only to Russian business and Russia's national economy, but also to the global economy as a whole. Many foreign companies that had to leave Russia for political reasons suffered losses, disruptions of supply chains (logistics), production chains, etc.

Ecosystem and platform businesses that operate globally, have sufficient financial capacity, and spare no expense to buy the most innovative and expensive start-ups to maintain monopoly power are now becoming increasingly important. Such business has a huge user database. All this contributes to new forms of economy monopolization, which sometimes even antimonopoly authorities are not able to track. The role of fake capital and vendor power is becoming stronger. Competition for resources and markets intensifies. The economy is increasingly under pressure from big capital, which benefits from information, trade, sanctions, economic, and other wars and state support, leading to an increased role of the state. The clear evidence of it is the significant support provided by the Russian state to the largest sanctioned Russian corporations and banks.

With the increasing influence of major platform businesses and transnational digital corporations, one of the central issues of global digitalization and the new tech entrepreneurship is the affected party, which includes tech entrepreneurs and the "new workers". This problem becomes relevant because the largest transnational corporations (TNCs) become digital platforms and monopolize the global economy, as well as the impact of the information and/or digital technology, in particular high humanity technology (high-hume) on human consciousness. The growing tension in the world and the emergence of local conflicts that could unleash a new world war also have an impact.

Methodology

It is now possible to model a new relationship between human development and scientific and technological progress affected by global digitalization. To make things optimistic, there could be a unique philosophical school, a true economic (house-building) science, such as the concepts of man as a microcosm and organoprojection of P.A. Florensky (1999). After all, modern machinery and technology breaks such boundaries. In this regard, it is necessary "to separate information and communication technologies and high humanitarian technologies and to develop mainly those that contribute to the life of the human being himself, his nature, without upsetting the anthropotechnological and humanitarian-technological balance, which could lead humanity to disaster" (Yudina, 2021).

This makes the scientists across the world wonder if the society is ready for digitalization and the sixth technological mode. L. Grinin, A. Korotayev, in their work, argue about the transition to a new era – the sixth technological mode, which the world is standing on the edge of (Grinin & Korotayev, 2015). They emphasize that its outlines begin to form in the economies of the most developed countries and demonstrate a focus on "high" technology. E. Ansong and R. Boateng examine the business models of digital enterprises and look into their direct impact on the human potential of an entrepreneur and a worker in a digital society (Ansong & Boateng, 2019). A. Negrea et al. explore the priorities of digitalization in making new policies

and pay attention in passing to the formation of a new man (Negrea, Ciobanu, Dobra & Burcea, 2019). D. Nepelski focuses on digitalization in Europe, the need for faster innovation and the formation of quality human capital for this purpose (Nepelski, 2019). S. Harrison, D. Tatar & P. Sengers examine human-computer interaction (Harrison, Tatar & Sengers, 2007). The same problem is raised by a team of authors led by S. Harrison (Harrison, Erickson & McDonald, 2008). It should be noted that a great virtue of the work is that people and machines are not considered separately, but through their relationship. While exploring the digital transformation, the authors focus on the need to preserve all the basic values of human civilization, security, and privacy of personal space.

Y. Rogers et al. also dwell on the relationship of man and computer socially, intellectually, and emotionally, and they emphasize that we should go beyond the purely technical aspects and focus on value and ethical preferences (Rogers, Sharp & Preece, 2007). They also focus attention on the fact that the modern digital generation has higher requirements for technology, linking it with a high quality of life, noting that high technology can be not only a means of communication for individuals, but also assistants in conducting business, such as the supervision of children and the elderly. At the same time, the authors note that such control may be perceived by those being monitored as an infringement of their freedom. R. Metz examines how new technology becomes indispensable for human life. It is virtually impossible to conduct business, make bank payments, shop, choose vacation destinations, and book tickets without it. Even flight safety depends on computers (Metz, 2012). K. Hernandez, B. Faith et al. analyze the impact of digital technology on economic growth, labor productivity, the formation of new markets, as well as explore the pressing issue of employment (Hernandez et al., 2016).

D. Isenberg looks into entrepreneurial ecosystems, argues that they enhance business opportunities, and barely scratches the surface of human-computer interaction issues (Isenberg, 2021). I.Z. Geliskhanov, T.N. Yudina show how "the digital economy through digital platforms improves the efficiency of business processes" (Geliskhanov, et al., 2018; Yudina, 2021). E. Stam reviews entrepreneurial ecosystems and their impact on the economy (Stam, 2015).

The review of relevant sources suggests that researchers consider many issues of digitalization in detail, including the platform economy. At the same time, the impact of the new digital reality on the tech entrepreneur has remained outside the research area, which is the purpose of this paper. The aim of the study is to consider the impact of new mechanisms and forms of entrepreneurship on the entrepreneur and the worker. The study hypothesis is to determine how the digital economy, including the platform economy, affects the formation of the technological entrepreneur and their worker, and what its challenge is. The methodology of the study consists of the interdisciplinary, institutional-economic, constructivist methods, general scientific methods that use comparative, logical analysis and synergistic approach.

Results

The role of AI and robotics in the emergence of modern business systems and the tech entrepreneur

A huge role in the digital economy is played by innovation ecosystems and platform-based innovation. They significantly reduce transaction costs, eliminate outdated links, promote new startups, industries, business models, and Robotic Process Automation (RPA) business processes, which is a type of automation technology based on software robots, which are becoming more adaptive and flexible, and artificial intelligence. The software robot mimics human actions, interacting with the system interface, which allows you to provide better and more reliable services to customers. This forms the intelligent automation, creating the conditions for making new high-quality technology. RPA replaces human labor at the necessary interaction points.

The progress in using AI around the world is enormous. For example, US government agencies have begun to actively use artificial intelligence to make important decisions. Completely new biological systems with predetermined functions are also created; for example, robots with integrated live muscles, capable of copying human movement. Unmanned delivery trucks and Yandex cars are already running in test mode in cities in Russia and around the world (Leybin, 2021). SBER and KAMAZ are also gradually introducing unmanned vehicles. With the growing popularity of AI and software robots, businesses and governments

are larger, despite their innovation and compliance with digitalization, they pose risks of undermining both the financial system of individual countries and the global financial system. Thanks to their financial power, they buy up companies in various industries, sometimes for next to nothing. Their activity contributes to the concentration of capital in the largest transnational corporations, which leads to monopolies crowding out free business.

The globalizing digital world is now breaking up into zones of influence of individual large companies. For example, M. Zuckerberg is creating a social metaverse on a single platform using AI and marginal robotization, combining the functions of social media and video games, which is the next step after NFT in developing a blockchain culture where humans and smart things interact. Metaverses are similar to the real world, they can host advertisements, trade, spread information, and much more. They have digital real estate and opportunities to rent it out. In 2021, digital real estate in meta universes sold for 500 million USD, and NFT token sales for January 2022 alone were 6 billion USD¹. Today, there are dozens of games offering to explore space, distant planets, participate in star wars, to feel like a super-rich man. All of this takes the user into a fantasy world far from reality. It's a world of "unreal" reality, a "brave new world", according to Huxley. But the person living in such a world is not ready for the "real" reality; they transfer the game actions from a fictitious world to the real one at times.

Today, there are more than 2.3 billion gamers around the world, i.e., a third of the world's population plays video games. This suggests that one third of the world's population are consumers of video games, which often do not contribute to the harmonious personality development, but instead make the mind narrower and develop the new "game addiction". There is even a game called Crossverse that, in theory, should combine several metaverses. The P2E (play-to-earn) business model began to form about 5 years ago. Its users are able to earn cryptocurrency by clashing characters against each other. It is a mixture of video games, metaverses, and DeFi (decentralized finance – financial services on blockchains). The main difference between P2E and metaverses, where the main thing is communication, is the opportunity to earn significant funds. More and more people create startups on promoting virtual pets and digital real estate. The popularity of P2E games can be judged by the capitalization of the most famous one, AxieInfinity, launched in 2018 by SkyMavis, a Vietnamese game studio. At the moment of writing, the company claims to have more than 10 million active players in its games. In October 2021, it was valued at 29.9 billion USD. This is more than four times the capitalization of Ubisoft and comparable to such gaming giants as Electronic Arts (40.9 billion USD), Nintendo (53.8 billion USD), and Activision Blizzard (61.1 billion USD)².

Quests net 150 SLP, which can be later exchanged for regular money on cryptocurrency exchanges. Some players earn up to 400 USD a month. However, the rate of cryptocurrency is constantly increasing, and capitalization is increasing too, which further attracts users. In Russia, the rush around P2E has not yet begun, but there are already dozens of job ads on websites looking for a "player" with salaries ranging from 250 to 400 USD a month. But some states consider P2E to be fraud. China has called the industry a scam and warned of a tougher policy on computer games. South Korean authorities have called for the removal of P2E games from the Apple App Store and Google Play. Today, blockchains are competing as browsers did in the early 2000s. The sensation generated by blockchain culture also makes millions of people get involved in pyramid schemes. Not only are these pyramid schemes dangerous, but they can also spread calls for terrorism, violence, racial discrimination, the military resolution of all kinds of conflicts, and most importantly the subjugation of the human consciousness, whom transnational corporations seek to turn into servants and an uncomplaining workforce.

It is also possible that P2E becomes the main node for all elements of a metaverse which everyone will join eventually. Due to the conflict in Ukraine, the Russian government has plans to make cryptocurrency legal

¹ Lapshov, E. (2021). *Kak milliony lyudej zarabatyvayut den'gi na srazheniyah avatarov v virtual'noj real'nosti*. Available at:https://www.forbes.ru/tekhnologii/455547-kak-milliony-ludej-zarabatyvayut-den-gi-na-srazeniah-avatarov-v-virtual-noj-real-nosti?utm_source=telegram&utm_medium=social&utm_campaign=o-populyarnosti-p2-e (accessed 25.02.2022).

² Lapshov, E. (2021). *Kak milliony lyudej zarabatyvayut den'gi na srazheniyah avatarov v virtual'noj real'nosti*. Available at:https://www.forbes.ru/tekhnologii/455547-kak-milliony-ludej-zarabatyvayut-den-gi-na-srazeniah-avatarov-v-virtual-noj-real-nosti?utm_source=telegram&utm_medium=social&utm_campaign=o-populyarnosti-p2-e (accessed 25.02.2022).

and create a national system. The AI is currently researched in different fields: math, economics, engineering, neurobiology. Their specialists strive to study ways to become a hybrid society. In future, people will enter a full-scale digital world, coexist with smart devices, robots, androids.

Even now, the UN declares "the death of liberal globalism and a new integrated world order project for the global class-based society called "happytialism" that is going to replace capitalism and socialism. This project proposes a new economic concept that puts forward happiness, prosperity, and freedom as its symbol. However, only a narrow circle of citizens from "privileged countries" are going to measure it, chosen based on digitalization and implemented "freedoms" and "values". Global transnationalism and transhumanism seek to continuously improve human mental and physical capabilities, eliminate aging and achieve immortality. To do that, they plan to use scientific and technological progress, AI, nanotechnology, and biotechnology. They're trying to turn the human brain into a computer. Super-billionaire E. Musk is hoping for a closer fusion of biological and digital intelligence as part of the biodigital economy, and to that end, he recently invested in a company that develops brain-computer interfaces. The result of the emerging biodigital economy could be an Internet Man, just as the Internet of Things was created earlier. After all, neurotechnology can be used to treat neurological diseases, but it can also drive the development of "human enhancement", as well as its zombification.

Transhumanism seeks to undo the vast experience of humanity through the voluntary introduction of new technologies that unite the physical, informational, and biological worlds in order to "improve", or rather subdue, people, turning them into a mindless herd ready only to satisfy inferior needs. Therefore, it is highly likely that new forms of inequality between people will be added to existing forms of inequality in society. After all, digitalization is already transforming people, especially young people, in their daily activities, thinking, social organization, and system of values. The Internet is increasingly becoming the main source of knowledge for young people, ignoring the values of world scientific literature, they have a large number of virtual "friends" with whom they have not met in person, some of which may be terrorists and dangerous people. However, virtual communication reduces the number of true contacts, and defaces the group identity, blurring both social and ethnic boundaries, and distorts the self-identity of the individual, the comprehension of the real world.

The worldview of a modern person, especially a young one, is exposed to different unverified, contradictory, and sometimes deliberately false sources, so along with forming intellectual capital of a person, mental information has to be protected. The flow of information is "turbulent and turbid", which makes it necessary to ensure the integrity of personality. It shall be able to respond adequately to external influences. Digitalization blurs the identity of an individual, their freedom is narrowed, their consciousness is manipulated, turning them more and more into a robot. This appeals to Y.N. Harari's ideas of a "human god" – Homo Deus, according to whom "humans will merge with computers and machines to form cyborgs" (Harari, 2020).

For example, the corporate world constantly manipulates the consciousness of the buyer, promotes deliberately false advertising, uses various techniques to sell unnecessary goods to consumers. There are special focus groups that study the human brain to understand the patterns of consumer decision-making buying a particular product and to change the way stores, both conventional and online, operate according to this. More employers use polygraphs and other neurotechnology during job interviews and to monitor the employees' activities, and this process becomes more common. Camera surveillance in a workplace is also widely used. Direct or indirect monitoring of employees' brains could be next. Serious ethical issues will also arise from using neurotechnology to improve healthy brain function. This also raises questions of inequality, if brain-enhancing neurotechnology will only be available to a select few, and it will not be affordable for the rest. For neurotechnology to become the most advanced technology of the Industry 4.0, the public needs to discuss it more, because this leads not only to fundamental technological, but also societal changes.

This is confirmed by the spread of personal data happening nowadays, the surveillance of citizens through the Internet, and the destruction of the privacy of their personal space, as well as new types of crimes that are increasingly more common in a globalized world. UN Secretary General A. Guterres (2021) noted:

"We don't know how this information has been collected, by whom or for what purposes. But we do know our data is being used commercially – to boost corporate profits".

In the digital world, human consciousness is increasingly exposed to manipulative influences and is gradually being reshaped by targeted information with the widespread use of fictions and all kinds of falsifications. In China, for example, there is already an honesty score today, confirming the level of responsibility and civic loyalty to the regime. This makes humanization one of the main issues in the new community.

New relationship of man as a tech entrepreneur and consumer in digital reality

Theoretically, however, it is possible to build a high-tech human civilization with supertech that serve people in order to realize their "divine" purpose. At the same time, it can only happen when the people are aware and comprehend the changes, when a new rational understanding of the world forms without manipulating the consciousness of the individual. One of the main such bridges between physical and digital reality could be the Internet of Things (IoT). Today, any container or even a package can be equipped with a sensor or radio transmitter allowing the company to track its progress. It gives entrepreneurs managing complex and long supply chains the opportunity to fundamentally change the way they do business. The consumers can observe the progress of a product or document online. The digital revolution is decisively changing the way companies and individuals interact and creating radically new approaches. Going forward, the Industry 4.0 will result in new ways for businesses and consumers to not only interact, but to reward each other for using data, and consumers will gradually begin to become partners. The companies will need to anticipate the future and critically evaluate their organizational structure based on new technologies. They need to be able to upgrade it quickly when needed, and analyze the relationship between internal management and the flexible and adaptive strategies of the outside world to select new business practices and management approaches.

Currently, an example of a large innovative technology company that tried to turn its business into a tech entrepreneurship, but failed to do so, is Rosnano, a Russian company. After all, tech entrepreneurship is not just a new business based on innovative high-tech idea to make new products and services using science and technology. It also provides an opportunity to achieve a sustainable competitive advantage. Despite trying to create completely new products based on new technology, Rosnano was not able to quickly restructure its activities depending on the changing situation. It could not use the best international business practices taking into account the specifics of the business environment in Russia. As a result, it could not withstand competition.

Even its innovative success didn't help it, such as a joint project with Renova Group – a company called Hevel, which built Russia's first full-cycle plant for producing solar (photovoltaic) modules and the first industrial-scale solar power plant. However, many of Rosnano's projects were expensive and could not withstand competition. In particular, the well known project of building a polycrystalline silicon plant for solar energy in Usolye-Sibirskoye, Irkutsk Oblast, which required enormous investments and took a very long time to build. China was able to create a similar production in their own country during this time and started producing at a price much lower than the one expected in Usolye, which made Usolye production absolutely unprofitable and led to the closure of the enterprise (Mechanic, 2021).

Among the company's failures is a joint project to organize production of flexible displays in Zelenograd using the technology of the British company PlasticLogic, which was funded by Rosnano along with the US venture fund OakInvestment Partners. The project, which cost about 300 million USD, was completed in 2013. Even after several resets, it was never able to make money at an industrial level, because Western business practices were blindly copied in a completely different business environment in Russia. Another well-known project is Liotech. It was supposed to produce lithium-ion batteries in Novosibirsk, but also failed (Mechanic, 2021). The company could not effectively work out the market prospects of the product, its consumer demand, so despite the huge investments and state support, the project was not competitive. In the 14 years of its existence, Rosnano has made little progress, its assets are gradually shrinking, it is always in the red, and it

owes many banks, but most of all Sovcombank. The analysis shows that the history of Rosnano is one of the pages of complex and contradictory emergence of innovation system of Russia, which has its own quirks. The entrepreneur was not given full freedom and could not use new business practices, and blindly copying the breakthrough products of other countries did not help as well. Novelties turned out to be very expensive and not needed by the country's industry. The mentality of Russian business inclined to traditionalism, which is not ready for super modern innovations, also affected it. The company has failed to anticipate the digital future, critically evaluate its organizational structure based on new technology, and creatively apply the experience of the most prominent Western companies.

At the same time, international corporations that own online platforms and social networks know how to adapt very quickly to changes in the market situation. Many of them, however, disseminate user data and use hostile methods to retain them in order to maximize profits. For example, a small company in Nebraska (USA) is helping law enforcement agencies from around the world to monitor users of Google, Facebook, and other IT corporations (Brewster, 2021). And while new rules are emerging to regulate personal data, such as GDPR³, which reduces the digital divide between the citizen and online platforms, many companies and platforms are breaking these laws. Thus, since May 2018, when GDPR started being enforced, to June 2021, the amount of fines paid by the companies was over 283 million EUR, and their number has reached 160 thousand violations. The largest fine was paid by Google – 50 million EUR (GDPR). Facebook (Meta) is constantly at the center of scandals. It has been accused many times of monitoring users and using facial recognition technology to collect biometric data from more than 100 million Instagram users⁴. The company, along with Google and Amazon, is on the radar of US antitrust agencies. With their technical capabilities, platforms can filter social media by date, data type, and even by sender and recipient. Due to the high technical level of platforms and their high competitiveness, states are required to constantly update laws on the issue. For example, in "2020, the EU developed new rules to enable European tech companies to compete with giants from America and Asia, they gained access to anonymized public and personal data"⁵.

Almost all major international tech ecosystems across different platforms not only strengthen their monopolistic influence and develop new forms of competition, which are difficult to trace, but also have their own developments in the field of megaverse. Apple, Microsoft, and many other large holdings, as well as numerous startups, are doing it. Currently, businesses are on the verge of moving to virtual offices, which opens up new opportunities for their development. However, the individual, the entrepreneur, the worker is increasingly pressured by big capital of monopoly, which is greatly facilitated by the platform economy, leading to an increase in the power of IT companies. Tremendous value is concentrated in the hands of a small group of people, and this is reinforced by the platform effect of digitally shaped companies creating networks that connect sellers and buyers of products and services. This increases profitability through scale, which the rest of the companies lack. This exacerbates the inequality of entrepreneurship as a result of the Industry 4.0.

For example, the leader among US technology companies is Google, which derives most of its revenue from providing web ads and access to some new developments, now controls more than 90% of the global search advertising market, with revenues of 182 billion USD in 2020⁶. Google is also involved in transportation (Waymo drones), cloud computing, medicine. It has strong intrapreneurship, where products created in one

³ GDPR. *GeneralDataProtectionRegulation*. Available at: [\(https://www.tadviser.ru/index.php/%D0%A1%D1%82%D0%B0%D1%82%D1%8C%D1%8F:GDPR_\(%D0%A0%D0%B5%D0%B3%D0%BB%D0%B0%D0%BC%D0%B5%D0%BD%D1%82_%D0%95%D0%B2%D1%80%D0%BE%D1%81%D0%BE%D1%8E%D0%B7%D0%B0_%D0%BE_%D0%BF%D0%B5%D1%80%D1%81%D0%BE%D0%BD%D0%B0%D0%BB%D1%8C%D0%BD%D1%8B%D1%85_%D0%B4%D0%B0%D0%BD%D0%BD%D1%8B%D1%85\)\)](https://www.tadviser.ru/index.php/%D0%A1%D1%82%D0%B0%D1%82%D1%8C%D1%8F:GDPR_(%D0%A0%D0%B5%D0%B3%D0%BB%D0%B0%D0%BC%D0%B5%D0%BD%D1%82_%D0%95%D0%B2%D1%80%D0%BE%D1%81%D0%BE%D1%8E%D0%B7%D0%B0_%D0%BE_%D0%BF%D0%B5%D1%80%D1%81%D0%BE%D0%BD%D0%B0%D0%BB%D1%8C%D0%BD%D1%8B%D1%85_%D0%B4%D0%B0%D0%BD%D0%BD%D1%8B%D1%85)) (accessed 25.02.2022).

⁴ Batyrov, T. Available at: <https://www.forbes.ru/newsroom/tehnologii/409349-facebook-obvinili-v-slezhke-za-polzovatelyami-instagram-cherez-kamery>(accessed 23.02.2022).

⁵ Available at: https://vuzlit.com/1250846/evropa_2020_novye_orientiry_evropeyskogo_ekonomicheskogo_upravleniya (accessed 25.02.2022).

⁶ Brewster, T. *Kak kompaniya iz Nebraski pomogaet FBR proslushivat' pol'zovatelej Facebook i Google*. Available at: https://www.forbes.ru/tehnologii/457287-kak-kompania-iz-nebraski-pomogaet-fbr-proslushivat-pol-zovatelej-facebook-i-google?utm_source=telegram&utm_medium=social&utm_campaign=nebolshaya-kompaniya (accessed 05.03.2022).

office are used by other departments. It is very scrupulous about the human capital of its employees and encourages them in every possible way to improve their professional level. Recent years show rapid growth (70% in 2021). The company's popularity among users has also increased, which has given the company even more power. The corporation is growing both through acquisitions of other companies and through the opening of new offices. Google's parent company has reached a market value of 2 trillion USD in 2021. The company's capitalization amounted to 1 trillion USD⁷.

The largest company Amazon, which concentrates sales of 75% of the global e-book market, began as an online store, and later diversified as an online retailer. The company accounts for half of the U.S. online shopping market. Today it owns a publishing house, a film studio, manufactures tablets, smartphones, it is the largest service provider, it opened the world's first automated supermarket without cashiers, it delivers goods using drones. The company has subsidiaries in numerous countries around the world. Its capitalization rose from 798 billion USD in 2018 to 1,756 trillion USD in 2022, and one share is worth 2,050 USD, with revenue of 368 billion USD in 2021⁸. Its owner, J. Bezos, has bankrupted many small bookstores and is one of the richest people on the planet.

The capitalization of another world's largest company Facebook (now Meta), the main developer and operator of social networks, which has concentrated in its hands more than 77% of mobile social networking traffic, is 569.2 billion USD⁹. Digitalization is backed up by powerful transnational corporations with vast amounts of information and the means to manage it, and hence real power in today's world. The analysis shows that today we can talk about creating a global instrument of redistribution of public wealth through powerful transnational corporations and the platforms created by them, the capitalization and popularity of which are rising ever more and which have a huge impact on all global business, as well as on the worker. The animal fear of the loss of vast capital and power pushes the super monopoly to dominate humanity, which creates wealth, and ultimately leads to its destruction. The pro-government policy of the world elite contributes to the blockage of social human self-organization, creative cognition, reveals the desire to control the communicative process in society, and put the individual under control, while all sorts of pandemics, which exclude feedback, strengthen this process. And what will be the "norm" of economic coercion for the total appropriation of the results of one person's labor by another is still difficult to predict.

The modern realities of digitalization and the human worker

The activities of transnational corporations and platforms lead to the dehumanization of human labor, which is increasingly losing its intrinsic value as the fundamental stimulus for human society. Human labor becomes a negative "pleasure," causing the feeling of being broken instead of joy. And while economic theory posits man as a physiological and social creature, the digital economy increasingly turns him into a cyborg who has no interest in the process of production, self-improvement, or authentic culture. They are more and more concerned with a well-appointed life with smart technology and the possibility of interesting leisure. The individual is not transformed into a creatively and harmoniously developed personality, but into a passive consumer of all new, most modern gadgets, i.e., a consumerist society is formed rather than a harmonious one.

Digitalization leads not only to dehumanization and a change in the essence of work, but also to a very rapid career change, which contributes to unemployment. The aging of the population and the prolonging of labor history, especially due to the increase in the retirement age in Russia, make this problem even more acute. All of this leads to a potential need for a new profession, comprehensive retraining, completely new skills, and mastery of fundamentally new devices. And as a consequence, the ability to master innovation is the key to an individual's adaptation to modern reality. The trend towards the disappearance of a large number of specialties will not yet affect medium and small businesses, especially in Russia, but large companies will be seriously affected. Especially large retailers will be affected, where more and more shipments will be made

⁷ Shamardina, L. Materinskaya kompaniya Google dostigla kapitalizacii v \$2 trln. Available at:<https://thebell.io/materinskaya-kompaniya-google-dostigla-kapitalizatsii-v-2-trln> (accessed 10.03.2022).

⁸ Available at: <https://skolko-stoit.ru/skolko-stoit-kompaniya-amazon/> (accessed 05.03.2022).

⁹ Available at: <https://ru.allstockstoday.com/FB-kapitalizaciya.html> (accessed 05.03.2022).

by unmanned vehicles, and AI will also replace employees in the sales floor. The demand for workers in the IT will increase, generated by startups and corporations competing for competent developers of AI.

Today, many professions are changing or moving into a platform solutions format. For example, taxi drivers and delivery workers have long been associated with online shopping and smartphone apps. Currently, there is not enough service staff, catering and construction workers, which creates the conditions for the development of a new format of the labor market – platform employment. Such relationships between the employee and the entrepreneur become relevant and in demand in the global economy, especially in the industries with the acute shortage of workers. While the share of the platform economy in the structure of the global labor market is only 3% of the economically active population (about 85 million people), according to the Organization for Economic Co-operation and Development, by 2023, this indicator will reach 5% – about 150 million people. Thus, the largest IT companies in Russia began to acquire services for hiring workers online. For example, SBER bought Rabota.ru, the service platform YouDo started a joint venture with HeadHunter, Avito acquired the GigAnt service. However, in new economic sectors, the Industry 4.0 creates less jobs than previous revolutions. The demand for labor is growing in highly paid creative specialties requiring high qualifications and a high degree of socialization, for example, in developing innovative ideas. In highly developed economies, demand in labor tends to decline in low-income manual work, but this does not apply to developing economies where business is economically unprofitable to replace the cheap physical work of AI and robotization.

Unemployment covers a rising number of population, and this trend will increase as people are liberated from manual labor. According to the International Labor Organization (ILO), in 2020, 114 million people around the world (Bykova, 2021) lost their jobs. According to PwC, until 2025, the global economy will have a steady increase of free workers in the freelance market. Excessive labor is supposed to find jobs through the introduction of new medicine using the Internet Body technology, the extrapolation of a more primitive Internet of Things.

Today, humanity faces a challenge to find a way to balance the advantages and risks of the digital economy and digital platforms. Even E. Musk compared some developments in this area to "summoning the devil" that can destroy humans.

Discussion

The results of studying the tech entrepreneurship, confirm the authors' hypothesis of an ambiguous contradictory impact of the digital economy on the tech entrepreneur, who is forced to quickly readjust, create new business models, explore new global markets, and switch to a new format of business and simultaneously be a consumer, for example, of video games that often deform human consciousness. Not every company or businessman is able to cope with such a task, which leads to their bankruptcy.

In the digital economy, capital is increasingly concentrated and monopolized, which clearly demonstrates the increasing shift to a platform economy where there is sufficient financial capacity to buy the most innovative and expensive startups for the sake of maintaining its monopoly power. Their global influence is strengthened by a huge database of users and by forms of monopolization that even antitrust authorities are sometimes unable to detect. Although, despite this, the authors agree with D. Isenberg, who argues for increasing business opportunities through entrepreneurial ecosystems (Isenberg, 2021).

F. Eggers examines large-scale changes in entrepreneurship caused by the crisis in many countries, and focuses on entrepreneurial ecosystems that ensure the growth and internationalization of enterprises and startups and their entry into the global market (Eggers, 2020). The author notes that ecosystems of different countries are based on different management models and are aimed at supporting startups and fast-growing enterprises. His evidence raises doubts that all ecosystems are formed on the same governance models, while the substantial variability in ecosystems entails new governance models, with which one can only agree. However, the impact of ecosystems on human capital remains outside F. Eggers' scope of study.

One should also agree with the opinion of V.Yu. Katasonov, who argues that "in a platform economy, along with real capital, fictitious capital represented by securities in financial markets becomes more

important, which also becomes a source of crises" (Katasonov, 2015). The authors also agree with the point of view of L. Grinin, A. Korotayev on the tremendous prospects of digitalization in the economy of the sixth wave of innovation (Grinin & Korotayev, 2015). Although with a caveat, because digital technology works mainly against people, it zombifies them, digitalization erodes the identity of individuals, which is beneficial to monopoly capital, digital platforms. The digital economy also has a negative impact on the worker, some of whom become unemployed, while others have to adapt to emerging innovations in a short period of time, quickly mastering new previously unknown professions, which not everyone can cope with. This problem is especially acute for workers of pre-retirement age.

J. Rifkin, in spite of the praise of digitalization, which is changing the structure of the economy with rapidly emerging high-quality communications, criticizes it because in this society, ownership, rather than property, is gradually becoming dominant, demonstrating this through the "economy of shared consumption", which leads to other forms of productive and digital cooperation (Rifkin, 2000). He also talks about degradation of human relationships, showing their increasing dependence on powerful corporate networks, their gaining control over information vital to humanity, and the virtual world replacing the real world. The authors of this paper agree that digitalization is changing human relationships and human interaction, while corporations are establishing control over information, thereby zombifying the individual. At the same time, J. Rifkin's concern about property in the digital society is puzzling, because the "economy of shared consumption" does not lead to its elimination. This model allows only a rational use of resources, reducing the burden on the environment and providing additional income to a huge number of people.

E. Bernays, who made an enormous contribution to the science of mass persuasion based on the manipulation of the individual's subconscious, which was widely used in US commercial advertising, spoke of the enormous importance of communication in this process (Bernays, 1947). The negative impact of his theory on the individual has been adopted today by the digital society, where the manipulation of individual and public mass consciousness leads to the restriction of human freedom, works mainly against the individual, including the entrepreneur and the worker. Their true spiritual, mental needs are mostly not met, and the person themselves as a microcosm does not develop, their natural intelligence falls. "In the digital economy, the search for truth is no longer relevant, its core is the generation of new ideas, values, meanings, it sees the information war for meanings, codes, the struggle between truth and fakes continue" (Yudina, 2021). The digital economy contributes to welfare improvement rather than quality human development according to Florensky (1999). To be human-centered, new technology must facilitate human interaction, transforming the individual into a more harmonious and meaningful being, reducing income inequalities among different segments of the population. Companies as the embodiment of tech entrepreneurship in the new digital reality, and in the West's sanctions war against Russia, need to learn to value people, not to dehumanize people, to stimulate the creativity of the individual, who must quickly solve the complex problems of import substitution.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR'S CONTRIBUTION

Tamara N. Yudina – Conceptualization, Project administration, Writing – original draft

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Inflationary transmission channel of integration spillover effects: assessment of the impact on the welfare of the EAEU member states' population

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Abstract. Integration processes generate so-called "spillover effects", which have an impact on the welfare of the population of the countries involved in integration processes. The purpose of the study is to assess the inflationary channel of the integration spillover effects on the EAEU member countries population welfare. The hypothesis of the study is that there should be an inverse (statistically significant) relationship between inflation in Russia and the EAEU member countries population welfare. "Inflationary shocks" coming from the Russian economy (through the channel of mutual trade); in the conditions of open borders in the EAEU space it will spread to the Union States. At the same time, they will reduce the population living standards through the growth of Consumer price index, increase in Gini index, decrease in average monthly net salary (after tax), and Human Development Index. We used correlation analysis to test the hypothesis proposed. As a result, the hypothesis proposed in the paper was generally not confirmed by the data characterising the EAEU member states economy over the long term time period. The data analysis showed that inflation in Russia has no impact on the population living standards in the EAEU member states (except for Kazakhstan: a direct statistically significant correlation was found between the dynamics of inflation in Russia and its average net salary).

Keywords: inflation, spillover effects, correlation analysis, EAEU, integration, population welfare.

JEL codes: E31, F15

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Introduction

The Eurasian Economic Union (EAEU) generates not only static and dynamic integration effects described in the classical economic literature (Salera, 1951), but also so-called spillover effects. Economic processes and phenomena are integrated from one economy to another, affecting the well-being of these countries population. Russia, as the largest economy of the Eurasian Economic Union (EAEU), acts as the main generator of economic impulses / "shocks" for the other member states of the economic association.

There are five channels of transmission of spillover effects in the EAEU space: the channel of labour resources transfer; the channel of capital transfer; the inflation channel; the currency channel; the channel of intra-industry trade.

The purpose of this paper is to assess the influence of the inflationary channel of integration spillover effects on the population welfare of the EAEU member states. We assume that high inflation in Russia spills over to the rest of the member states of the economic association, which causes prices increasing and lower welfare of the EAEU residents.

A similar view on the nature of spillover effects and the inflationary propagation channel was studied in a number of researchers.

Thus, Afanasiev (2014) considers spillover effects in the context of chain spreading of crisis phenomena: "The effect occurs when a crisis from one country 'spills over' to another, and they, in turn, affect a third country". The crisis spillover effect is a logical phenomenon in the context of trade and financial integration of countries in the global economy.

According to Kalinkova (2012), the mutual dynamics of business fluctuations among the G-8 countries is volatile and unstable. Nevertheless, the spillover effect becomes distinctly stationary in its fluctuations: in the global economy the US and Japan are the main net transmitters of economic shocks, while Germany is the largest net recipient of economic shocks in the period of 2000-2012.

Qabobho & Khobai (2022): the findings indicated that the fixed-exchange-rate regimes (soft pegs and hard pegs) are associated with high responsiveness of the domestic inflation rate to the foreign countries' inflation rates, rather than to floating exchange-rate regimes (free-floating and managed floats). The policy implications for control of inflation in SADC economies are that, because of the financial market integration increase between SADC and BRIC economies, monetary authorities in SADC countries should consider floating exchange rate regimes (managed-floats or free-floating).

Zhang (2022): this paper explores the international spillover effects of China's government spending onto global inflation dynamics and the role of the oil price channel in the transmission process based on a monthly dataset covering 20 OECD economies spanning from January 2000 to September 2021. Based on the estimation results of Large Bayesian VAR models this paper provides three novel findings to the literature. Firstly, China's government spending expansion significantly raises the CPI of most OECD economies. Secondly, the oil price rises significantly in response to China's government spending expansion and magnifies its spillover effect on global CPI inflation. Thirdly, the effect of the oil price channel on the international transmission of China's government spending to the global inflation dynamics crucially depends on the oil import dependence rate and the energy subsidies of the shock recipient countries.

Ntshangase, Zhou & Kaseeram (2023): this study employs the panel vector autoregressive (PVAR) model to examine the spillover effect of US unconventional monetary policy on inflation and non-inflation targeting emerging markets post credit crunch and during COVID-19 from 2000Q1 to 2020Q4. According to the empirical results, the US unconventional monetary policy induces a surge in the exchange rate and a decrease in the central bank policy rate for both inflation and non-inflation targeting emerging markets. However, there was no significant impact on the equity prices. The empirical results are statistically significant, robust, and consistent with previous studies except for the response of equity prices.

Guirguis, Dutra & McGreevy (2022): this paper introduces a new global inflation measure based on the principal component analysis (PCA) of the inflation rates of major US trade partners. Authors find that US domestic inflation correlates strongly with global inflation in the short- and long term. Moreover, global inflation leads the US inflation and accounts for 80% of the price discovery process. In summary, the present results support the hypothesis that global inflation is a crucial determinant of domestic (US) inflation.

Zhao (2022): the implications of trend inflation in an open economy are investigated in a two-country DSGE model. The results show that increasing trend inflation from 2 to 4 percent in the domestic country generates a consumption-equivalent welfare loss of about 0.36 percent and 0.04 percent in the domestic and foreign countries, respectively. Incorporating trend inflation in an open economy has new dynamics: domestic trend inflation amplifies the spillover effects of a domestic technology shock on foreign countries; trend inflation in foreign countries reinforces these spillover effects through the effect of price dispersion.

Hall, Tavlas & Wang (2023): authors find the inflationary shocks in the United States are transmitted to the euro area and the United Kingdom in a powerful and consistent way. The euro area transmits inflation to the other regions but to a lesser extent, while the inflation in the United Kingdom has little effect on the other two regions.

Golitsis, Gkasis & Bellos (2022): this paper focuses on the price determinants of gold, and on the challenges associated with gold's safe haven property. The findings identify gold as a strong dollar hedge, while crude oil and Treasury bills appear to drive inflation; they also indicate strong spillover effects between exchange rate and gold returns. In general, co-movement dynamics display state-dependent characteristics.

Both total and directional spillovers increase significantly during market turbulence caused by severe financial crises such as the Global Financial Crisis (GFC) of 2007-2009 and the European Sovereign Debt Crisis of 2010-2012. Net spillovers switch between positive and negative values for all these markets, implying that the recipient/transmitter position changes drastically with market events. Economic policy uncertainty, stock market returns, and crude oil price returns are the main transmitters, while Treasury bills and CPI are the main return shock recipients. Gold and exchange rate act both as receivers and transmitters over the sample period.

Goczek & Witkowski (2023): authors analyze the effects of the European Central Bank's (ECB) unconventional monetary policy spillovers on the inflation-targeting Central Eastern European (CEE) countries using daily panel data from 2000 to 2019. Overall, they find that the spillovers from the unconventional ECB policy are not different from the conventional spillovers and are generally insignificant. The main result is that the international spillovers manifest themselves through the risk-taking channel, not the bond/interest rate channel, and have the form of volatility co-movement.

Course of the study: at the first stage we will verify the existence of a relationship between inflation rates in the EAEU member countries; at the second stage we will assess the impact of inflation in Russia on the dynamics of socio-economic indicators characterising the welfare of residents of the EAEU member countries.

Our previous work found that the correlation coefficient is not statistically significant, hence inflation in Russia has no impact on inflationary processes in the EAEU member countries (Mayorova, Markin & Tkachenko, 2023). Therefore, the hypothesis proposed at the first stage of the study was not generally confirmed by the data characterising the economy of the EAEU member states in the long-term period.

Methods

The hypothesis of the second study stage dwells on the existence of the inverse (statistically significant) relationship between inflation in Russia and the welfare of the EAEU member countries population. "Inflationary shocks" coming from the Russian economy (through the channel of mutual trade); in the conditions of open borders in the EAEU space it will spread to the Union States. At the same time, they will reduce the population living standards through the growth of Consumer price index, increase in Gini index, decrease in average monthly net salary (after tax), and Human Development Index.

Research methodology:

1. The data used in the study are presented in Table 1.
2. Sample: 5 EAEU member states.
3. Study interval: long-term, 13-year time interval (2010-2022).
4. Research methods: correlation analysis. Correlation analysis (significance level 5%) was used to verify the relationship between the indicators under study; the data were processed in the software package "Statistica" by StatSoft.

Table 1 – Indicators under study, 2010-2022 (annual, %)

	Series Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Belarus	Consumer price index (2010 = 100)	100	153.2	243.9	288.6	340.9	387.0	432.9	459.0	481.3	508.0	536.5	587.3	676.6
	Gini index	28.6	27.2	26.5	26.6	27.2	25.6	25.3	25.4	25.2	25.3	24.4
	Average Monthly Net Salary (After Tax)	471.8	339.7	402.7	529.7	520.5	354.5	344.9	389.0	442.9	467.7	426.7	424.9	392.9
	Human Development Index	0.790	0.797	0.806	0.808	0.812	0.812	0.813	0.817	0.818	0.817	0.807		

	Series Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Armenia	Consumer price index (2010 = 100)	100	107.6	110.4	116.7	120.2	124.7	123.0	124.2	127.3	129.1	130.7	140.1	152.2
	Gini index	30	29.4	29.6	30.6	31.5	32.4	32.5	33.6	34.4	30	25.1	27.9	..
	Average Monthly Net Salary (After Tax)	375.0	321.0	295.0	350.0	358.0	269.4	309.0	291.3	333.2	324.0	370.2	388.5	445.5
	Human Development Index	0.746	0.750	0.755	0.760	0.764	0.766	0.765	0.768	0.771	0.778	0.757	0.759	
Kyrgyz Republic	Consumer price index (2010 = 100)	100	116.6	119.9	127.8	137.4	146.4	146.9	151.6	153.9	155.7	165.5	185.2	211.0
	Gini index	30.1	27.8	27.4	28.8	26.8	29	26.8	27.3	27.7	29.7	29
	Average Monthly Net Salary (After Tax)	162.0	197.3	207.1	236.0	242.8	263.5	202.2	229.4	232.3	233	264.7	235.4	297.5
	Human Development Index	0.664	0.665	0.675	0.682	0.688	0.690	0.693	0.696	0.698	0.698	0.689	0.692	
Kazakhstan	Consumer price index (2010 = 100)	100	108.4	113.9	120.6	128.7	137.2	157.2	168.9	179.1	188.5	201.2	217.4	..
	Gini index	28	28	28.2	27.1	27	26.8	27.2	27.5	27.8
	Average Monthly Net Salary (After Tax)	400	477.1	536.8	753.4	757.1	731.7	407.2	415.0	421.6	426.1	453.8	455.6	564.6
	Human Development Index	0.767	0.775	0.783	0.792	0.799	0.805	0.805	0.811	0.814	0.819	0.814	0.811	
Russian Federation	Inflation, consumer prices (annual %)	6.84	8.44	5.07	6.75	7.82	15.5	7.04	3.68	2.87	4.47	3.38	6.69	11.94

Source: World Bank Database, 2023

Results

The results of the correlation analysis are presented graphically on Figures 1, 3, 5, 7, 9.

We see increasing of one variable, while other variable also increases. It may indicate a positive relationship between the two variables, although there is irregularity in the distribution of the variables under study. We verify this relationship by calculating Spearman correlation coefficients.

```

Pearson's product-moment correlation
data: Russian_ Federation and Belarus
t = 0.49454, df = 10, p-value = 0.6316
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
-0.4601988 0.6690820
sample estimates:
cor
0.1545104
Pearson's product-moment correlation
data: Russian_ Federation and Armenia

```

t = 0.97973, df = 10, p-value = 0.3503
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.3348294 0.7435556
 sample estimates:
 cor
 0.2959397
 Pearson's product-moment correlation
 data: Russian_Federation and Kyrgyz_Republic
 t = 1.2288, df = 10, p-value = 0.2473
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.2672637 0.7750001
 sample estimates:
 cor
 0.3621921
 Pearson's product-moment correlation
 data: Russian_Federation and Kazakhstan
 t = 0.43572, df = 10, p-value = 0.6723
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.4745805 0.6587922
 sample estimates:
 cor
 0.1364981

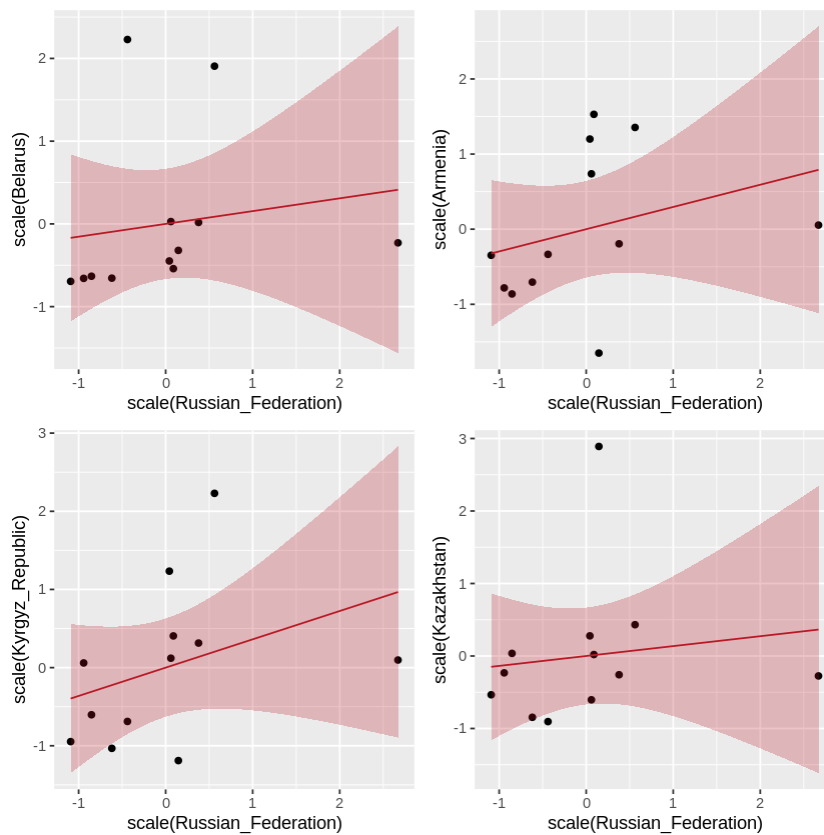


Figure 1. Correlation area between inflation dynamics in Russia and Consumer price index in EAEU countries

Source: composed by the authors

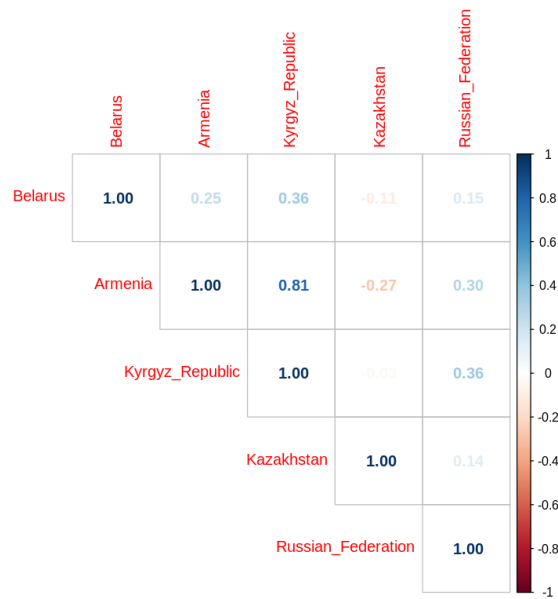


Figure 2. Final results of the correlation analysis

Source: composed by the authors

The correlation coefficient is not statistically significant. Hence, the relationship between the two variables is not linear; there is no significant influence of the variables under study.

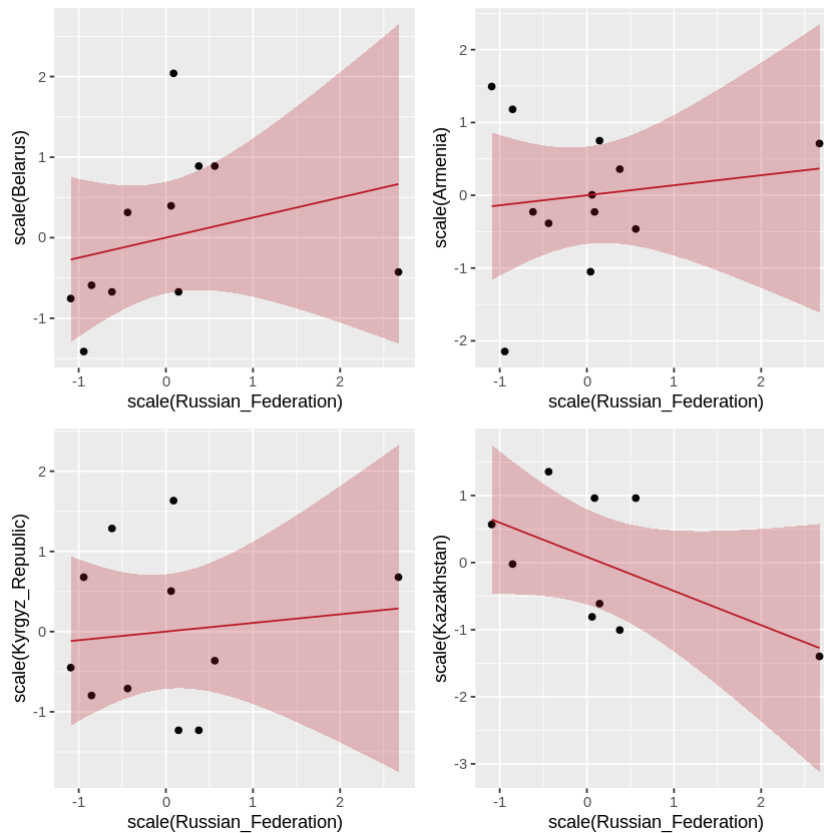


Figure 3. Correlation area between inflation dynamics in Russia and Gini index in EAEU countries

Source: composed by the authors

Pearson's product-moment correlation
 data: Russian_Federation and Belarus
 $t = 0.81222$, $df = 9$, $p\text{-value} = 0.4376$
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:

```

-0.4014829 0.7444946
sample estimates:
  cor
0.2613309
  Pearson's product-moment correlation
data: Russian_Federation and Armenia
t = 0.43932, df = 10, p-value = 0.6698
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
-0.4737064 0.6594300
sample estimates:
  cor
0.1376046
  Pearson's product-moment correlation
data: Russian_Federation and Kyrgyz_Republic
t = 0.34116, df = 9, p-value = 0.7408
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
-0.5222839 0.6676154
sample estimates:
  cor
0.1129921
  Pearson's product-moment correlation
data: Russian_Federation and Kazakhstan
t = -1.7604, df = 7, p-value = 0.1217
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
-0.8904761 0.1742855
sample estimates:
  cor
-0.5539546
    
```

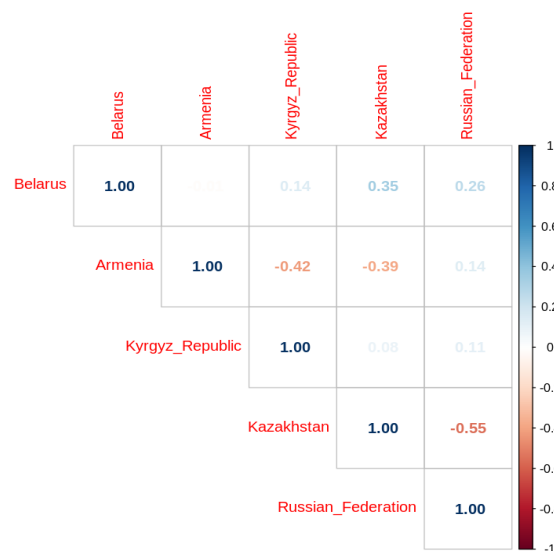


Figure 4. Final results of the correlation analysis

Source: composed by the authors

The correlation coefficient is not statistically significant. Hence, the relationship between the two variables is not linear; there is no significant influence of the variables under study.

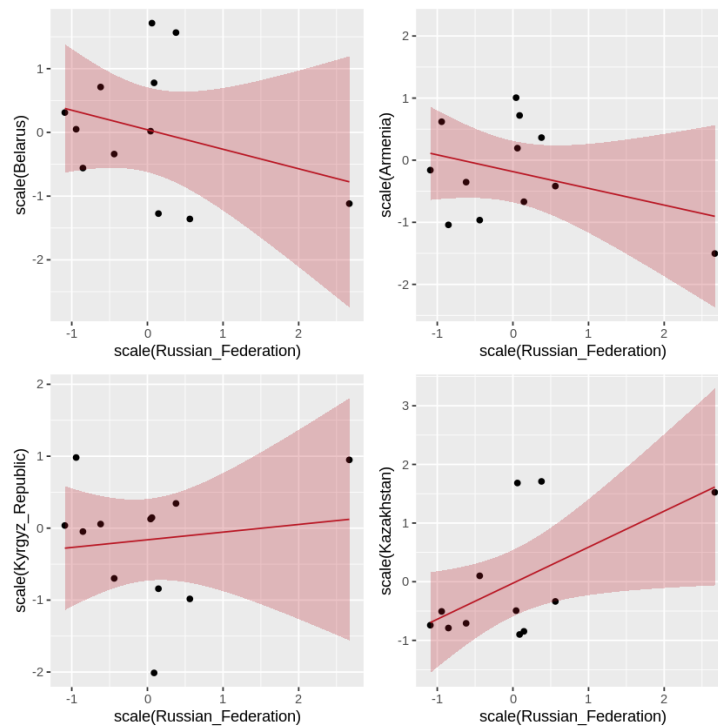


Figure 5. Correlation area between inflation dynamics in Russia and average net salary in EAEU countries
 Source: composed by the authors

Pearson's product-moment correlation
 data: Russian_Federation and Belarus
 $t = -0.98195$, $df = 10$, $p\text{-value} = 0.3493$
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.7438558 0.3342329
 sample estimates:

cor
 -0.2965524

Pearson's product-moment correlation
 data: Russian_Federation and Armenia
 $t = -1.162$, $df = 10$, $p\text{-value} = 0.2722$
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.7669880 0.2855108
 sample estimates:

cor
 -0.3449053

Pearson's product-moment correlation
 data: Russian_Federation and Kyrgyz_Republic
 $t = 0.40036$, $df = 10$, $p\text{-value} = 0.6973$
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.4831253 0.6524711
 sample estimates:

cor
 0.1256014

Pearson's product-moment correlation
 data: Russian_Federation and Kazakhstan
 $t = 2.3153$, $df = 10$, $p\text{-value} = 0.04312$
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 0.02548926 0.86977077

sample estimates:
 cor
 0,5907492

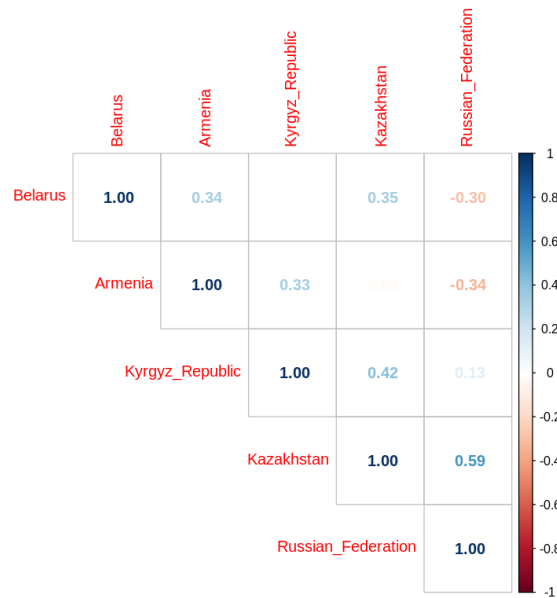


Figure 6. Final results of the correlation analysis

Source: composed by the authors

The correlation coefficient is not statistically significant (except Kazakhstan). Hence, the relationship between the two variables is not linear; there is no significant influence of the variables under study.

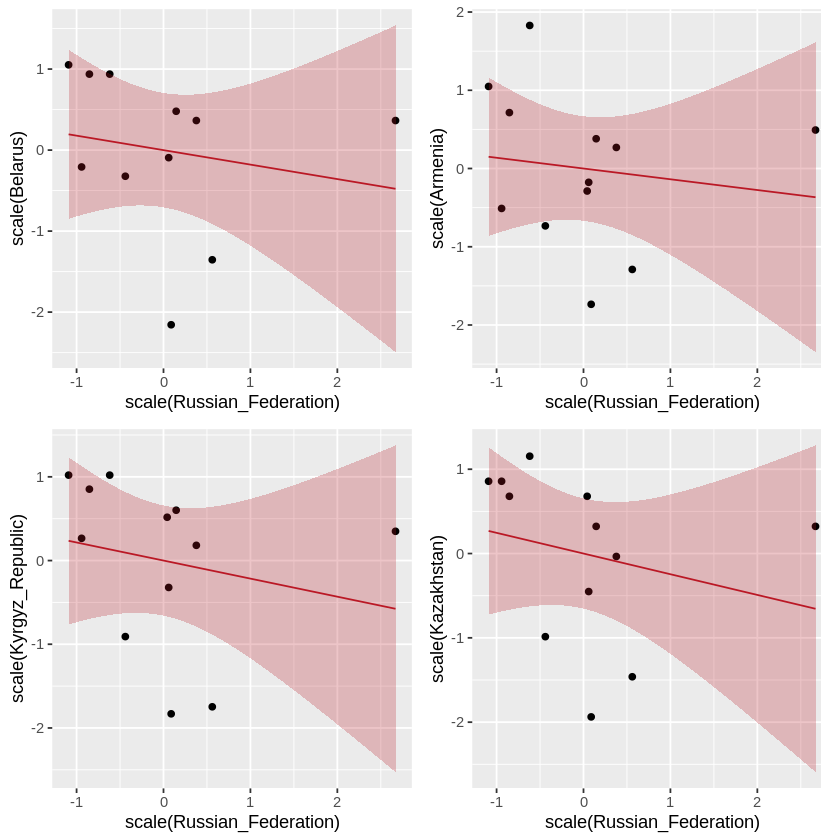


Figure 7. Correlation area between inflation dynamics in Russia and Human Development Index in EAEU countries

Source: composed by the authors

Pearson's product-moment correlation
 data: Russian_Federation and Belarus
 t = -0.5723, df = 9, p-value = 0.5811
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.7077096 0.4647269
 sample estimates:
 cor
 -0.1873877

Pearson's product-moment correlation
 data: Russian_Federation and Armenia
 t = -0.43893, df = 10, p-value = 0.67
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.6593612 0.4738007
 sample estimates:
 cor
 -0.1374852

Pearson's product-moment correlation
 data: Russian_Federation and Kyrgyz_Republic
 t = -0.69907, df = 10, p-value = 0.5004
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.7027058 0.4086727
 sample estimates:
 cor
 -0.2158551

Pearson's product-moment correlation
 data: Russian_Federation and Kazakhstan
 t = -0.8007, df = 10, p-value = 0.4419
 alternative hypothesis: true correlation is not equal to 0
 95 percent confidence interval:
 -0.7181888 0.3822980
 sample estimates:
 cor
 -0.2454573

The correlation coefficient is not statistically significant. Hence, the relationship between the two variables is not linear; there is no significant influence of the variables under study.

Discussion

The data analysis showed that the correlation coefficient is not statistically significant. Hence, inflation in Russia has no impact on the welfare of the EAEU member states population (except for Kazakhstan: a direct statistically significant relationship between the dynamics of inflation in Russia and average net salary was revealed). Thus, the hypothesis proposed was not generally confirmed by the data characterising the EAEU member states economy in the long-term interval.

It is important to realize, the results obtained should be interpreted carefully, as they are depend on the sample size and other model limitations.

Research limitations:

- under-fetching data and short study interval;

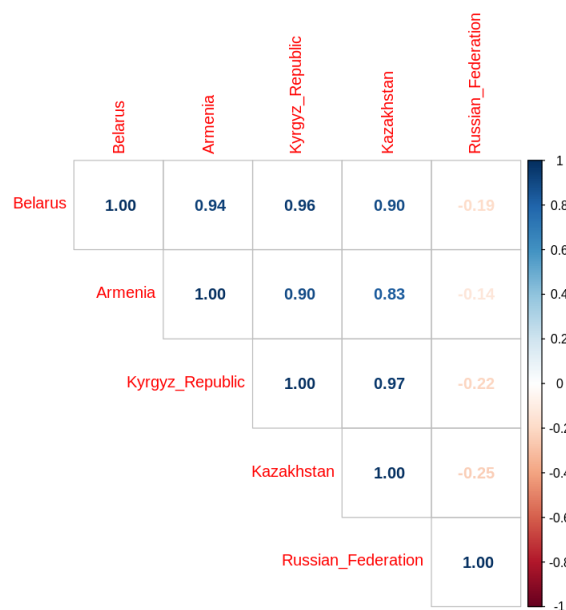


Figure 8. Final results of the correlation analysis

Source: composed by the authors

- data outliers distorting the overall result, influenced by the coronavirus pandemic and subsequent lockdown in 2019 and 2020; economic sanctions against Russia since 2014; and the start of the Special Military Operation in 2022;

- strong disagreement in the dynamics of economic development and living standards in the EAEU member states, volatility of national currencies exchange rates and the Monetary Policy of national Megaregulators (which also causes the issue of data outflow);

- perhaps the use of correlation analysis for the research task was not optimal (the research methodology is being tested and searched for appropriate to the research tasks).

We hope that the data obtained as a result of the study and the problems solved will activate a new wave of applied research on the spillover effects impact on the EAEU member states residents'well-being.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR'S CONTRIBUTION

Mayorova M.A. – Conceptualization, Project administration, Writing – review & original draft

Markin M.I. – Formal Analysis, Validation, Data curation

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Risk-oriented approach in the activities of organizations: problems of theory and practice for its implementation

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Abstract. Nowadays, in Russia there is an active promotion of an idea of introducing a risk-based approach into the domestic organizations activities. Currently, there occur a number of legislative acts obliging organizations to implement a risk-based approach in their activities. Nevertheless, the concept of a risk-based approach in the adopted Laws and legislative acts is mostly declarative one. There is no proper justification of its scientific essence and, as a result, practitioners do not understand its practical application. At the same time, supervisory organizations (authorities) have to implement a risk-oriented approach, which should regulate the planning and frequency of control (supervisory) activities and inspections. Moreover, supervisory authorities should develop their own documents to classify the legal entities activities and (or) production facilities used to a certain risk category or class in terms of the specifics of their activities. However, practitioners have questions on documentation, methods, and implementation of the designated risk-oriented approach in the practical activities of organizations. Nowadays the domestic supervisory authorities should employ risk management specialists who are able to professionally and scientifically provide an objective assessment of risks in order to classify the activities of legal entities and (or) production facilities to a certain risk category or a class. This is the most difficult and time-consuming work when implementing a risk-based approach, as an effective one, requiring special training and conducting scientific research in this field.

Keywords: risk management, risk-oriented approach, risk categories, risk map.

JEL codes: D21, L02, M21

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Introduction

Nowadays, in Russia there is an active promotion of an idea of introducing a risk-based approach into the domestic organizations activities. Currently, there occur a number of legislative acts obliging organizations to implement a risk-based approach in their activities.

Indeed, the risk-oriented approach in the organizations activities is firstly mentioned in Federal Law No. 277-FZ of 03.07.2016 "On Amendments to the Federal Law "On the Protection of the Rights of Legal Entities and Individual Entrepreneurs in the State (Supervision) and Municipal Control" and the Federal Law "On Strategic planning in the Russian Federation"; Federal Law No. 246-FZ of 13.07.2015 "On the Protection of the Rights of Legal Entities and Individual Entrepreneurs in the State (Supervision) and Municipal Control" was supplemented by Article 8.1 "Application of a Risk-based Approach in the Organization of the State Control (Supervision)"¹. As it notes, "the risk-oriented approach is a method of organizing and implementing state control (supervision), in which, in the cases provided for by this Federal Law, the choice of intensity (form,

¹ Federal Law No. 277-FZ of 03.07.2016 "On Amendments to the Federal Law "On the Protection of the Rights of Legal Entities and Individual Entrepreneurs in the State (Supervision) and Municipal Control" and the Federal Law "On Strategic Planning in the Russian Federation". Available at: <http://www.kremlin.ru/acts/bank/40987> (accessed at 23.02.2023)

duration, frequency) of control measures is determined by the attribution of the activities of a legal entity, an individual entrepreneur and (or) used in the implementation of such activities of production facilities to a certain risk category, or a certain class of danger". Additionally, it indicated a risk-oriented approach is being introduced "in order to optimize the use of labor, material, and financial resources involved in the implementation of state control (supervision), reducing the costs of legal entities, individual entrepreneurs and improving the effectiveness of their activities, state control (supervision) authorities in the organization of certain types of state control (supervision), determined by the Government of the Russian Federation"².

Experts consider introducing a risk-based approach in organizations allows business to reduce routine audit quantity. At present, the decision as to whether a particular business is associated with risks is made by the supervisory agency on the basis of criteria specially developed by the same agency. By the lawyer-consultant N. Loginova, "before the risk-based approach introduction, the supervisory authorities checked all enterprises and individual entrepreneurs periodically. This model is resource-intensive and insufficiently effective. The number of inspected objects significantly exceeds the labor, material, and financial resources of the supervisory authorities. For instance, the shortage of personnel ensures problems for supervisors to thoroughly check each enterprise on time. In this regard, supervisory measures were conducted superficially and less frequently, and the most of defaulters remained undetected. As a result, we have poor quality of services provided to consumers, unregulated prices, increased danger to the public, etc."³. In other words, the risk-oriented approach was designated by Law No. 277-FZ of 03.07.2016 in order to increase the efficiency of control and supervisory activities and reduce the burden on inspectors, avoid the previous total inspections.

For instance, during his speech at the St. Petersburg International Economic Forum in 2023, Russian President Vladimir Putin said that if a business is not associated with high risks of harm to citizens or the environment, then it should not be checked at all – neither in a planned manner, nor in an unplanned one. Preventive measures are sufficient ones⁴.

At the same time, at the legislative level, businesses with a risk of harm to people include such production and types of entrepreneurship that sell goods and services, the addressees of which are consumers. For example, they include construction, catering, etc.

Therefore, today there is a legislatively determination to implement a risk-based approach by control (supervision) authorities and organizations. Firstly, there is in relation to organizations "with high risks of harm to citizens or the environment"; secondly, for optimal use of the organization's resources for inspections; thirdly, to reduce the costs of legal entities during such inspections; fourthly, to improve the effectiveness of the state supervisory authorities activities. Indeed, the concept of a risk-based approach has appeared in the current legislation, implying the resources of regulatory (supervisory) authorities and organizations for conducting inspections. Today they are distributed more regularly than usual, and in depending on the risk affect the frequency of inspections and their intensiveness.

However, practitioners have questions on documentation, methods, and implementation of the designated risk-oriented approach in the practical activities of organizations.

Main part

Nevertheless, the concept of a risk-based approach in the adopted Laws and legislative acts is mostly declarative one. There is no proper justification of its scientific essence and, as a result, practitioners do not understand its practical application. In the theory of organization management researchers discuss risk management issues (Kiselyov, 2023).

Hence, the researchers try to provide a scientific justification for the essence of the risk-based approach.

² Federal Law No. 277-FZ of 03.07.2016 "On Amendments to the Federal Law "On the Protection of the Rights of Legal Entities and Individual Entrepreneurs in the State (Supervision) and Municipal Control" and the Federal Law "On Strategic Planning in the Russian Federation". Available at: <http://www.kremlin.ru/acts/bank/40987> (accessed at 23.02.2023)

³ Risk-oriented approach: what is it and why is it needed. Available at: <https://blogkadrovika.ru/risk-orientirovannyj-podhod-cto-eto-i-dlya-chego-nuzhen/> (accessed at 23.02.2023).

⁴ Why Putin cancels business inspections and how it will affect customers. Available at: <https://63.ru/text/economics/2023/06/21/72417989/> (accessed at 23.02.2023).

For example, a number of researchers under a risk-based approach consider "a way of organizing supervision, which involves reducing the number of state inspections of businesses where the risk of irregularities is lower. In plain, businesses of a high risk category are controlled more and with a low risk category less often." Today a tax audit can take a long time, during which dishonest businessmen have time to sell off all their property, withdraw capital and declare their bankruptcy. But signs of possible tax evasion "will be established according to a certain risk-oriented approach"⁵. But such an understanding of the risk-based approach essence by researchers does not give practitioners a concrete understanding of its practical content. At the same time, it is necessary to proceed from the fact that the legislation has already established that a risk-based approach should be determined by a method, not by a way of its implementation. In terms of science, method and way of implementation are still different scientific concepts. Meanwhile, the main difference between the concepts is that the method is a broader concept describing general approach to achieve the goals of the activity; in its implementation various methods can be used. For example, flow production is a method of production which characterized by the division of the production process into separate, relatively short operations performed at specially equipped, sequentially located workplaces – flow lines. Therefore, method is a certain algorithm for applying a certain sequence of actions or procedures in the process of work. For example, an organization can use a method of flow production based on the rhythmic repeatability of the main, auxiliary, and servicing production operations coordinated in time and space, performed at specialized workplaces located along the technological process.

Other researchers suggest considering the risk-based approach as "a new model of state and municipal inspections aimed at total control over companies and individual entrepreneurs who can harm people and nature with their activities"⁶. But the model and the method are also different in their essence scientific concepts.

Nevertheless, all researchers, focusing on legislation, point out the essence of the risk-based approach with the organization of inspections. At the same time, the main meaning of the risk-oriented approach will be the choice of the intensity (form, duration, frequency) of inspections which is determined depending on the degree of the potential danger (harmfulness) that the activity of the supervised entity or object entails.

This was formulated, for example, in the Decree of the Government of the Russian Federation No. 806 on August 17, 2016 "On the Application of a Risk-based Approach to the Organization of Certain Types of State Control (Supervision) and Amendments to Certain Acts of the Government of the Russian Federation". The Rules for Attributing the Activities of Legal Entities and Individual Entrepreneurs and (or) production Facilities Used by them were approved to a certain category of risk or a certain class of danger; a list of types of federal state control (supervision), in respect of which a risk-oriented approach is applied; a list of types of regional state control (supervision), in the organization of which a risk-oriented approach is mandatory⁷.

For example, it indicated that a risk-based approach must necessarily be applied by departments in the field of environmental, construction, housing, price supervision, as well as in the field of protection from natural and man-made emergencies, the safety of highways of regional significance, the technical condition of self-propelled vehicles, attractions and other equipment, etc.

At the same time, the Decree allowed ones to use of a risk-oriented approach to departments that control fire, medical, sanitary-epidemiological, transport, labor, energy, veterinary activities, as well as communications, civil defense, and road safety.

At the same time, the Decree allows the use of a risk-based approach by other organizations in the organization of its activities. For example, in the information letter of the Bank of Russia on December 27,

⁵ *What is a risk-based approach? Explain easily. Available at: <https://news.rambler.ru/disasters/47507181-cto-takoe-risk-orientirovanny-podhod-obyasnyem-prostyimi-slovami/> (accessed at 23.02.2023).*

⁶ *What is a risk-based approach? Explain easily. Available at: <https://news.rambler.ru/disasters/47507181-cto-takoe-risk-orientirovanny-podhod-obyasnyem-prostyimi-slovami/> (accessed at 23.02.2023).*

⁷ *Decree of the Government of the Russian Federation on August 17, 2016 No. 806 "On the Application of a Risk-based approach in the Organization of Certain Types of State Control (Supervision) and Amendments to Certain Acts of the Government of the Russian Federation". Available at: https://www.consultant.ru/document/cons_doc_LAW_203819/1b4eb7f157ab8133a972d132863e0f8dbb7d398e/ (accessed at 23.02.2023)*

2017 No. IN-014-12/64 "On the Application of a Risk-based Approach in the AML/CFT Sphere" on January 18, 2018, it was noted that the Bank of Russia needs a risk-based approach "in order to counteract the legalization (laundering) of proceeds from crime and the financing of terrorism, to develop financial measures to combat money laundering." Based on this Letter, all financial institutions of the Bank of Russia are required to identify, evaluate, and take measures to reduce their own risks of money laundering and terrorist financing. And, as the Letter notes, it is the "risk-based approach which allows flexible application of money laundering and terrorist financing measures to more effectively allocate available resources and focus efforts on preventive measures in high-risk areas"⁸.

However, none of this provided organizational practitioners with a clear understanding of the necessary actions to comply with the law on the risk-based approach, although the risk-based approach as a method of organizations' (facilities') inspections by supervisory authorities should be officially implemented at the legislative level since 1 January 2018.

As a consequence, even at the legislative level there was "specification" on the implementation of the risk-oriented approach. So, for example, according to Article 56 of Federal Law No. 248-FZ of 31.07.2020 "On State (Supervision) and Municipal Control in the Russian Federation" (with amendments and additions), it was clarified that borrowing with a controlled person is conducted during the following control (supervisory) measures: control procurement; monitoring procurement; selective control; auditor visit; raid audit; documentary audit; field audit⁹. Additionally, according to this Law, an inspection can be conducted even using means of remote interaction, including through audio or video communication. The control (supervisory) measures as monitoring compliance with mandatory requirements and on-site inspection can be conducted without interaction with a controlled actor. However, by the opinion of the Russian Government, organizations which may cause harm to the values protected by law need profound and regular supervision. However, it was not obvious how to determine in practice the risk categories and risk classes (categories), according to which the frequency of routine audits should be determined, as defined by Resolution No. 806 of the Government of the Russian Federation.

According to the Article 23 of Federal Law No. 248-FZ, there were presented categories indicating the degree of harm (damage) that organizations and entrepreneurs can cause during their activity. Such risk categories in accordance with the Law include extremely high risk; high risk; significant risk; medium risk; moderate risk, and low one.

Nevertheless, risk categories and hazard classes were established by law. According to this law, the timing of routine audit was determined, both for federal state control (supervision) and for regional state control (supervision) (Table 1).

Table 1 – Risk categories and classes

Risk categories	Risk classes	Features of scheduled inspections	
		for federal state control (supervision)	for regional state control (supervision)
Extremely high risk	1th class	routine audit is conducted once during the period established by the regulation on the type of federal state control (supervision) or the regulation on licensing of a specific type of activity	routine audit is conducted once a year
High risk	2nd class		routine audit is conducted once in 2 years
Significant risk	3rd class		routine audit is conducted once in 3 years

⁸ Information letter of the Bank of Russia, December 27, 2017 No. IN-014-12/64 "On the Application of a Risk-based approach in the Field of AML/CFT". Available at: <https://www.garant.ru/products/ipo/prime/doc/71751262/4>. (accessed at 23.02.2023).

⁹ Federal Law No. 248-FZ of 31.07.2020 "On State (Supervision) and Municipal Control in the Russian Federation" (with amendments and additions). Available at: <https://base.garant.ru/74449814/> (accessed at 23.02.2023).

Risk categories	Risk classes	Features of scheduled inspections	
		for federal state control (supervision)	for regional state control (supervision)
Average risk	4th class	routine audit is conducted no more than once during the period established by the regulation on the type of federal state control (supervision) or the regulation on licensing of a specific type of activity	routine audit is conducted no more than once in 4 years and at least once in 5 years
Moderate risk	5th class	routine audits are not conducted	routine audit is conducted no more than once in 6 years and at least once in 8 years
Low risk	6th class		

Source: Federal Law No. 248-FZ of 31.07.2020 "On State (Supervision) and Municipal Control in the Russian Federation" (with amendments and additions)

Therefore, when implementing a risk-based approach, when drawing up a plan of inspections, it is necessary to be guided by the frequency of their conduct established by laws. Routine audits are not conducted.

Nevertheless, all above did not make it clear for the organizations the way to define risk categories and hazard classes. Although, in accordance with the current legislation, now each type of activity and (or) objects belonging to organizations and individual entrepreneurs should be assigned a certain category (a certain class) of hazard (risk) by the relevant regulatory authority. Therefore, taking into account the severity of the negative consequences that may occur if an organization or an individual entrepreneur does not comply with mandatory requirements, an assessment of the probability of non-compliance with such requirements by them is also taken into account. This category (class) of danger will influence the intensity, duration, and frequency of future control measures.

At present, the decision as to whether a particular business is associated with risks is made by the supervisory agency on the basis of criteria specially developed by the same agency.

At the same time, the legislation provides an opportunity for controlled organizations to realize the frequency of inspections, the category (class) the organizations danger. There are two ways they can do this. The first way is to review the information on the website of the supervisory authority. Indeed, the Decree of the Government of the Russian Federation No. 806 determined the website of the control authority should contain information about organizations and individual entrepreneurs classified as extremely high, high, significant risk or the first, second, or third class of danger (risk). For example, to determine the timing of fire inspections by the Ministry of Emergency Situations (MES), we can see the website of the regional MES department for information on risk categories.

The second way to determine the category (class) of hazard (risk) established for specific organizations is to request the supervisory authority. Within 15 working days from the date of receipt of the request it should give an answer not only about the category of hazard (risk). Also, in accordance with paragraph 13 of the RF Government Resolution No. 806, it should to provide the information on the basis of which the appropriate category (class) of hazard (risk) was assigned¹⁰.

At the same time, in accordance with paragraph 6 of Article 8.1 of Law No. 294-FZ of December 26, 2008 "On the Protection of the Rights of Legal Entities and Individual Entrepreneurs of State (Supervision) and Municipal Control", if organizations do not agree with the data provided by the controlling (supervisory) authorities, entrepreneurs can submit an application to change the category (class) assigned to them danger (risk)¹¹.

¹⁰ Decree of the Government of the Russian Federation on August 17, 2016 No. 806 "On the Application of a Risk-based approach in the Organization of Certain Types of State Control (Supervision) and Amendments to Certain Acts of the Government of the Russian Federation". Available at: https://www.consultant.ru/document/cons_doc_LAW_203819/1b4eb7f157ab8133a972d132863e0f8dbb7d398e/ (accessed at 23.02.2023).

¹¹ Federal Law No. 294-FZ of December 26, 2008 "On the Protection of the Rights of Legal Entities and Individual Entrepreneurs in the State (Supervision) and Municipal Control"(with additions and amendments). Available at: <https://base.garant.ru/12164247>.

But for controlling (supervisory) authorities required to define categories (classes) the dangers (risks) of controlled organizations are still the most problematic issue.

Firstly, the Decree of the Government of the Russian Federation No. 806 notes "the assignment to a certain class (category) of danger is conducted by the state control (supervision) authority, taking into account the severity of the potential negative consequences of possible non-compliance by legal entities, individual entrepreneurs with mandatory requirements, and to a certain category of risk. Also, it should take into account the assessment of the possibility of non-compliance relevant mandatory requirements". Secondly, "the criteria for classifying the activities of legal entities, individual entrepreneurs and (or) production facilities used by them to a certain risk category or a certain class (category) of danger are determined by the Government of the Russian Federation, unless such criteria are established by Federal law." Thirdly, "if the criteria for classifying the activities of legal entities, individual entrepreneurs and (or) production facilities used by them to a certain risk category provide for the state control (supervision) authority to calculate the values of indicators used to assess the severity of potential negative consequences of possible non-compliance with mandatory requirements, assess the possibility of non-compliance, methods of such the calculations are approved by the federal executive authorities performing the functions of developing state policy and regulation." Fourth, "the rules for classifying the activities of legal entities, individual entrepreneurs and (or) production facilities used by them to a certain risk category, a certain class (category) of danger are determined by the Government of the Russian Federation." Fifth, "if, in accordance with the Federal law, the activities of legal entities, individual entrepreneurs and (or) production facilities used by them to a certain risk category, a certain class (category) of danger is conducted by the state control (supervision) authority for state registration, issuance of a permit (special paper) or other similar papers, the rules for classifying the activities of legal entities, individual entrepreneurs and (or) production facilities used by them to a certain risk category, a certain class (category) of danger are determined by a regulatory legal act establishing the procedure for such a state authority"¹².

The absence of a clear and "transparent" mechanism for assessing risks and hazards can cause a conflict between controlling organizations and controlled (audited) organizations.

Thus, the risk-based approach is defined by federal legislation as a method of reducing the costs of control measures by regulatory and supervisory authorities in the activities of relevant organizations, both at the federal and regional levels. However, clear and understandable mechanisms for its implementation in practice have not yet been developed. It makes the implementation of a risk-based approach problematic for practitioners, primarily from the standpoint of determining and assessing the criteria for assigning subjects to different classes.

As a rule, the hazard class (category), for example, in construction can be determined by the severity of the potentially negative consequences of possible non-compliance with mandatory requirements, and the risk category – by assessing the likelihood of non-compliance with mandatory requirements (Fig. 1).

At the same time, it should be taken into account that in accordance with GOST R 51.898.2002 "Safety aspects. Rules for inclusion in standards" risk refers to the expected frequency or probability of occurrence of hazards of a certain class and the amount of damage from an undesirable event.

The danger is considered as an undesirable event, situation, object that can potentially lead to losses or damage to the organization or an undesirable outcome of any type of activity.

Indeed, according to the Decree of the Government of the Russian Federation No. 806, the classification of organizations, individual entrepreneurs, and types of activities into the risk category is providing by calculation, which takes into account such indicators as:

- severity of potential negative consequences of possible non-compliance of legal entities and individual entrepreneurs with the requirements in sanitary and epidemiological welfare;
- index of the weighted average frequency of disturbances per check (probability of disturbances of

¹² Decree of the Government of the Russian Federation on August 17, 2016 No. 806 "On the Application of a Risk-based approach in the Organization of Certain Types of State Control (Supervision) and Amendments to Certain Acts of the Government of the Russian Federation". Available at: https://www.consultant.ru/document/cons_doc_LAW_203819/1b4eb7f157ab8133a972d132863e0f8dbb7d398e/ (accessed at 23.02.2023).

mandatory requirements) in the implementation of a certain type of activity;

- index of potential harm to human health due to possible non-compliance with mandatory requirements when conducting a certain type of activity;

- index of the population size under the influence of the object of state supervision.

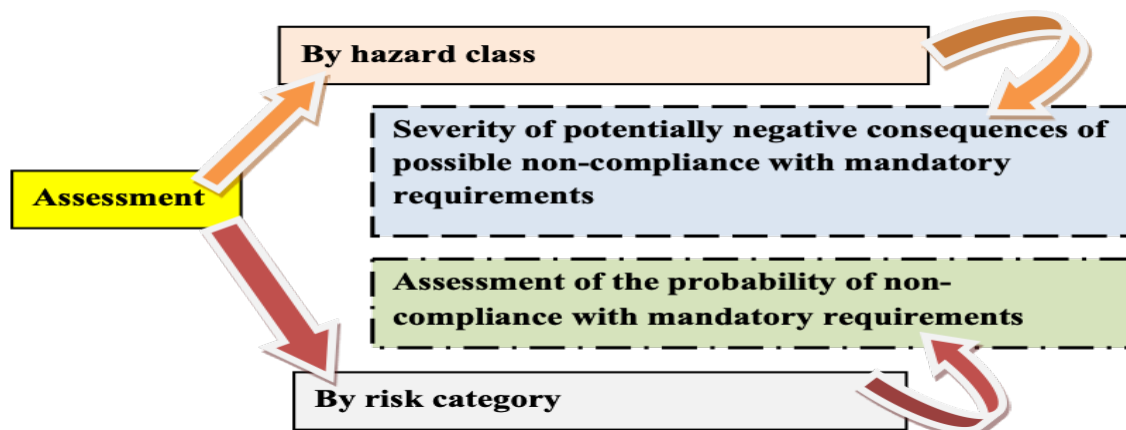


Figure 1. The essence of hazard classes and risk categories

Source: composed by the authors

Meanwhile, the indicator of the population size under the influence of the state supervision object or the indicator of the weighted average frequency of violations per inspection (probability of mandatory requirements violation) in the implementation of a certain activity can be determined, as it is related to the availability of statistics. Thus, the following statistics are used to assign an entity to a hazard class: the number of employees, the size of the population living in the sanitary protection zone, the size of the normative sanitary protection zone, the population density in the nearest settlement, and the area of the supervised object.

Nevertheless, there is an issue of calculating the severity of potential negative consequences of possible non-compliance by legal entities and individual entrepreneurs with requirements on sanitary and epidemiological well-being or the indicator of potential harm to human health due to possible non-compliance with mandatory requirements when conducting a certain type of activity.

The categorization of an object into a particular risk category will depend on such factors as:

- type of activity of production facilities of a legal entity or individual entrepreneur subject to supervision;
- the size of the population affected by the supervised object's activities (labour conditions, products manufactured, services provided, discharges into water bodies, atmospheric air emissions, soil pollution, etc.);
- unsatisfactory environmental factors at the facility, confirmed by laboratory for three years;
- relationship of the facility to population morbidity;
- repeated confirmed complaints on actions of business entities;
- number of detected sanitary and consumer protection legislation violations over 3 years.

Moreover, Decree No. 806 of the Government of the Russian Federation provides the possibility for legal entities to submit applications to change the risk categories or hazard class categories previously assigned to their activities or production facilities used by them by providing reliable information or updated information on their activities and production facilities. For the moment, an increase or decrease of risk is influenced by the presence of control and supervisory activity results within the last three years as of the decision-making date to classify the state supervision object to the risk category. In particular, two or more resolutions on administrative offence cases or a decision to suspend or cancel an activity license, as well as the conduct of an inspection without irregularities.

However, the Decree of the Government of the Russian Federation No. 806 does not specify how the designated risk factors can be assessed.

But Federal Law No. 248 established the risk criteria should be taken into account:

- severity of causing harm (damage) to legally protected assets (this assessment is made on the basis of

information on the severity of harm actually caused, damage in such cases, the potential scope of spread of probable negative consequences entailing its infliction, taking into account the complexity of handling such consequences);

- probability of negative events that may cause harm (damage) to legally protected assets (previous data on the actual infliction of harm (damage) due to the events caused by certain sources and causes of harm (damage) risk are considered for different types of objects controlled with the identification of control objects characterized by similar or different frequency of cases of actual harm (damage);

- integrity of controlled entities (assessed based on information about the measures implemented by the controlled entity to reduce the risk of harm and its prevention; the presence of implemented certified internal control systems; the controlled entity's provision of access to its information resources to the control (supervisory) authority; independent assessment of compliance with mandatory requirements; voluntary certification, confirming the increased required level of security of legally protected assets; the controlled entity's access to its information resources)¹³.

The current model of determining the criteria for attributing objects of state control (supervision) to risk categories is focused only on the severity of potential negative consequences of possible non-compliance by legal entities and individual entrepreneurs with the established requirements and the probability of non-compliance. These criteria are most often subjective. Therefore, they indicate on the problems in this area. As a consequence, in fact, these risk criteria are constantly being updated legislatively. For example, in 2021, the Decree of the Government of the Russian Federation No. 1662 on 12.10.2020 "On Amendments to the Regulation on Federal State Fire Supervision" appeared. It specified the procedure for assigning objects to the fire risk category¹⁴. The document introduced a risk-based approach to the objects of protection. It attempts to determine not only the degrees of fire danger in the industry, but also for individuals. Otherwise, after this Decree adoption, each building started to be considered separately. It results, for example, that gross irregularities of one organization located in the building would not result in an increased audits frequency for the other organizations in those building.

Meanwhile, to separate dangerous activities from safe ones, there is a need of scientific methods for all economic sectors. The Russian Government has developed a special risk scale. However, N. Klyuchevskaya believes that "the risk assessment model is not specified in the norms. It can cause significant difficulties in law enforcement, since the limits of discretion or the possibility of unjustified application of exceptions from the general rules in the actions of regulatory authorities and their officials are expanded." In addition, "there may be risks of substituting the formation of a risk-based approach. That is, control is based on the risks of causing damage (harm), by creating legal conditions for manipulation ("management") risks in determining the risk categories for the objects of control". At the same time, "it is unclear how the adopted norms will correlate with the risk-based approach system already used in the organization of control (supervision)". In addition, experts in risk management believe that "at present, in a number of control (supervision) types, it is sufficient to commit only one or two offences to increase the risk category and, therefore, to increase the intensity of audits". However, an increase of the risk category should not be based on minor infringements, which do not critically affect the establishment of hazards, but on the identification of systematic and significant infringements" (Klyuchevskaya, 2023).

Furthermore, in addition to general risks (for example, fire safety risks and hazards in an industry) each industry may have its own specific risks and hazards that need to be taken into account by the relevant supervisory authorities (organizations) of the industry. Researchers Gerasimova M.V. and Avdeeva L.A. consider "the construction industry is one of the key sectors of the Russian economy. It has a significant impact on the development of almost all branches of material production and largely determines the solution of social, economic, and technological problems of the country's development. Meanwhile, there are many problems in construction, determined by factors that increase the level of risk in the industry: high prices

¹³ Federal Law No. 248-FZ of 31.07.2020 "On State (Supervision) and Municipal Control in the Russian Federation" (with amendments and additions). Available at: <https://base.garant.ru/74449814/> (accessed at 23.02.2023).

¹⁴ Federal Law No. 248-FZ of 31.07.2020 "On State (Supervision) and Municipal Control in the Russian Federation" (with amendments and additions). Available at: <https://base.garant.ru/74449814/> (accessed at 23.02.2023).

for building materials; high competition; risks of shared-equity construction when purchasing housing; insufficient financing of road construction; long time to obtain a construction permit; bureaucracy in the sphere of state and municipal tenders. These problems can provide the risks for the particular construction company" (Gerasimova & Avdeeva, 2015). However, they believe risks most frequently occurring in the construction company's activity are divided into two groups: production and financial risks. Production risks include natural and environmental risks, property risks, organizational, sociological, and technological risks. Financial risks include credit risks, bankruptcy risk, liquidity risks, inflation risks, which together form the total risk of construction.

Therefore, today supervisory authorities should have risk management specialists. They can identify and take into account the necessary risks, on the basis of which organizations and production facilities can be assigned to a certain risk category, a certain class of danger.

Nevertheless, even the practitioners need the scientific help; only science is able to provide methods for determining (assessing) risks so that practitioners can professionally determine categories (classes) of risks and hazards to optimize the use of resources for control (supervisory) activities.

Nowadays, researchers offer various scientific methods. For example, at present, specialists apply a risk matrix for application at each facility in accordance with the history of compliance with the requirements of those facility (Fig. 2).

Danger level	Probability of non-compliance at the facility				
	Extremely low	Low	Average	High	Very high
High	<i>RA</i>	<i>HA</i>	<i>HA</i>	<i>High</i>	<i>High</i>
Higher average (HA)	<i>Reduced average (RA)</i>	<i>RA</i>	<i>HA</i>	<i>HA</i>	<i>High</i>
Reduced average (RA)	<i>Low</i>	<i>RA</i>	<i>RA</i>	<i>HA</i>	<i>Higher average (HA)</i>
Low	<i>Low</i>	<i>Low</i>	<i>RA</i>	<i>RA</i>	<i>HA</i>

Figure 2. Risk matrix for application at sites according to compliance history

Source: composed by the authors

For distribution of risks on categories of importance we can use the matrix of ranking of risks. To categorize the risks, it is divided into corresponding zones, i.e. qualitative categories. Figure 3 shows a variant of matrix with the distribution of risks by category (by score).

Probability levels	Levels of serious consequences (severity of damage)				
	Low (1)	Insignificant (2)	Medium (3)	High (4)	Critical (5)
Often (5)	5	10	15	20	25
Possible (4)	4	8	12	16	20
Rarely (3)	3	6	9	12	15
Unlikely(2)	2	4	6	8	10
Impossible (1)	1	2	3	4	5

Figure 3. Matrix of risk distribution by significance categories (variant)

Source: composed by the authors

For example, risks can be ranked as follows: 1-4 scores are moderate (minimal) risks, 5-10 scores – significant (acceptable) risks, 12-25 scores are critical ones (unacceptable or undesirable risks).

However, as applied to the specific conditions of organizations' activities, these matrices may vary in terms of both the risks identified and the indicators of their assessment, for example, the number of points assigned to risks and hazards.

We must also take into account the degree to which different risks affect the characteristics of a business or facility may vary by industry and environment. To distribute risks by categories of significance, domestic researchers often suggest dividing them into three groups: critical risks, significant risks, and moderate risks

(Fig.4).

Levels of probability	Severity levels of consequences (damage)				
	Insignificant	Moderate	Significant	High	Critical
Often	II	II	III	III	III
Probable	I	II	III	III	III
Improbable	I	II	II	III	III
Rarely	I	I	II	II	III
Very rarely	I	I	I	II	II

Figure 4. Distribution of risks by categories of significance (option)

Source: composed by the authors

Legislation risks are divided into six classes, which create problems for practitioners to use these matrices in practical work.

Concurrently, to completely characterize risks, it is not sufficient to assess the probability of risk occurrence. Essentially, it is necessary to identify critical risks which can cause serious performance problems for organizations.

To identify critical risks, researchers commonly recommend developing a risk map identifying a set of critical risks, the ignoring of which would be disastrous for organizations.

A risk map is a graphical and textual description of a limited number of an organization's risks arranged in a rectangular table. One "axis" of the table shows the impact, consequence or significance of the risk and the other – the probability or frequency of its occurrence. The map provides a visualization of the probability and degree of impact of various risks on performance based on the experts' analysis of possible risks. The map makes it possible to determine which risks should be prioritized, facilitates a regulated procedure for planning the minimization of threats from risks, and the method of responding to anticipated risks, as well as for planning control (supervisory) measures (Fig. 5).

For example, the group of risks outlined inside the red line will include the "critical risks". Consequently, they should be prioritized for minimizing the negative impact of risks and hazards and planned for unscheduled (urgent) audits.

According to the practice, to develop a risk map it is necessary to engage risk managers, experts who are competent to perform such complicated analytical work. The advantages of the risk assessment experts' activity include the absence for accurate source data and expensive software tools. But the disadvantages of expert risk assessment include the difficulty in attracting professional experts (there is difficult to find them), and their certain subjectivity.

It is impossible to regulate this kind of analytical work. Currently, there are attempts to develop IT tools to assess risks. Nevertheless, modern software designed for different levels of risk assessment. For example, for a large organization, risk analysis tools are most often embedded immediately in an integrated ERP-class package. ERP systems are based on the principle of creating a single data warehouse containing all corporate business information and providing simultaneous access to it for any required number of employees with the appropriate authority. The latest versions of MS Project are also used for risk assessment. They configure the risk assessment unit for identification, classification, as well as assessment and qualitative risk analysis with the construction of a probability matrix. Simulation modeling is provided by Project Expert, Alt-Invest software, etc. These techniques also need to be used correctly; we should be aware the field of their application, industry specifics, etc.

Thus, if a risk map was compiled by professionals, it allows us to identify potential risks; arrange risks by categories of significance; highlight the key, most dangerous risks, etc. Actually, a risk map will not solve the problems of reducing the negative impact of possible risks on activities or objects, but it will help specialists to resolve them practically.

For example, in relation to the construction of M.V. Gerasimova and L.A. Avdeeva proposed an algorithm containing three stages (Fig. 6).

At the first stage we conduct risk identification. It is the process of identification and compilation of

risks of the construction organization; each risk is characterized by risk management specialists, considering the specifics of the project's activity or object.

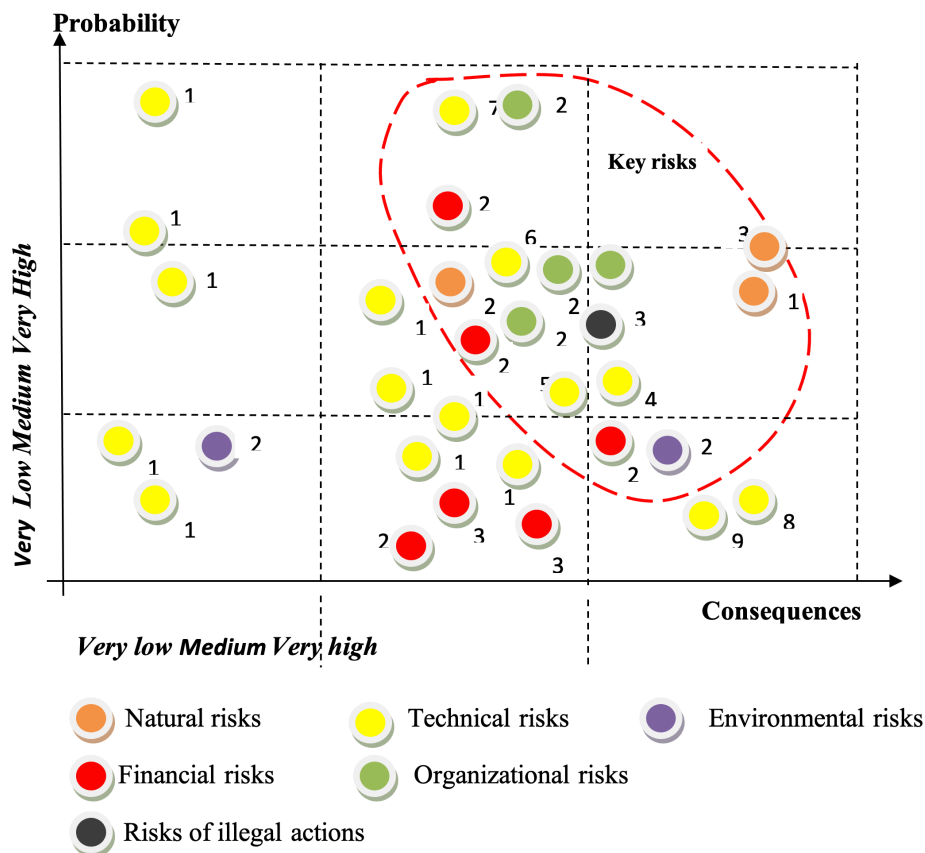


Figure 5. Risk map (option)

Source: composed by the authors

At the second stage, using the SWOT analysis method, it is possible to identify the maximum number of risks to which the organization is exposed. Concomitantly, risk management specialists can categorize the identified risks and describe their components (causes, hazardous events, types of impact, consequences and risk factors) in a uniform format.

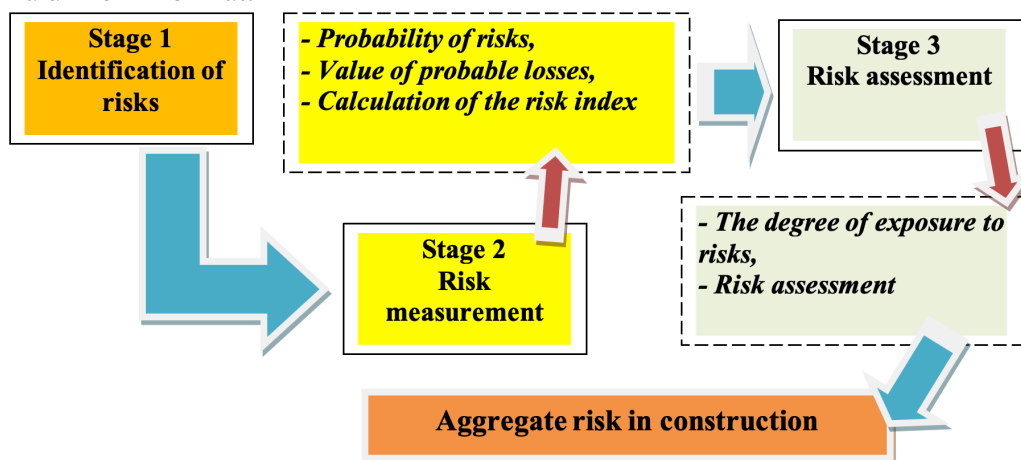


Figure 6. A variant of the algorithm determines the level of cumulative risk in construction for a specific organization or a specific production facility to a certain risk category or a certain hazard class.

Source: composed by the authors

At the third stage, risk management specialists should measure the probability of identified risks occurrence and the probable losses (Gerasimova & Avdeeva, 2015).

As a result of these actions, the level of cumulative risk in construction is determined for a specific organization or a specific production facility. Their assignment to a certain risk category or a certain hazard class (category) will serve as a basis for determining the frequency of their audits and the content of control (supervisory) measures.

This algorithm is applicable for risk assessment in all economic sectors. The effectiveness of this algorithm implementation will be determined by professional qualifications of the specialists performing this work, as well as by the methods they apply to assess the risks and hazards.

Conclusion

Therefore, firstly, at present, supervisory organizations (authorities) are obliged to implement a risk-oriented approach, which should regulate the planning and frequency of control (supervisory) activities.

Secondly, in order to classify the activities of legal entities and (or) production facilities used by them to a certain risk category or a certain hazard class (category) in order to determine the frequency of routine audits, it is necessary to take into account the documents of relevant departments, such as the Ministry of Emergency Situations, as well as documents adopted in the relevant industry, characterizing the specifics of the industry and individual types of activities and facilities in this industry.

Moreover, supervisory authorities should develop their own documents to classify the legal entities activities and (or) production facilities used to a certain risk category or class in terms of the specifics of their activities. At the same time, data on the attribution of the activities of controlled legal entities and (or) production facilities used by them to a certain risk category or a certain class (category) of danger should be posted on the website of the controlling (supervisory) authority and available to the audited organizations.

Nowadays the domestic supervisory authorities should employ risk management specialists who are able to professionally and scientifically provide an objective assessment of risks in order to classify the activities of legal entities and (or) production facilities to a certain risk category or a class. This is the most difficult and time-consuming work when implementing a risk-based approach, as an effective one, requiring special training and conducting scientific research in this field. All above actualize the topic of training specialists in domestic universities.

Fifth, Laws and regulatory documents in the field of risk management should take into account the recommendations of analysts, risk management specialists and domestic researchers studying the problems of implementing a risk-based approach in organizations.

Hence, only complex measures will make it possible to effectively fulfill the requirements of legislation on the implementation of the required risk-oriented approach in controlling (supervisory) organizations (authorities). It allows them to reduce the costs of conducting control (supervisory) measures and ensure their effectiveness through timely response to possible risks and dangers.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

Alexander A. Kiselev – conceptualization, project administration, funding acquisition, writing – original draft.

Roman V. Kolesov – validation, writing – review & editing.

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Energy security of economic systems in the context of global challenges: problems and consequences

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Abstract. The article reviews the global energy crises of the 1970s, 2021, and 2022 in the context of the economic systems energy security. The methodological basis of the research was general scientific and historical methods of the information analysis and assessment: generalization, data analysis and synthesis, logical and comparative analysis. The paper highlights and systematizes specific measures taken by countries to offset the consequences of energy crises, analyzes the effectiveness of these measures in the context of the economic systems energy security. The article also dwells on the causes and course of crises, highlights their common features, features, and differences. The study revealed that a combination of factors such as recovery from COVID, depletion of fossil fuel energy reserves and extreme weather conditions cause a sharp increase in global energy demand. The results of the study can be used as elements for the development of an energy security strategy.

Keywords: global challenges, energy crises, economic systems, energy security.

JEL codes: L16, L71, O13

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Introduction

The modern stage of the world economy development, individual economic systems development highlights the issues of energy security of the world economic system at all levels – international, national, and regional (local). Moreover, the importance of solving the energy supply problem is increasing as global challenges are intensifying their impact on economic systems at various levels.

Issues of access to energy resources to ensure economic growth and meet the needs of the growing world population, changing the structure of the existing fuels use, and the threat of climate change are on the agenda of most international organizations and governments of the largest world countries. The recent global trends in energy and trade provide the unprecedented opportunities for economic growth and sustainable development of national economies in the context of global instability. At the same time, there are also significant threats in the context of energy security. They threaten to some countries sustainable development and economic growth.

The purpose of the research is to study the theoretical foundations and develop practical recommendations on economic systems energy security in the global challenges.

Main part

Nowadays, energy crises are one of the most influential global challenges. Since the end of the last century, these problems have been escalating (Fig. 1).

The world is experiencing sharp price increases for all energy sources: gasoline, natural gas, and coal. According to the analysis of many experts in the field of energy market development, the forecast is unfavourable one. There is a well-founded concern on Ukrainian crisis, characterising by the years of

insufficient investment in the energy sector, has led to the world crisis. It could surpass the oil crises of the 1970s and early 1980s. Moreover, the energy crisis of 2021-2022 is not concern with oil only. Therefore, there is a need to analyze the energy crisis of the 70s of XX century.

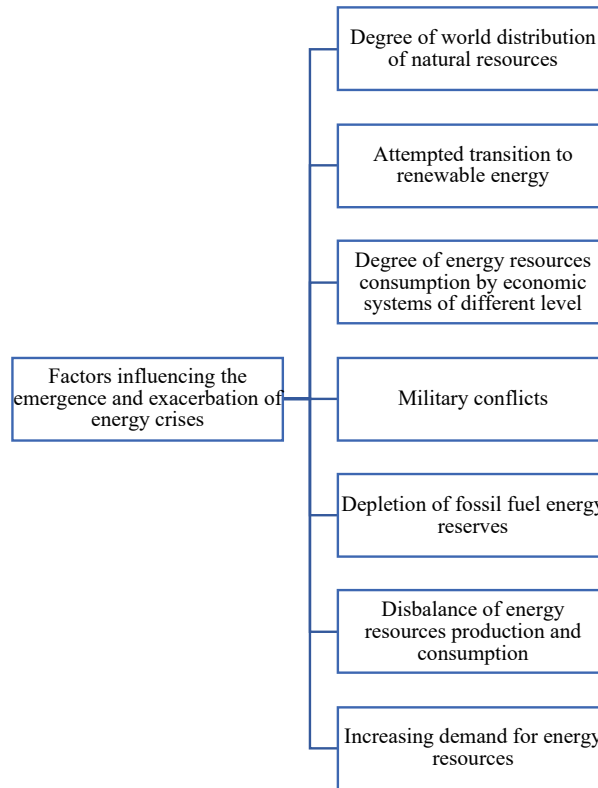


Figure 1 Factors influencing the emergence and exacerbation of energy crises

Source: composed by the authors

There are some obvious correlations between the crisis of the 70s and the modern one: gasoline prices are high, oil supplies are limited, and President Joe Biden, like former Democratic President Jimmy Carter, is under political pressure, etc. In addition, in the 70s, OPEC countries decided to ban oil supplies to the United States and other countries supporting Western policies (the UK, Japan, Canada, the Netherlands) to limit with military supplies to the United States – Israel in the conflict with Syria and Egypt. Currently, due to the military conflict in Ukraine within the framework of the OPEC+ agreement, the countries decided to reduce oil production. It will significantly increase the cost of energy resources, hence dealing a serious strike to the US, the EU, and their allies.

However, there are significant differences between today's crisis and that of 1970s. Today, oil prices are not under regulation, and the supply crisis raises the prices. It is mostly in accordance with the political situation. Also, interest rates and inflation rates are still significantly lower than they were decades ago.

There is also major element in today's crisis that was less noticeable in the 1970s: irreversible climate change combined with a liberal claim to abandon dependence on fossil fuels. Indeed, they significantly influenced on the transformation of energy systems in many countries. Therefore, the green agenda is extremely beneficial for Oil and Gas Companies working in the field of production and maintenance of equipment and infrastructure for the green economy project implementation. At the same time, it is extremely unprofitable for both national economies and energy-dependent industrial enterprises in energy-deficient countries.

In addition, the catalyst for today's crisis was a combination of the following factors: recovery after COVID-19, depletion of energy reserves of fossil fuels, extreme weather conditions causing a sharp increase in global energy demand, the military conflict in Ukraine¹.

Obviously, the 1970s were a turning point for power engineering. The political actions in the United

¹ Carita, F. A perfect storm: understanding the European energy crisis. LevelTen Energy. Available at: <https://www.leveltenenergy.com/post/europe-energy-crisis> (accessed 17.10.2022)

States, following the Arab oil embargo in 1973 and 1974, the Iranian Revolution in 1978 and 1979, formed the world. For instance, they helped introduce a 55-mph speed limit. Moreover, the energy revolution of the 1970s was not rapid one. Many challenges, such as rising energy prices, last during three presidential administrations, and their struggle has affected those authorities' political careers. The 1973 oil crisis was characterised by the long queues at gas stations, fuel shortages and panic (which, however, is very typical for the energy crisis of 2021-2022).

Fifty years later, a new energy crisis ensues, following the embargo on Russian crude oil. Negative transformation processes followed the inflated energy prices due to a post-crisis global supply shortage. Also, the situation tends to get worse. Meanwhile, European leaders are in a controversial position: there are merits of cutting oil and gas dollars and demanded Russian energy. Large TNCs are relocating their business from Europe to countries with lower energy prices, which will negatively affect the economic security of European countries.

As it was decades ago, these dynamic changes may determine energy policy for many years. In the United States, the oil crisis offers the country two options: abandoning fossil fuels or increasing oil dependence. However, at this stage there is a more interesting competition in the world between oil, gas, hydrogen, renewable energy sources, etc. The 1970s ensured the energy development for the last 50 years. Nowadays, there is kind the same situation but the less predictable one (Marchant & Chainey, 2022).

The US oil market was already under stress due to restrictions on the foreign oil import when crude oil price controls were introduced in 1971 to reduce the cost of everyday gasoline purchases by Americans. Price controls cause a shortage of gasoline and the Arab oil embargo. The crisis starts one of the greatest problems: rapid inflation.

No U.S. president has been affected by the oil crisis of the 1970s, perhaps as much as Carter, who lost his bid for re-election in 1980. Carter has taken several actions in response to energy instability in the long term. He claimed Americans to save energy by advising people to wear a sweater rather than turn the thermostat and installing solar panels in the White House. He also established the Ministry of Energy and invested in research and development of alternative energy sources, such as solar.

There is a feature of the energy crisis of 2021-2022, which is very different from the 1970s – it was partially created by the United States. The sanctions restrictions on the purchase of Russian oil were an attempt to weaken Russia by reducing its oil revenues. It was popular among both Democrats and Republicans in Congress, even though it meant the voluntary withdrawal of additional global supplies at a period of already inflated energy prices. Indeed, it distinguishes it from the Arab oil embargo, which aggravated the energy crisis of the 70s, when OPEC excluded America from oil supplies because of the USA supported Israel in its war with Egypt and Syria.

But the events of the 1970s can be interpreted in different ways. Modern politicians have tried to reduce energy costs, save their political careers, and get rid of dependence on foreign oil (Litvinov, 2021).

For today's politicians, economists, the message of a decade ago is that radical proposals can have long-term consequences and become popular, but they can also become political issues. This is a kind of dilemma that is being faced today about whether to strive to promote large energy and climate issues, or to move more gradually in terms of the energy policy. For example, in the 1970s, some decisions caused the opposite results – price control and resource allocation in the United States. The 1975 Corporate Average Fuel Economy Standards were introduced to improve the fuel efficiency of cars and trucks and represented the changes concerning the energy sector today.

Other long-term policy implications include the creation of agencies such as the Ministry of Energy, as well as the International Energy Agency, an attempt to balance OPEC with its system of member countries strategic reserves, and a new emphasis on data exchange to ensure greater transparency and research of oil markets. Moreover, in 1975, under Republican President Gerald Ford, the United States passed a law on the creation of its crude oil reserves as a buffer against manipulation of world crude oil reserves. It happened in the hope that the United States would never hold on to a barrel again due to an oil global shortage (Skorokhodova, 2015).

Before proceeding to the analysis of the current crisis in the energy sector, we consider the actions of various countries in the 70s (Table 1). In addition to creating strategic energy reserves and diversifying their imports from the following countries: the USSR, Mexico, Africa, and Southeast Asia, there were taken actions to develop their own energy production. The countries have also taken various political decisions to protect their energy security.

For example, France has reached an agreement with OPEC member states regarding long-term oil supplies. Japan began to support the Persian Gulf countries at the international level to ensure constant supplies. The United States and the United Kingdom made the efforts towards establishing cooperation with the countries of the Persian Gulf. The United Kingdom and the Persian Gulf countries worked according to a special scheme. According to it, petrodollars went to London, in turn, British firms began to expand their industrial activities in Saudi Arabia. Also, the arms supply there began. 3 months after the lifting of the embargo, the United States and Saudi Arabia signed an agreement on economic cooperation and arms supplies, and the investment of Arab countries in US assets also began.

In addition, they joined forces to fight communism. There is an issue of relevance of today's energy crisis against the similar previous ones, especially the oil shocks of the 1970s. This issue appears all over the world when consumers are suffering from high prices, businesses are concerned about energy supplies, political leaders and bankers are struggling with inflation, and countries are facing pressure on the balance of payments, and all this is accompanied by a military conflict in Ukraine.

Table 1 – Actions of countries to offset the 1970s energy crisis consequences

France	The UK	Japan	Germany	The USA
France emphasized the production of its own electricity through nuclear power (Messmer plan)	Accelerating domestic production of oil and gas in the North Sea	Increased investment in energy production (solar and nuclear power), which utilised domestically produced technologies. A forced measure was the increase in coal and LNG imports.	Diversification of energy re-sources import from the USSR and Norway. Development of nuclear energy industry. Increase in the investments into energy saving	Control of energy prices. Creation of the Strategic Petroleum Reserve and the Department of Energy within the government. Increasing investments in new technologies and alternative energy sources.
Results				
increase in the production of its own nuclear energy from 8 % in 1973 to 75 % in 1990.	reduced dependence on foreign energy imports; 80 % self-sufficiency in electricity needs by early 1980s; increase in domestic oil and gas production from 4.5 % in the early 1970s to 42 % in 1978.	- increased exports of cars; - competitiveness in the foreign car markets (the UK and the USA).	- increase in the market share of petrol, diesel, fuel oil produced in Germany to 50% by the mid-1970s; - reduced dependence on imports of energy products from Poland and the USSR.	- price control prevented an increase in own production; - mixed investment results: investments in nuclear power and shale gas production. At the same time, investments in synthetic fuels failed

Source: composed by the authors

In fact, today's crisis is potentially more destructive, and its consequences are even more negative. In the 1970s, it concerns with oil only, whereas the current crisis covers natural gas, coal and even the nuclear fuel cycle areas. One of the factors which could mitigate the crisis is price changes and consumer reaction.

In addition to inflation, today's crisis is turning the previously global market into a fragmented and more vulnerable to disruptions, which is holding back economic growth. Moreover, together with the geopolitical crisis caused by the war in Ukraine, this further deepens the rivalry of the great powers in the world. Today's energy crisis did not begin with the aggravation of the crisis in Ukraine; it arises in 2021, when the demand for energy resources increased sharply as the world emerged from the COVID-19 pandemic. It was caused by the coal shortage in China, and sharply prices increasing. Then the global market prices on liquefied natural gas and oil increase. The process of transition to renewable energy sources (hereinafter referred to as RES) depleted the energy reserves of fossil fuels. It caused a deficit of energy. There has been a significant increase in energy demand, and this deficit cannot be filled at the expense of renewable energy. Therefore, the energy crisis emerged. The energy supply crisis in the UK and parts of Asia and Europe has shown how the energy transition can have a ripple effect for all segments of society.

Having analyzed the production and consumption of energy by the world's largest economies, it is advisable to note the imbalances occurrence in the energy production and consumption (Fig.2).

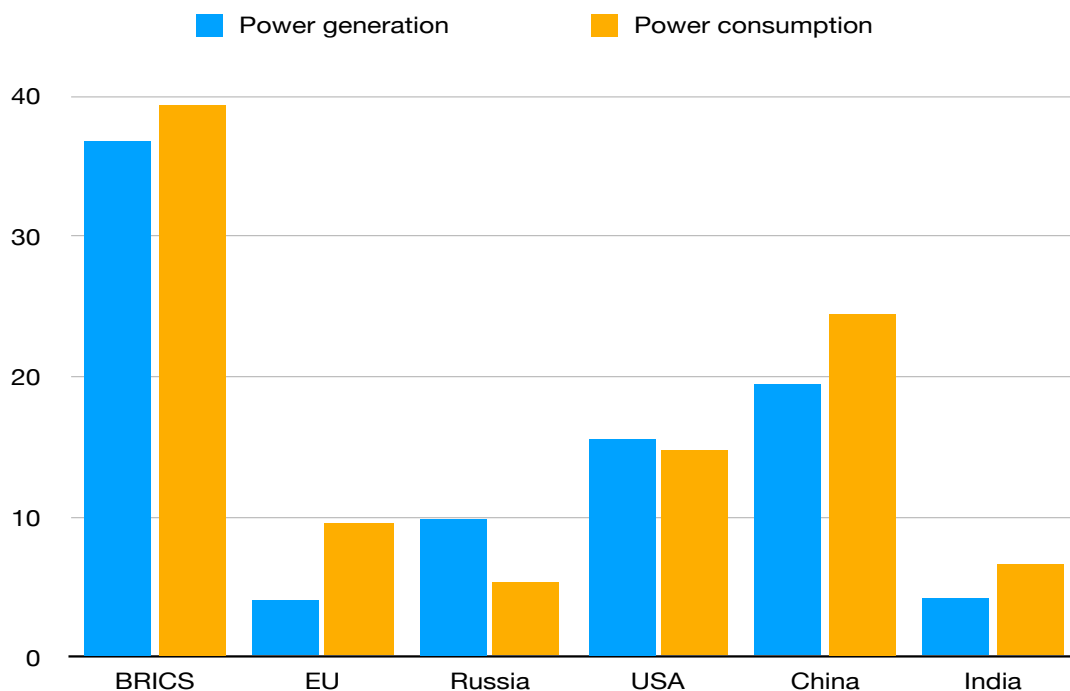


Figure 2. Total energy production and consumption in 2020, (mln tons of oil equivalent)

Source: compiled by the author according to <https://www.enerdata.ru>

Having analyzed the dynamics of the production of hard and brown coal in the EU, the Russian Federation, and the USA for the period from 1990 to 2020, (Fig. 3) it is advisable to note the downward trend occurrence in the USA and EU. In the context of the active development of the "green economy", it is quite reasonable.

In addition, analyzing the dynamics of changes in the trade balance of natural gas and LNG (Fig. 4), the Russian Federation has significant surpluses of natural gas, while European countries have a significant gas deficit, which has an extremely negative impact on energy security.

Analyzing the crude oil trade balance for the same period, the United States, as well as the EU countries, require crude oil imports, while the Russian Federation and Saudi Arabia have a negative trade balance and have the opportunity to export oil to other countries (Fig.5).

In 2022, the energy policy of the EU and the United States has changed dramatically towards strict protectionism. The start was the beginning of the SMO in Ukraine. All the adopted packages of sanctions against the Russian Federation had a sharply negative impact on the energy security of both EU countries and

individual enterprises and households.

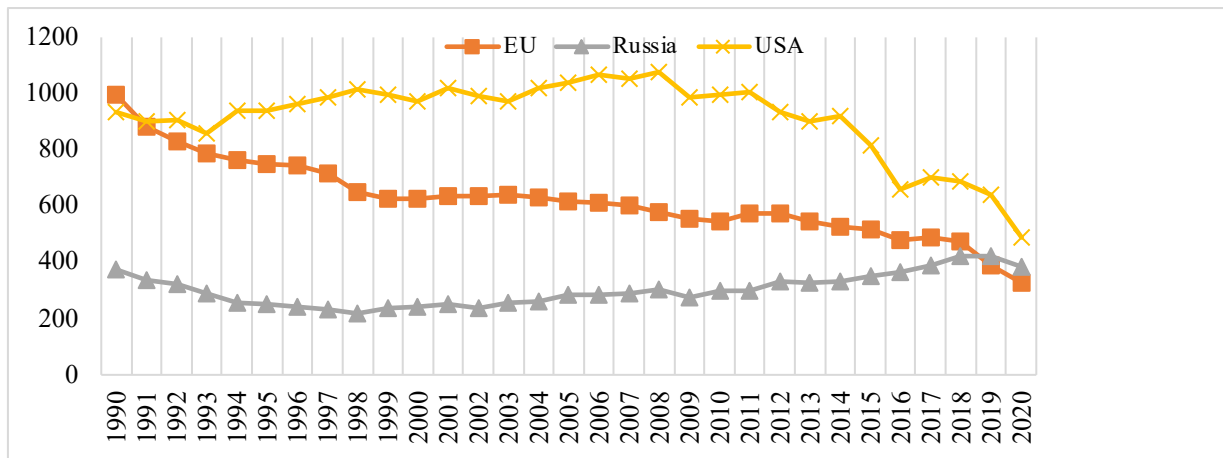


Figure 3. Dynamics of production of hard and brown coal in the EU, the Russian Federation, and the USA, 1990 - 2020, mln tons

Source: <https://www.enerdata.ru>

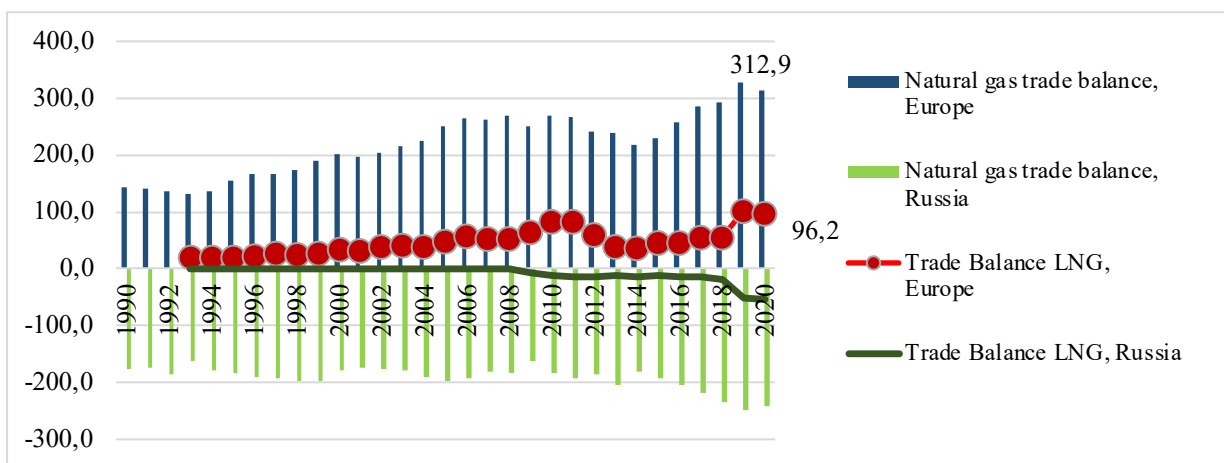


Figure 4. Dynamics of changes in the trade balance of natural gas and LNG in Europe and the Russian Federation, 1990 - 2020, bn cubic meters

Source: <https://www.enerdata.ru>

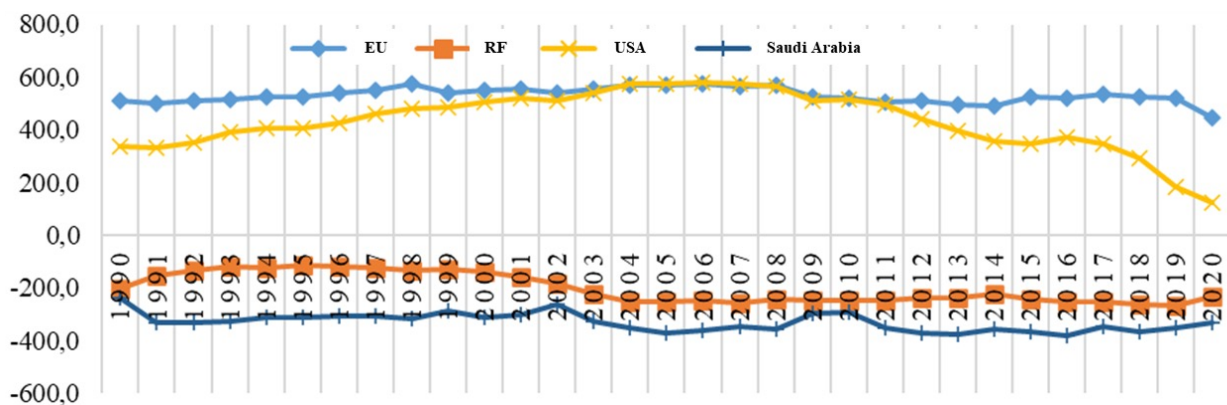


Figure 5. Dynamics of changes in the trade balance of crude oil for the period from 1990 to 2020, mln tons

Source: <https://www.enerdata.ru>

The energy crisis partly demonstrates reluctance of the renewable energy sources to meet the ever-growing global demand for energy from households and corporations (Fig. 6).

Therefore, it is necessary to consider claims to slow down the transition to energy until the renewable

energy sector is fully developed and ready to meet the ever-growing global demand for energy. Slowing down the transition to renewable energy is a necessary action (Borovsky & Shishkina, 2021).

Meanwhile, RES have the advantages. The most important advantage is that they do not pollute the atmosphere. Investments in the renewable energy sector are growing rapidly. Additionally, there have been significant improvements in battery technology. However, battery technology is not yet sufficiently developed to store large amounts of energy and provide the power required to meet national energy needs or to serve the national power grid. In contrast, the fossil fuel industry has been relatively ignored as investors exit the sector, resulting in a decline in fossil fuel energy stocks.

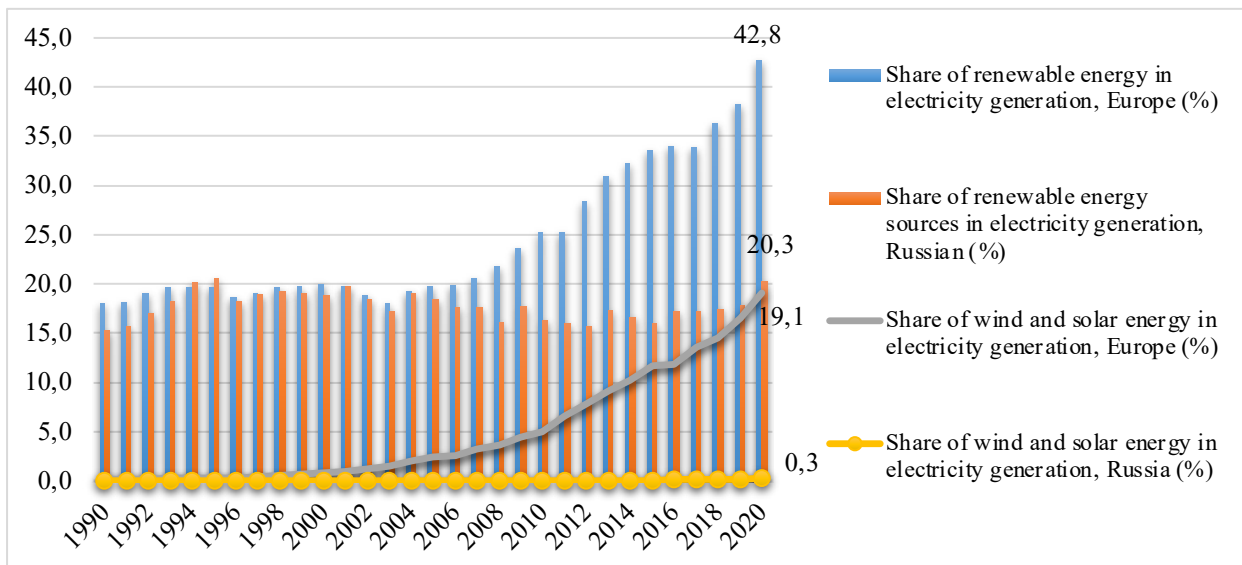


Figure 6. Dynamics of changes in the share of renewable energy sources and wind and solar energy in power production in Europe and the Russian Federation, 1990 - 2020, %

Source: <https://www.enerdata.ru>

It created a kind of vacuum. Subsequently, the recovery after COVID and the lifting of the restrictions of the pandemic era caused the unprecedented increase in energy demand, which could not be met by RES. Those RES were either undeveloped or developing, and it was also impossible to meet the growing demand due to depleted fossil fuel reserves due to the propaganda of the rapid RES transition. Excessive demand for energy against the background of depletion of the world's fossil fuel reserves caused an energy crisis in the UK, China, Lebanon, etc. The challenge faced by countries around the world during the recovery period is to reduce fossil fuel emissions to ensure the achievement of zero-carbon targets, as well as to guarantee energy supply to countries to avoid any undesirable socio-economic consequences of energy deficit.

Ahead of a large-scale energy crisis in 2022, world nations already have had complex energy challenges, such as rapidly rising global prices for natural gas and electricity. For example, in European countries, electricity prices have increased by more than 200%, especially in winter. The rise in electricity prices was caused by many factors, such as low natural gas reserves, low foreign supplies and sluggish maintenance work. It caused the shutdown of nuclear generators and other power plants. Further increase in electricity prices caused social protests. In the Middle East, the energy crisis affected Lebanon. Lebanon depleted stocks of imported fuel. It caused the fuel deficit in 2021.

India and China had an unexpected deficit of coal for utilities. Meanwhile, in India, more than 70% of electricity is generated by burning coal. In the middle of 2021, energy consumption in China increased due to the recovery period after COVID-19 and very hot weather. China had the most global blackout in a decade. Due to it, more than 20 factories in 31 provinces of China had unexpected shutdowns and growth retardation. The energy crisis in China was partly caused by the government's plan to decarbonize China's heavy industry, as well as attempts to reduce environmental pollution due to the climate change.

The UK provided state political support for the transition from the old economy (based on fossil fuels) to the new one (based on RES) before the crisis. It caused the money outflow from fossil fuel companies. Investors have started investing into renewable energy companies. Due to the lack of capital for fossil fuel enterprises, companies reduced their activities and production. Some fossil fuel companies attempted to have financial assistance, but failed. It forced them to terminate many of their employees. In August 2021, after the restrictions on the COVID-19 pandemic were completely released, the energy crisis became large scaled. It causes a sharp increase in energy consumption in winter.

Excessive demand for gas could not be met due to depletion of natural gas reserves and low wind speed in the UK. It caused gas deficit. Additionally, external factors, such as Brexit, also indirectly contributed to the energy crisis in the UK, as it made it difficult to import cheap gas from adjacent European countries. Brexit has also made it harder for heavy-duty vehicle (HGV) drivers to enter the UK to drive trucks and assist in the wholesale distribution of gas through many petrol stations. As a result, Brexit was a reason of HGV truck drivers' deficit in the UK. Consider the various measures taken by countries to minimise the impact of energy challenges. Those presented in Figure 7 had both positive and negative consequences. For example, in Punjab (India), the blackouts caused the protests. The UK regulator has limited the price that energy suppliers can charge consumers. This restriction caused the collapse of four small energy companies, as they were unable to raise the retail price of electricity to cover their operating costs. US demands from oil-producing countries to increase production have provoked the environmental activists. Regulation of rising gas prices in France caused the criticism of the French Economy Minister – Bruno Le Maire; he was accused of destroying 85% of the state-owned electricity giant EDF. EDF is under public regulation and forced to sell more of its electricity to competitors at a lower price. According to EDF, it will cost to the company 8 bn euros this year.

Country actions for mitigating energy challenges in the post-COVID-19

- Providing subsidies to energy suppliers and introducing marginal price to protect citizens from electricity price increases as their economies fully recover from COVID-19 (Spain, Italy, Greece, UK).
- Shortage of coal in India caused coal use cancelling for non-energy purposes; coal supply only for energy purposes.
- Scheduled and rolling blackouts for households and industries (India, Lebanon, China), rationing of electricity to manufacturing plants (China).
- Marginal price limiting (the UK); limiting energy products prices and company profits (Spain).
- Providing loans to energy-intensive industries to help them pay energy bills; paying fuel bills for people on lower incomes (the UK).
- Financial help to the poorest households (France, Italy).
- Payments of €100 (£83) to low-income families (France); Denmark plans to issue a tax-free cheque to families with a system of individual gas heating (project not yet approved).
- Spain has reduced tax rates and introduced a temporary windfall profits tax for energy ofited from price spikes (the "Shock Plan"). The plan is to get €2.6 bn by the end of 2022 to redirect these profits to consumers in months when energy consumption was the highest one.
- Many countries suspended or slowed down the transition to green energy and renewables, e.g. Austria and Germany have reactivated some abandoned coal-fired power plants.

Figure 8. Country actions for mitigating energy challenges in the post-COVID-19, 2021

Source: composed by the authors

According to Fatih Birol, economist and energy expert, International Energy Agency CEO (hereinafter – IEA), the key aspect to mitigate the current energy crisis is the maximum use of existing oil and gas deposits, as well as the use of shale oil and gas as they quickly enter the market. Moreover, it is also necessary to reduce the amount of methane emissions from fossil fuel operations, and ensure the construction of liquefied natural gas terminals for the storage of ammonia or hydrogen in the future. He noted that most of the response measures should come from an emphasis on clean energy, renewable energy, energy efficiency, and an increase in nuclear production (in countries with nuclear potential) (Birol, 2022).

Today, the higher investment in clean energy is formidable ones. According to IEA, the key solution

to today's energy crisis – and to achieve net zero emissions – is to dramatically increase energy efficiency and clean energy. In terms of production, the most suitable options are short time projects and fast payback periods. They include, for example, shale oil and gas (which can be quickly brought to market), expansion of production from existing fields, and the use of natural gas. New infrastructure may also be needed to facilitate the diversification of supplies outside of Russia. It is especially important for the European Union, since an embargo on oil supplies from the Russian Federation is being imposed on December 5, 2022. Many European countries try to implement LNG import terminals. Moreover, with careful investment planning, they have opportunities to facilitate future imports of hydrogen or ammonia. However, the long-term strategies to today's crisis are to reduce demand due to the rapid introduction of renewable energy, energy efficiency, and other low-emission technologies. They include maximizing the use of nuclear energy in countries which assess their future energy balance.

In the long term, renewable energy sources are one way to maintain affordable energy prices while facilitating the transition to zero consumption.

Among the continents of the world, Asia is the largest investor in solar energy. Having overtaken Germany in 2015, China is now the world leader in the use of photovoltaic systems, with an installed capacity of 174 GW. Moreover, country energy suppliers plan to place a solar power plant about 22,000 miles above earth.

Germany has been one of the leading producers of solar energy on the planet for many years. More than 120,000 German households have solar panels, and more than 30 important photovoltaic power plants are located throughout the country. Germany plans to use only renewable energy sources by 2050.

Japan has been one of the leaders in the field of renewable energy since the 1990s. In addition to being at the forefront of electricity generation, Japan is also one of the largest producers of technologies for the solar panels. For the past two years, the Japanese government has considered solar energy as one of country priorities. They have made the panels more attractive and accessible to citizens by reducing the cost of installing solar panels².

Other examples of countries using solar energy are:

- in terms of installed capacity, the UK has finally managed to overtake Spain and France. Public initiatives encouraging households, businesses, and schools to use solar panels have successfully helped the UK become one of the leading producers of solar energy on the continent;

- over the past decade, the use of solar energy in Australia has increased significantly: as of September 2019, more than 2 million plants were installed. However, many people believe the country could have done much more – there are many hours of sunshine in almost all areas of Australia. Indeed, the government plans to finance new plants and increase production next years;

- over the past decade, Italy's dependence on solar energy production has increased dramatically. In 2009-2013, the installed photovoltaic capacity of Italy increased 15 times, overtaking the USA, Japan and China. However, the tax benefits provided by the government to solar farms have cancelled. It causes the closure or sale of many farms producing solar energy. Nevertheless, Italy is still one of the leading countries in Europe in terms of the use of solar energy;

- since India is a developing country, this energy plays a crucial role in the purification and heating of water in many of its regions. The government of India plans to increase the installed capacity to 100 GW next years;

- The USA has a long history of solar energy implementation. Since the launch of the SEGS thermal power plant in 1983, more than 17 million megawatt-hours have been produced. The United States is steadily increasing its status as a leader in solar energy production – in 2014 almost \$ 20 bn was invested in the solar energy industry.

According to experts, Europe's rapid transition to a sustainable low-carbon future is impossible without the involvement and participation of citizens who produce and consume this energy locally. Forest fires,

² Samsa, M. *Top 10 Countries Using Solar Energy – Solar Panel Renewable Energy*. Available at: <https://energieadvisor.org/countries-that-use-solar-energy/> (accessed 17.11.2022).

drought and record heat caused by climate disruption, combined with a sharp rise in gas and electricity prices due to the Ukrainian crisis, made the transition to alternative, renewable sources even more urgent³.

Many European communities (i.e. solar panels on the Netherlands, biomass burners in Spain, etc.) are increasingly producing, consuming, and selling their own energy. This EU trend is crucial one in terms of the achievement of climate sustainability. According to the latest data, 2 mln Europeans currently participate in 7,000 local energy communities across the continent. Moreover, their number is growing rapidly after the introduction of the EU directives on the development of clean energy and energy communities in 2018-2019. They will play a key role in Europe's transition to green energy, because as heat pumps replace gas boilers and electric vehicles replace internal combustion engines, highly centralized power generation and distribution systems – power plants and networks – will not be able to adequately handle with the huge demand. The only way is increasing of decentralization, production, and consumption of more energy locally using sources such as solar and wind, as well as increased storage and intelligent solutions for efficient energy management. It provides the involvement of ordinary citizens into this particular process.

Some communities have been successfully operating for many years. For example, in the Bera Bera district of San Sebastian, Spain, a cooperative has been operating since 1985, providing hot water and communal heating to more than 500 of its members. Studies of energy exchange models between equal partners show their accessible, democratic, cooperative and socially nature in comparison with the traditional energy markets. In essence, they prosper because of the social interconnectedness between end-users, rather than on the basis of competing economic interests.

Thus, the key feature of the modern crisis is a clear political character, namely the confrontation between Russia and the West. Indeed, by imposing sanctions against Russia and restricting the import of Russian energy carriers, Europe is driving itself into an energy crisis. In addition, a further series of events, such as the undermining of the Nord Stream and the OPEC+ agreement on reducing oil production, only deteriorate the current situation, also for the United States. The EU's prosperity consisted in importing cheap Russian energy, and in the current situation they need to source energy from European countries. In this connection, the EU economy will undergo significant structural changes.

Conclusion

Currently, the solution can only be the complex use of various measures. Renewable energy sources are one of the possible solutions. However, at the moment RES cannot fully deal with the current complex energy situation. In the framework of a comprehensive approach to this problem, RES can be one of its tools. In addition, the social aspect of RES implementation is of great importance for the EU.

Moreover, diversification of both energy resources and their suppliers is extremely important for economic systems of various levels.

The most important condition for this is the depoliticization of energy security. The attempt to make energy (a necessary condition for economic growth) the subject of political confrontation is a challenge to the global energy security system. Furthermore, in terms of the fact that a third of the world's population does not have access to energy resources, the global social dimension of energy security also becomes obvious one.

The inability to develop the economy without energy also implies the impossibility of overcoming problems recognised by the world community as global: poverty, epidemics, low level of education, environmental threats, etc.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

³ Henley, J. *Energy citizenship: Europe's communities forging a low-carbon future*. *The Guardian*. Available at: <https://www.theguardian.com/environment/2022/sep/03/energy-citizenship-europes-communities-forging-a-low-carbon-future> (accessed: 05.11.2022).

AUTHORS' CONTRIBUTION

Viktoriya A. Kravchenko – conceptualization, project administration, funding acquisition, writing – original draft.

Evgeny B. Mishin – data curation, formal analysis, validation, writing – review & editing.

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Necessary and sufficient conditions for the competitiveness of the «technological sovereignty of Russia» project

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Abstract. The article analyzes the problem of gaining technological sovereignty in terms of formational and civilizational approaches. The paper highlights the stages of Russia's acquisition of technological sovereignty: from economic – through scientific and technological – to technological one. It initially interpreted as import substitution (less often – as proactive import substitution), later – as the creation of its own competitive technologies. According to this stage, the purpose of forming technological sovereignty acquired the status of a priority for the domestic national economy. The author gives definition of technological sovereignty as an economic category. Namely, the expanded reproduction of technological self-sufficiency based on the design, implementation, and development of key technologies in an open-closed economic system. On the one hand, the author highlights the necessary conditions for the competitiveness of the «technological sovereignty of Russia» project, and refers to them those that ensure the simple reproduction of Russia's technological self-sufficiency, or its survival in a hybrid war. On the other hand, author substantiates the sufficient conditions for the competitiveness of the project named above. Moreover, those should ensure the expanded reproduction of Russia's technological self-sufficiency, or its development in a hybrid war. As a result, author comes to the conclusion that despite the importance of creating the necessary and sufficient conditions, the implementation of the «technological sovereignty of Russia» project does not guarantee the successful innovative development of industries without appropriate institutional and economic conditions for their modernization.

Keywords: competitiveness, technological sovereignty, industrial policy, critical technologies, core technologies, supporting industries technologies, autarkical model, open-closed economic system.

JEL codes: O14, O25, O33, P51

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Introduction

The technological development of society was considered in terms of theoretical economics, but rather as a minor one; the major one were the property relations (within the framework of the formational approach of K. Marx & F. Engels (1961), V.I. Lenin (1969) etc. Nevertheless, it also was considered in cultural, social, historical, legal, etc. relations (within the framework of the civilizational approach of A. Toynbee (2009), K. Jaspers (2017), P. Sorokin (2000), U. Rostow (1961), E. Toffler (2010), N.Ya. Danilevsky (1985) et al. Indeed, it is surprising, since it is the technological basis that is the platform on which essential property relations are built (as relations between people regarding the appropriation of factors and production results in the interests of certain subjects of public life). Moreover, it is the way labour is connected with the means of production determining the system of relations of production, distribution, exchange, and consumption of any society. This causal dependence is particularly clearly indicated in the formational approach: production relations should correspond to the level and nature of the development of productive forces. On the other hand, there are critical historical periods when the problem of technological rearmament voluntarily and involuntarily become primarily in terms of the the theoretical economic research. It is a transition to a new technological paradigm which associated with the beginning of a new big wave of the K-cycle, or an issue of

the society survival (as a result of natural or military events).

Many Russian scientists concerns with the idea of technological sovereignty: O.V. Andreeva (2014), A.A. Afanasiev (2023), A.V. Efimov & S.A. Tikhonovskova (2022), I.B. Konstantinov & E.P. Konstantinova (2022), A. Neklyudov & I. Livshits (2016) etc. They considered this concept in a conceptual, methodological sense, and in the context of technological sovereignty of the Russian Federation building strategy.

Recently, the purpose of Russian economic technological sovereignty was formulated as a prior one (for the period up to 2030)¹. Currently, it is caused by both reasons: the development of the sixth technological way of life, and the life support of Russian society in the face of unprecedented anti-Russian sanctions that have escalated into an undeclared war against the Russian Federation. The purpose of this paper is to study this problem to the identification of necessary and sufficient conditions for the acquisition of technological sovereignty of Russia, which will ensure its technological competitiveness.

Main Part

The issue of "technological sovereignty"

Since early times, this issue has been considered through the theory of comparative advantages in international exchange by D. Ricardo (2008). In accordance with it, full technological independence is possible when implementing a self-reliance model. The autarkical model guarantees autonomy from international cataclysms, and ensures the invulnerability of national development, no matter what demands, or even ultimatums, are made by the other nations. However, such independence provides reducing of benefits of the international labour division, and the consequent decline the living standards. Meanwhile, in case of deformation of this system, causal connections are also transforming. Currently, as a result of a hybrid war against Russia, it decreased economic efficiency considerations and made the economy subordinated on politics and geopolitics. Therefore, technological sovereignty is a necessary condition for the country survival and the maintenance of economic and political independence.

There was no concept of "technological sovereignty" in Soviet encyclopaedias. The technological method of production was considered as "a historically defined way of combining various components in the system of productive forces, primarily man and technical means of labour" (Economic Encyclopedia, 1980). The basis of this definition is the position of K. Marx, who introduced the term "technological method of production" (Marx, 1974). However, the textbooks considered only the social mode of production (within the framework of the formational approach) as a specific way of combining productive forces and production relations (Course of Political Economy, 1973; Medvedev, 1988).

The term "sovereignty" (from fr. Souveraineté) literally means supremacy, domination, independence in various matters (Brockhaus and Efron Encyclopedic Dictionary, 1901; Great Soviet Encyclopedia, 1976). In this paper we do not consider the political interpretation of the complex category of "sovereignty" in the form of state, national, and national sovereignty. Economic sovereignty is associated with independence in the economic sphere, or economic independence of a state or region from other states or regions (Dictionary of Financial and Economic Terms, 2021; Reisberg, 2023).

The world science began to use the term "technological sovereignty" recently. There were two reasons for the emergence of this concept: on the one hand, the scientific and technological revolution began to play the role of a factor ensuring not only the economic success of states, but also their security, primarily in the information and communication sphere, and, on the other hand, the development of post-industrial society increased the role of the knowledge economy as the most important branch of the national economy. Therefore, any technological and information dependence became a condition for increasing the gap in the

¹ Decree of the Government of the Russian Federation No. 603 on 04.15.2023 "On Approval of Priority Directions of Projects of Technological Sovereignty and Projects of Structural Adaptation of the Economy of the Russian Federation and Regulations on the Conditions for Assigning Projects to the Technological Sovereignty Projects and Projects of Structural Adaptation of the Economy of the Russian Federation, on Providing Information on Projects of Technological Sovereignty and Projects of Structural Adaptation of the Economy of the Russian Federation and Maintaining a Register of these Projects, as well as Requirements for Organizations Authorized to Submit Conclusions on the Compliance of Projects with the Requirements for Projects of Technological Sovereignty and Projects of Structural Adaptation of the Economy of the Russian Federation". Available at: <http://government.ru/docs/all/147043/> (accessed 01.02.2023).

global competitiveness (Prihodko, 2022).

In Russia, the transition from economic to technological sovereignty can be considered as the category of "scientific and technological sovereignty". It appeared in connection with the activities of the Information and Analytical Center of the President Administration 30 years ago. The wave of anti-Russian sanctions after the return of Crimea in 2014 led to interest in the import substitution projects. However, the term has acquired particular relevance since 2022, after the start of the Special Military Operation. It was the result of the unprecedented sanctions pressure of the collective West on Russia. Indeed, it became obvious that a simple replacement of foreign analogues, and the mechanical replacement of some foreign suppliers by other ones, is insufficient, and it is necessary to design and develop own competitive technologies².

According to the amendments of 2023 to the Federal Law "On Industrial Policy" of 2014, technological sovereignty is not the protection of the national economy as the preservation of human, financial, technological, and material potential. It could contribute to the industrial development as a whole³. In this concept, there is no necessary requirement to ensure the preservation of potential and its development, but also the implementation of technologies which would not allow the economy to become technologically dependent.

The modern interpretation of technological sovereignty does not identify it with the absolute isolation of the national economy from the world. It considers the technological sovereignty over critical technologies to ensure well-being and competitiveness. It also provides scientific, technical, and industrial development of the country to establish and maintain its own technologies and the necessary infrastructure, as well as guaranteeing the independence of politics and economy from foreign technologies⁴. Key technologies should be developed independently or borrowed from other economies without unilateral structural dependence. In other words, dependence is still allowed, but it should ideally be minimized. It makes it possible to evaluate technological relations with other countries as partnerships in which technological sovereignty should be considered as a "strong negotiating position" ensuring "mirror deals"⁵.

Russian scientific literature interprets the issues on what technologies are critical ones. S. Yu. Glazyev proposes to distinguish core technologies and technologies of supporting industries technologies providing the possibility of deploying nuclear directions and their transition from the origin to the growth. In terms of the sixth technological order, its core consists of nanobiotechnology, cellular technologies, methods of genetic engineering, artificial intelligence, and robotics (Glazyev, 2019). Electrical engineering, aviation, space, nuclear industry, instrument engineering, machine tool construction, education, communications retain their role of supporting industries technologies from the technological order, as so as healthcare, agriculture, the creation of new materials with predetermined properties, chemical, metallurgical complex, construction, shipbuilding, and automotive industry.

In terms of the last 10 years, and in more applied aspect, there is the set of key technologies: 5G Internet, production of electric cars and self-driving cars, 3D printing, artificial intelligence and Big Data, VR and AR (virtual reality and augmented reality), cloud data storage, Internet of Things, quantum computing, blockchain, brain implants⁶. Nevertheless, there are country-specific features. Hence, the EU countries rely on energy and digital transformation of the economy, quantum computing, artificial intelligence, and blockchain; China – on 5G, green energy, wireless cars, and quantum technologies; Japan – on robotics, "green", and space exploration; Russia – on unmanned transport, manufacturing of electric vehicles and personal medical

² Meeting with young nuclear scientists (2023). Website of the President of Russia: official website. September 8th. Available at: [URL:http://www.kremlin.ru/events/president/news/72220](http://www.kremlin.ru/events/president/news/72220) (accessed 01.02.2023).

³ Federal Law No. 245-FZ of 13.06.2023 "On Amendments to the Federal Law "On Industrial Policy in the Russian Federation" and Article 44 of the Federal Law "On General Principles of the Organization of Public Power in the Subjects of the Russian Federation" (2023). Available at: <http://publication.pravo.gov.ru/document/0001202306130070?index=1> (accessed 01.02.2023).

⁴ Andrey Belousov Named the Main Directions of Technological Policy (2022). Rospatent. July 18. Available at: <https://rospatent.gov.ru/ru/news/belousov-tehnologicheskayapolitika-18072022> (accessed 01.02.2023); Denis Manturov: We Will Ensure Our Technological Sovereignty Over Critical Technologies (2023). Rossiyskaya Gazeta, June 14 (in Russian).

⁵ Why Technological Sovereignty Is Important for Russia. RBC: official website. June 9th. Available at: <https://www.rbc.ru/newspaper/2022/06/10/62a0e95b9a79472d8b713207> (accessed 01.02.2023).

⁶ 10 Key Technologies of the Last Decade (2020). Skillfactory: official website. December 18. Available at: <https://habr.com/ru/companies/skillfactory/articles/533668/> (accessed 01.02.2023).

devices, pharmaceutical, chemical, energy, and aviation industries, as well as projects to create infrastructure and provide services (Goryacheva, 2023).

The domestic scientific literature interprets the technological sovereignty as criteria for achieving it, or as achieving a stable state of the country's economic system (Afanasyev, 2022); as an element of the scientific and technological security system goal (Kokoshin, 2015); as the ability of the state or organization to independently control and manage their own technological resources, infrastructure, and processes, as well as design and develop their own technologies (Yankovskaya, 2022); as the utilitarian and applied aspect as "full or partial withdrawal of the technological chain (chains) from external cooperation" (Egerev, 2022); or, on the contrary, as a state of the economy in which any imports within the framework of the production of commodities of proper quality are compensated by proceeds from the sale of their own exports (Faltsman, 2018). In our opinion, it does not guarantee the achievement of technological sovereignty. Moreover, Faltsman's definition obviously does not correspond to the meaning put into the concept and is more suitable for the term "foreign trade sovereignty" or "foreign trade security". The inclusion of the requirement to compensate imports at the expense of exports in the definition is not complemented by the condition to ensure the exchanges do not cause unequal development, because if compensation is provided at the expense of trade in raw materials and agricultural goods, there can be no issue of technological sovereignty.

The author gives definition of technological sovereignty as an economic category. Namely, the expanded reproduction of technological self-sufficiency based on the design, implementation, and development of key technologies in an open-closed economic system.

Necessary conditions for the competitiveness of the "technological sovereignty of Russia" project

In accordance with the author's definition of technological sovereignty, we believe that the necessary conditions for the competitiveness of the "technological sovereignty of Russia" project include those ensuring the simple reproduction of Russia's technological self-sufficiency, or its survival in a hybrid war.

The establishment of these conditions began with the import substitution policy. The concept of technological sovereignty replaced the previous import substitution strategy, which emerged in 2014. The first wave of sanctions against Russia in 2014 resulted in restrictions on imports of some key goods, which required local production, i.e. import substitution. Therefore, the Government of the Russian Federation adopted Decree No. 1936-r on 30.09.2014 "On Approval of the Plan to Promote Industrial Import Substitution". The plan was designed for the period up to 2020, and included 23 sectoral action plans on import substitution. The Government of the Russian Federation has adopted a number of decrees on import substitution, a special government commission has been established. Over the period 2015-2018, 1.6 trillion RUB of budget funds were allocated for the purpose of import substitution. However, the import substitution plan was implemented only partially, for example, for the production of certain food products. In general, by 2020, the policy of import substitution has not become a significant factor in the growth of industrial production. It is quite difficult to really characterize the situation, since the materials for assessing the results of the import substitution policy implementation are not available in the official publications of Rosstat, the Government of the Russian Federation, etc.

In 2022, due to the withdrawal of a significant number of foreign companies from the domestic market, massive sanctions restrictions on the import of many critically important goods, and the disruption of logistics chains, it became vital for Russia to develop effective compensatory mechanisms to maintain the stability of the national economy. The model of import substitution formed in previous years did not meet these requirements.

Meanwhile, the concept of technological sovereignty, in contrast to the import substitution doctrine designed for a short-term period, due to its universal nature and potential ability to provide a radical solution to the issues of restructuring the country's economy, is most correspond to the long-term economic and national interests of Russia. The President of the Russian Federation drew attention to this both during the St. Petersburg International Economic Forum in 2023⁷ and during his speech at the XX meeting of the Valdai

⁷ Results of SPIEF-2023 (2023). *Vedomosti*, June 19. Available at: https://www.vedomosti.ru/press_releases/2023/06/19/.

International Discussion Club in October 2023⁸.

In practice, according to the Decree of the Government of the Russian Federation No. 603 on 04.15.2023, there are 13 priority areas, which can be referred to the technologies of the supporting industries technologies rather than to nuclear technologies: aviation industry, automotive industry, railway engineering, medical industry, oil and gas engineering, production of agricultural machinery, specialized machine-building sector, machine building, shipbuilding, pharmaceuticals, chemical industry, electronics, and energy. For example, in the aviation industry, projects will be implemented to design civil and cargo aircraft, unmanned aerial vehicles, spacecraft and satellites. In the medical industry, the priority is the development of pacemakers, prostheses, surgical instruments, artificial lung ventilation devices, etc. In agricultural engineering, the emphasis is on the production of domestic combines, tractors and their parts.

The priority areas include industries with the level of production localization is now less than 50%.

The Decree No. 603 also identified priorities for projects of structural adaptation of the modern economy realities. They are required for the creation or modernization of infrastructure that allows reorienting transport and logistics flows to Southern and East friendly countries. Such projects, in particular, include the construction of seaports, shipyards, the design and development of industrial technology parks, the construction of customs warehouses, and various products transportation services.

Projects within priority areas will benefit from the special bank approach in approving loans, lower interest rates, and more active participation of development institutions.

The implementation of structural economy adaptation projects requires a new strategy of foreign economic activity, the appearance of which is expected by the end of 2023. The emphasis is on the processes of deglobalization, which presuppose the establishment of a "development enclave" by Russia. At the same time, the United States, Germany, and other EU countries are following the same path and establish their own enclaves, relying on protectionism and the development of domestic demand. First Deputy Prime Minister of the Russian Federation A. Belousov define it as an "own strategic sustainability". It is ubiquitous, although in the West it depends on the positions of the ruling parties and groups and may change with the change of public authorities⁹.

Anyway, the strategic plan for Russian foreign economic relations is to establish two tracks. The Russian authorities call the first track (or space) integrational one, and reduce it primarily to the EAEU (common infrastructure, standards, market access rules, etc.). The second space includes a kind of "distant circle of supporting countries", in which included Asian, partly Latin American and African partners of the Russian Federation. This approach corresponds, of course, to the modern realities. The main problem is their strategic stability. Meanwhile, the Russia partner countries in the EAEU have a negative attitude towards this association and the dominant role of Russia. Therefore partners are developing the other niches in the global economy. Nevertheless, they can change their preferences depending on the needs and conjuncture, and pay great attention to relations with the West.

Based on the foreign economic strategy being developed by the government, it can be expected that the Russian authorities will pay more attention to the infrastructure for international settlements, cooperate with exporters, helping them to work in new sales markets through support and information. The development of transport corridors, including those such as the North-South corridor, remains a focus to ensure their secure operation in terms of border crossing and flow speed.

To solve the problem of developing domestic demand, special attention is paid to small and medium-sized enterprises (SMEs). A new national project to support SMEs is expected to be developed. The authorities see this as a way to keep people employed (including a special focus on youth business) and to ensure their income. In turn, as a result of the measures taken, SMEs are expected to take a more active part in solving the tasks of achieving technological sovereignty (with a stake on high-tech developers), increasing labor productivity, developing domestic tourism, etc. Essentially, the intention is to avoid the image of SMEs as

⁸ *Meeting of the Valdai Discussion Club (2023). Website of the President of Russia: official website. October 5th. Available at: <http://www.kremlin.ru/events/president/news/72444/videos> (accessed 01.02.2023).*

⁹ *Belousov Announced a Paradigm Shift in the Functioning of the World Economic Space (2023). TASS: official website. October 21. Available at: <https://tass.ru/politika/19081911>(accessed 01.02.2023).*

traders and other service industries. In other words, the idea is to move away from the image of SMEs as trading and other service industries. Instead, the aim is to establish a "technological", "productive" SME, partly export-oriented, related to big business and the authorities.

However, SMEs are not able to launch the process of self-reproduction of the economy as a whole and prevent the stagnation of entire industries (for example, civil aviation or machine tool construction, which is a key for the country's technological sovereignty). About 20,000 machines are produced in Russia today. It is only 0.001% of the world output of machine tools. Hence, the output of the Russian machine tool industry is only 0.02% of Russia's GDP¹⁰.

The Higher School of Economics regularly conducts surveys of enterprises in various sectors of the Russian economy. One of the latest (conducted in 2023) concerns with about 1,000 industrial enterprises. When asked about their dependence on imported equipment, 18% of enterprises consider this dependence as an extremely high; 37% – as is low one. The rest rated this dependence as moderate.

Experts believe the production rate should be about 40 thousand machines. With approximately this scale of domestic production, Russia can achieve real technological sovereignty.

But it is necessary to make the ruble a full-fledged investment mechanism. By Academician S.Yu. Glazyev, the size of the Central Bank's key rate should be significantly lowered – up to a near-zero or even zero value for enterprises of supporting industries, i.e. group "A" enterprises (production of capital goods) to ensure their rapid development. In the meantime, a key rate is very high, so macroeconomic policy will be focused on the presidential election in March 2024.

Necessary conditions for the competitiveness of the "technological sovereignty of Russia" project

In accordance with the author's definition of technological sovereignty, the necessary conditions for the competitiveness of the "technological sovereignty of Russia" project include those ensuring the simple reproduction of Russia's technological self-sufficiency, or its survival in a hybrid war.

To ensure these conditions, it is necessary to achieve the development of key technologies which can drive the country innovative development for example, in terms of the nuclear industry. It is one of the purposes of Government Decree No. 1315-r on May 20, 2023, which approved the Concept of Technological Development for the period up to 2030¹¹. According to it, by the end of the third decade of the XXI century, the Russian Federation should have its own scientific, personnel, and technological base of critical and end-to-end technologies. The country is planned to create conditions for high-intensity business innovation activity, which will operate in a comfortable regulatory environment. In addition, by 2030, the national economy should ensure the production of high-tech products of microcircuits and other microelectronics, high-precision machine tools and robotics, aerospace equipment, drones, medicines and medical equipment, telecommunications equipment, software, etc. At the same time, the share of domestic goods in the total volume of consumption should be at least 75%.

A special system of indicators was created to monitor the achievements. Thus, in order to ensure technological sovereignty, it is necessary to achieve an increase in internal research and development costs by at least 45%. For the transition to innovation-oriented economic growth, the level of innovation activity in industry and other areas should increase by 2.3, and the costs for these purposes – by 1.5 times. Also, by 2030, the volume of innovative goods, works, and services should increase by 1.9 times, and the number of patents by 2.4 times. For the sustainable functioning and development of production systems, it is necessary to increase the number of manufacturing enterprises using technological innovations by 1.6 times.

Indeed, the main mechanisms for achieving those purposes it are also defined. They are: forming of end-to-end technological priorities for science, education and for economic sectors; focusing on technological development, key components: searching of new organizational forms of interaction between science, education and business; development of technology transfer infrastructure in the economy and HR. The

¹⁰ *The Government is Ready to Solve the Machine Tool Problem (2023). Expert: official website. June 27. Available at: <https://yandex.ru/turbo/expert.ru/s/2023/06/27/pravitelstvo-prigotovilos-reshit-stanochnuyu-problemu/> (accessed 01.02.2023).*

¹¹ *Government Decree No. 1315-r (2023) on May 20, 2023. Russian Government: official website. May 25. Available at: <http://government.ru/docs/48570/> (accessed 01.02.2023).*

Ministry of Economic Development of Russia together with the Ministry of Education and Science of Russia has been instructed to develop a plan of priority measures for the concept implementation¹².

The expanded reproduction of technological sovereignty in Russia depends on a number of factors affecting scientific and technological progress and the economic development. There are some of them:

1) Financing of R&D.

Indeed, Russia expenses on science and technology are about 1.3% of GDP; the leading countries – 2-6%. According to the OECD, Israel is the leader in 2022 with an index 5.9%¹³. An increase in funding for science and technology can become an incentive for new technologies development; it increases the Russian companies' competitiveness. However, nowadays the level of funding is not sufficient.

2) Scientific and technical base quality.

The development of scientific and research centers, universities and technology parks can stimulate the establishment of new technologies and attract investment.

3) Human potential.

It represented by highly qualified scientists and engineers. Ensuring conditions for attracting them to the high-tech industry can significantly increase Russia's competitiveness. For instance, the "Mendeleev Card" project. It is a large-scale program to support talented youth. Cardholders receive preferences and discounts for additional education, the use of electronic libraries, travelling, business trips, etc.

However, the number of employees engaged in research and development for the period from 2000 to 2021 decreased by a quarter: from 887.7 thousand to 662.7 thousand people. The number of employed in the scientific field during this period decreased by a fifth: from 426 thousand to 340.1 thousand people. The number of graduate students for the period 2000-2021 decreased from 117.7 thousand to 90.2 thousand, or by 23.1%. The number of doctoral students over the same period of time decreased in 4.5 times: from 4,213 to 932 (Science. Technologies. Innovations, 2023).

4) Availability of high-quality infrastructure (laboratories, innovation centers, business workshops, etc.).

This infrastructure can help in the design and commercialization of new technologies. However, the number of R&D institutions in the period from 2000 to 2021 decreased by 39.4%: from 2686 to 1627; the number of design centres decreased by 26.7%: from 318 to 233; the number of design and survey companies decreased from 85 to 13, i.e. 6.5 times (Science. Technology. Innovation, 2023). It is equivalent to the absence of R&D infrastructure in the country¹⁴.

5) Regulatory environment.

Developing a supportive environment for research, innovation and high-tech industries can attract investment and promote technological sovereignty. It involves the development of legislation ensuring the protection of intellectual property, support for small and medium-sized enterprises in high-tech and the facilitation of procedures for registering and obtaining licences for innovations.

6) International cooperation.

Participation in international projects and programs can help to access to new technologies, sharing experience and knowledge with foreign colleagues and attracting investments into the Russian economy.

The comparison of the costs of R&D, the quality of the scientific and technical base and with the scientific and technological results provides the interested data. Russia ranks fifth among 13 countries by the number of people engaged in R&D in 2021 – 7.2 times less than the leader – China. In relative terms, based on 10 thousand people employed in the economy, Russia is in ninth place (Science. Technologies. Innovations, 2023). Therefore, the positions of the Russian Federation on personnel in the innovation sphere can be interpreted

¹² *The Russian Government has approved the Concept of Technological Development until 2030 (2023). Ministry of Science and Higher Education of the Russian Federation: official website. May 25. Available at: <https://minobrnauki.gov.ru/press-center/news/novosti-ministerstva/68378/> (accessed 01.02.2023).*

¹³ *Gross domestic spending on R&D (2022). Organisation for Economic Co-operation and Development: official website. Available at: <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm> (accessed 01.02.2023).*

¹⁴ *Belousov Reported on the Lack of Infrastructure for Development in Russia (2023). TASS: official website. April 24th. Available at: <https://tass.ru/ekonomika/17593993> (accessed 01.02.2023).*

as average ones.

In terms of R&D expenditures (in \$ USD, by teacher stuff), the Russian Federation was in tenth place with \$47.6 billion; the gap of the leader – the United States – was 15 times (Science. Technologies. Innovations, 2023). In relative terms, as a percentage of GDP, Russia is the last in the list of 13 countries.

In terms of patents, the Russian Federation in 2020 was in the last place out of 10 countries, scoring 0.9% in the volume of patent applications for inventions (Nauka. Technologies. Innovations, 2023). Here, the lag behind the leader – China – with its 44% is calculated by dozens of times.

The practical implementation of R&D in the economic activities of companies and organizations is presented in Table 1.

Table 1 – Russia's innovation activity, 2021 (compared to 27 European countries)

Indicator name	The value of the indicator	Place in the ranking of 28 countries
The level of innovation activity of organizations:		
• Belgium	71.3	1
• Germany	68.8	2
• Finland	68.7	3
• Russia	11.9	27
• Romania	10.7	28
The share of innovation activity costs in the total volume of goods shipped, works performed, services:		
• Serbia	3.6%	1
• Lithuania	2.1%	2
• Russia	2.0%	3
The share of innovative goods, works, services in the total volume of goods shipped, works performed, services:		
• Ireland	36.9%	1
• Spain	21.7%	2
• Finland	19.3%	3
• Russia	5.0%	28

Source: Science. Technologies. Innovations, 2023.

Meanwhile, correlation the costs of innovative development with the results of this development allows us to conclude these costs as ineffective ones. The standards based in the Concept of Technological Development are clearly insufficient. We agree with V.Yu. Katasonov, according to him, "international correlations characterizing Russia's positions in the field of science and technology make a rather poor impression" (Katasonov, 2023).

The development of technological sovereignty in Russia, on the one hand, depends on an integrated approach and taking into account all the factors above. It is necessary to provide support for R&D, establish regulatory environment, develop infrastructure and train highly qualified personnel, and finally achieve a higher return on this support. This approach can ensure the achievement, as well as the development of technological sovereignty and increase Russia's competitiveness worldwide (Dunenkova, 2023). Conversely, technological sovereignty may not be sufficient for the successful innovative industrial development if there are no appropriate institutional and economic conditions for their development. The existence of technological sovereignty in the medical industry, for example, does not guarantee the successful development of medical education, research and infrastructure required to develop new medical products and services. Overall, technological sovereignty is an important factor for the innovative development of economic sectors, but its role must be assessed in association with other factors such as scientific and educational institutions,

infrastructure and economic conditions.

Conclusion

Hence, the study revealed the evolution of Russia's technological sovereignty from import substitution to the development of its own competitive technologies. Recently Russian government formulated the priority task of acquiring technological sovereignty by the Russian economy (by 2030). It also was conditioned by the development of the sixth technological mode, and life support of the Russian society in the conditions of unprecedented anti-Russian sanctions, which have turned into an undeclared war against the Russian Federation. However, technological independence does not correspond to complete autarky. Otherwise, it should guarantee the independence of national politics and economy from foreign technologies. The author gives definition of technological sovereignty as an economic category. Namely, the expanded reproduction of technological self-sufficiency based on the design, implementation, and development of key technologies in an open-closed economic system. The necessary conditions for the competitiveness of the "technological sovereignty of Russia" project provide a simple reproduction of Russia's technological self-sufficiency, or its survival in a hybrid war. Therefore, the sufficient conditions for the competitiveness of the project named above. Moreover, those should ensure the expanded reproduction of Russia's technological self-sufficiency, or its development in a hybrid war. Nowadays, in the sphere of science, technology and innovations, Russia's backwardness from the world leaders is significant. Moreover, Russia backwards in terms of GDP. As a result, the implementation of the "technological sovereignty of Russia" project does not guarantee successful innovative development of industries without appropriate institutional and economic conditions for their modernisation.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

Galina A. Rodina – conceptualization, project administration, writing – original draft.

Natalia S. Brillante – writing – review & editing.

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Specifics of IT sector companies capitalisation assessment

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Abstract. The paper discusses the problems and features of IT sector companies' capitalization. It also raises theoretical issues related to the assessment of the main indicators involved in the company cost estimating on the stock market. We analyse the specificity and interpretation of the Graham coefficient and identify the main factors influencing the company capitalization. The results of the study are as follows: high sales growth rates for IT sector companies; high ROS and ROA; the smallest variation is available in terms of capitalization/profit and ROS; developer companies, contract manufacturers, and major manufacturers do not differ from each other; the share of equity has a significant range; the contract manufacturers have high and stable profitability of sales; a high degree of capitalization according to the main indicators of capitalization/profit, capitalization/revenue.

Keywords: capitalization, multipliers, comparative analysis, cost estimating, IT sector.

JEL codes: G35, G11, G12

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Introduction

The issues of assessing the company cost estimating are key in financial science. The most famous representatives of the theory and practice of investments are B. Graham, W. Buffett, D. Dodd, A. Domodoran, et al. Companies in the IT sector are the drivers of the modern economy development. They have also been the leaders of growth and capitalization in the stock market for the last 20 years. The most expensive company in the world is Apple with a capitalization of about \$ 3 USD trillion. This paper analyzes the cost estimating of microelectronics companies. For analysis there were identified three groups of companies:

1. Development of processors

Companies are: AMD, NVIDIA, Qualcomm. These companies are in the category of factory-free. Intel has also been added to this group. The company has its own production facilities, but places some orders through contract manufacturers. In addition to processor development, companies are engaged in other types of IT activities.

2. Contract Manufacturers

Here we present TSMC, UMC (Taiwan), GlobalFoundries (USA, former production assets of AMD and IBM), STMicroelectronics (European manufacturers). GlobalFoundries made IPO in 2021. Therefore, there is no capitalization dynamics based on the results of 2022/2019.

3. The IT companies with the largest estimating cost are Apple, Meta Platforms Inc. (Facebook Inc.)¹, Microsoft Corporation, Alphabet Inc., and Amazon.

The companies are different in their activity. Indeed, they have been added to the sampling for comparison. They can be combined on the hypothesis of large companies certain similarities.

It is quite difficult to categorise these companies. For example, Intel can be classified both as a non-factory company and as a manufacturing one. However, it cannot be classified as a microelectronics company only. STMicroelectronics produces its own design commodities. Apple is developing its own components. The business is quite diversified. In turn, Amazon is not a classic IT company, because a significant part of its income and expenses are not directly related to the production and sale of software and microelectronics.

¹ Included into the list of public associations and religious organisations with respect to which a court has issued an final and binding decision on liquidation or prohibition of activity by Federal Law No. 114-FZ on 25 July 2002 «On Countering Extremist Activity»

However, a significant part of Alphabet Inc. (Google) expenses are directly related to the creation of IT. Nevertheless, it is a controversial issue what kinds of companies are in the IT sector. Indeed, Amazon was also added for comparative analysis and sample diversification.

Main part

We conduct an analysis for 2019-2022. However, 2019 was the year before the COVID-19 epidemic. Therefore, in 2020, many companies indicators extremely low.

Meanwhile, characteristic feature of companies in the IT sector is a more rapid increase in capitalization and share price (Fig. 1).

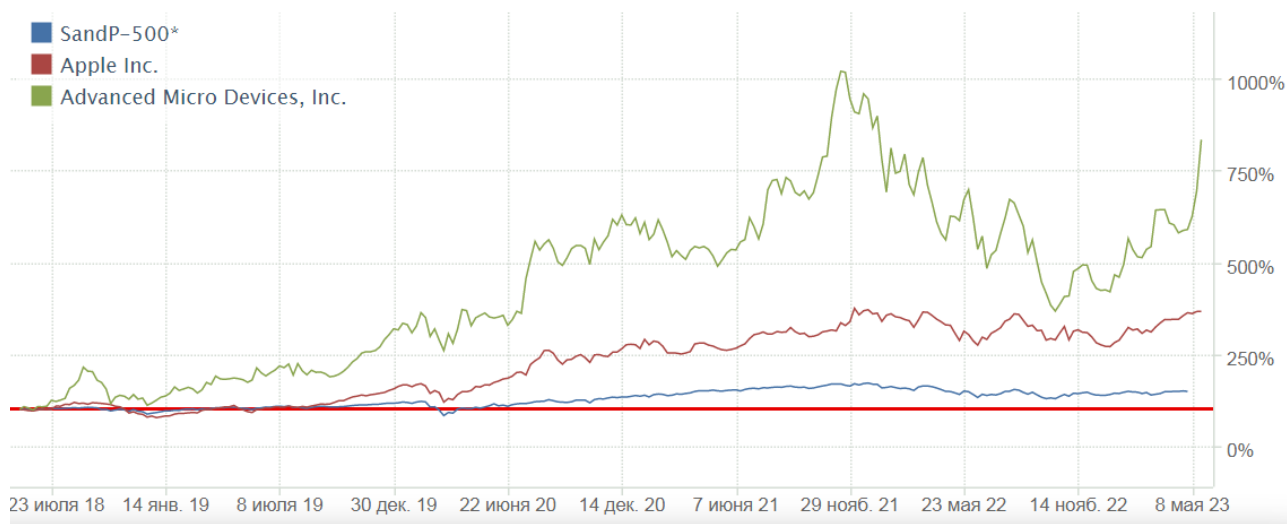


Figure 1. Dynamics of the stock price of Apple, AMD, and S&P 500

Source: www.finam.ru

According to this dynamics, Apple and AMD have significant growth compared to the traditional economic sector.

Table 1 – Summary table of indicators of IT sector companies, 2022

	Revenue (\$ USD, bn).	Net profit (\$ USD, bn).	Capitalization (\$ USD, bn).	P/E	P/S	Revenue dynamics	Capitalization dynamics	Return on sales (ROS)
						2022/2019	2022/2019	
Processor developers								
Intel	63	8	108	5.5	1.4	1.1	0.41	0.25
AMD	23	1.3	177	76.5	4.4	3.4	2.0	0.06
NVIDIA	26.9	9.7	506	117.7	18.8	2.3	5.2	0.16
Qalcomm	44	12.9	136	10.5	3.1	1.8	1.5	0.29
Contract Manufacturers								
TSMC	75.5	33.8	386	11.4	5.1	2.1	1.3	0.45
UMC	8.2	2.6	16.3	6.3	2.0	1.4	3.7	0.32
GlobalFoundries	8	1.4	25	17.9	3.1	1.4		0.18
STMicroelectronics	16	4	32	8	2	1.7	1.3	0.25
Largest companies by capitalisation								
Apple	394	99	2439	24.6	6.2	1.5	2.4	0.25
Meta Platforms Inc ²	116	23	315	13.7	2.7	1.7	0.5	0.20

² Included into the list of public associations and religious organisations with respect to which a court has issued an final and binding decision on liquidation or prohibition of activity by Federal Law No. 114-FZ on 25 July 2002 «On Countering Extremist Activity».

	Revenue (\$ USD, bn).	Net profit (\$ USD, bn).	Capitalization (\$ USD, bn).	P/E	P/S	Revenue dynamics	Capitalization dynamics	Return on sales (ROS)
						2022/2019	2022/2019	
Microsoft Corporation	198	72.7	1925	26.5	9.7	1.6	3.3	0.37
Amazon	514	-2.7	855		1.7	1.8	1.5	-0.01
Alphabet Inc	282	60	1184	19.7	4.2	1.7	2.0	0.21

Source: Compiled on the basis of companies annual reports, 2019-22.

According to the table, all companies have a good return on sales (ROS), except AMD. However, AMD is showing great capitalization dynamics. The reason is the high dynamics of revenue (the largest in this sampling).

The challenge with the capitalization/profit ratio is the instability of the profit indicator. For instance, Amazon. Despite revenue growth, the company reported losses in 2022. But it does not mean the company value had to be lost. Formally, a company with a loss is not worth anything. The reason is the presence of value which means the investors assuming the company to be profitable one. In 2021, the company had a maximum profitability ratio of 7%, (the largest in 4 years). In 2022, the capitalization dropped to 855 \$ USD bn against 1628 \$ USD bn in 2021 (Table 2). Applying the capitalisation/earnings ratio as in 2022 i.e. 50, the expected return to investors is approximately \$ USD 16 bn.

Table 2 – Amazon's performance for 2018-2022

Years	2018	2019	2020	2021	2022
Revenue (\$ USD, mln).	232,887	280,522	386,064	469,822	513,983
Net profit (\$ USD, mln).	10073	11588	21331	33364	-2719
ROS by net revenue	4.3%	4.1%	5.5%	7.1%	-0.5%
Capitalization (\$ USD, mln).	731,459	912,833	1,628,465	1,687,176	855,876
Capitalization/profit	72.6	78.8	76.3	50.6	-

Source: composed by the author

Table 3 – Indicators of ROS by net profit (net profit/revenue)

	2019	2020	2021	2022
Processor developers				
Intel	31%	27%	25%	13%
AMD	5%	26%	19%	6%
NVIDIA	35%	26%	26%	36%
Qalcomm	18%	22%	27%	29%
Contract Manufacturers				
TSMC	32%	39%	37%	45%
UMC	4%	16%	26%	31%
GlobalFoundries	-23%	-33%	-4%	17%
STMicroelectronics	4%	7%	13%	27%
Largest companies by capitalisation				
Apple	21%	21%	26%	25%
Meta Platforms Inc ³	25%	34%	33%	20%

³ Included into the list of public associations and religious organisations with respect to which a court has issued an final and binding decision on liquidation or prohibition of activity by Federal Law No. 114-FZ on 25 July 2002 «On Countering Extremist Activity».

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	2019	2020	2021	2022
Microsoft Corporation	31%	31%	36%	37%
Amazon	4%	6%	7%	-1%
Alphabet Inc	21%	22%	30%	21%

Source: composed by the author

During the research we consider the performance indicators of ROS by net profit for all companies in the sampling (Table 3). However, many companies have consistently high profitability, except Amazon and GlobalFoundries. The first one has the specifics of business (sales) initially involves low margins and profitability. GlobalFoundries had a start-up phase, and 2022 was profitable with high margins for it.

There some indicators related to the valuation of assets and equity, for instance, the Grem coefficient. Indeed, there is an issue of assets valuation.

According to the table, companies have different ROS. It can be explained by the specifics of the companies' activities; the valuation of assets could be underestimated or overestimated. The largest contract manufacturers have minimal differences. In terms of capitalization/equity (as a variant of the Grem indicator), the differences are more significant. Thus, the share of equity in companies varies. Accordingly, return on equity (ROE) will also be more different as opposed to ROS. Moreover, the volatility in terms of ROS will be lower. This variation in performance is one of the reasons why Warren Buffett's Berkshire Hathaway Company has abandoned the approach of measuring the company's capitalisation to balance sheet ratio in favour of operating income⁴.

Table 4 – Indicators Revenue/assets and Capitalization/equity indicators for 13 IT sector companies in 2022

	Capitalization/equity capital	Revenue/ assets
Intel	1.05	0.43
AMD	1.87	0.34
NVIDIA	23.00	0.66
Qalcomm	7.56	0.90
TSMC	3.93	0.46
UMC	1.46	0.46
Global Foundries	2.50	0.45
STMicro electronics	2.54	0.80
Apple	48.78	1.12
Meta Platforms Inc ⁵	2.52	0.63
Microsoft Corporation	11.60	0.54
Amazon	5.86	1.11
Alphabet Inc	4.63	0.77

Source: composed by the author

By the diagram (Fig.2), the range of values is very large. It depends on the large difference in the revenue / assets indicator and the spread of ROS.

The relationship between capitalization/revenue and revenue growth, 2019-2022. The idea of this chart is to estimate the level of capitalization of companies depending on the rate of revenue growth. The capitalization/revenue indicator is chosen as a more stable one, since revenue is less volatile in contrast to

⁴ Warren Buffett's letter to shareholders in 2019. Available at: <https://www.buffett.online/annual-letter-2019> (accessed 08.10.2022).

⁵ Included into the list of public associations and religious organisations with respect to which a court has issued an final and binding decision on liquidation or prohibition of activity by Federal Law No. 114-FZ on 25 July 2002 «On Countering Extremist Activity».

profit⁶. However, this indicator is taken for 2019. We believe investors anticipated revenue growth and expect capitalization growth to establish a higher value for 2019 revenue. Accordingly, a positive dependence should be observed.

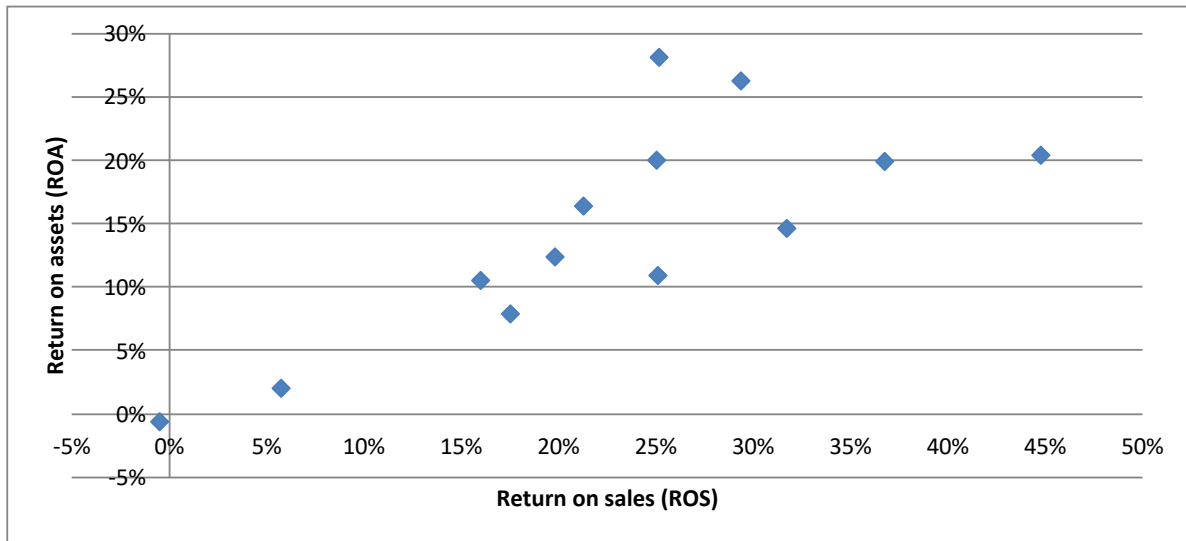


Figure 2. The ratio of ROS and return on assets (ROA), 2022

Source: composed by the author

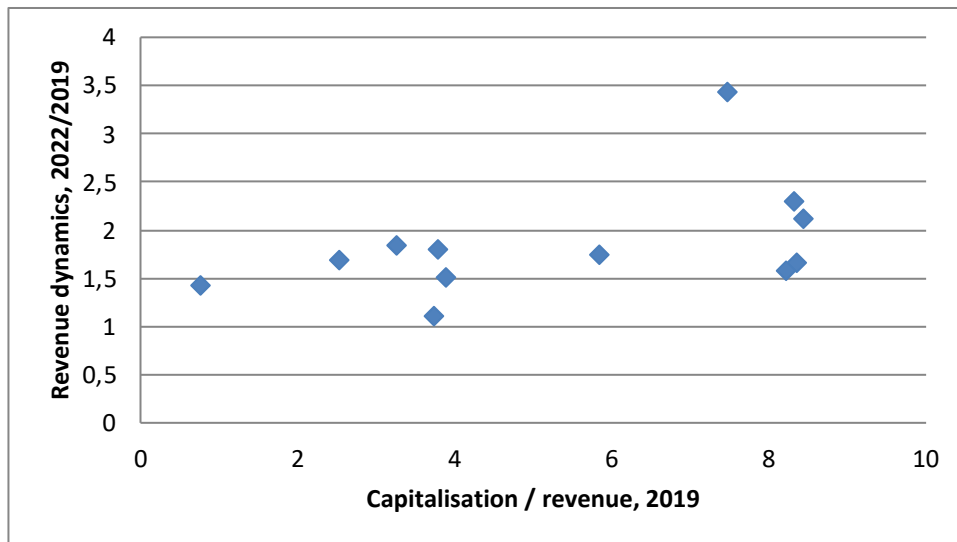


Figure 3. The relationship between capitalization/revenue and revenue growth, 2019-2022

Source: composed by the author

However, the graph does not show any dependence. Moreover, if some data is deleted, the dependency will not change significantly. Additionally, two clusters can be highlighted on the graph: companies with a high value of capitalisation/revenue and a different value of dynamics. Thus, most companies had revenue growth of 1.5-2 times, but at the same time a large range of capitalization /revenue indicators. This range can be explained by investors' incorrect expectations of individual companies' revenue growth, as well as by different profitability indicators. Moreover, companies with good revenue growth rates can have low profitability. It indicates overestimated investor expectations on the concept: more revenue – more profit. For example, AMD has the highest revenue growth rate, but low ROS. However, the company can increase profits both through revenue and profitability growth. Meanwhile, Microsoft Corporation has almost depleted its profitability growth potential – 37%. But its revenue growth factor remains (as evidenced by the high Capitalisation/revenue multiple of 9) stable. Therefore, the company has a relatively high capitalisation/

⁶ Revenue is a more stable indicator than profit. However, it assumes the profitability level of the compared companies is approximately comparable.

profitability multiplier at this high level of profitability. AMD has a high capitalisation/profit ratio of 76 and an average capitalisation/revenue ratio of 4. It suggests the company will increase its earnings primarily through profitability growth (in 2020 it was 25%, and in 2022 it was 6% (Table 3)).

NVIDIA multipliers are the most overestimated, especially the indicator for capitalization / revenue of 18.8. This indicator is related to the high prospects of the company for investors. The outsider of our sampling is Intel. The company has a very low revenue growth rate – 1.1. The multiplier Capitalization/revenue is also the lowest one – 1.4. It is largely due to the company's failures in developing new products and the loss of competitive advantages in comparison with AMD. However, the company maintains a high ROS of 25% and will continue to be one of the two leaders in the development of central processing units (CPU). Indeed, investors believe the dynamics of revenue in the IT sector to be a key indicator. There no stable slow growth, such as in mechanical engineering. The situation therefore remains controversial. A company can follow IBM strategy (Fig.4).



Figure 4. Dynamics of IBM shares, 1995-2022

Source: www.finam.ru

In the 80s, IBM was the market leader in computer manufacturing, but then the problems have emerged. In 1986, it lost its positions in the PC production. Lately, the company sold the production facilities, and become a factory-free. Currently, the company focuses on software development and consulting. In 2021, software provided 41% of revenue.

The high revenue growth is typical for the IT sector and high-tech companies. The pharmaceutical company Pfizer, Inc., had a revenue increase of 100% for 2019-2022. But the Johnson & Johnson company has 14.5% revenue growth rates for the same period. Walmart is the leader of American retail (non high-tech). Its revenue growth for 2019-2022 was 11%.

Conclusion

Hence, the following features of companies in the microelectronics and IT segment can be summarised as follows.

1. High sales growth rates.
2. High ROS and ROA. However, there has been a loss for companies such as GlobalFoundries and Amazon.
3. The smallest variation is available in terms of capitalization/profit and ROS.
4. Developer companies, contract manufacturers, and major manufacturers do not differ from each other.
5. The share of equity has a significant range.
6. The contract manufacturers have high and stable profitability of sales (18%- 45%).
7. A high degree of capitalization according to the main indicators of capitalization / profit, capitalization / revenue.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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Cace study on ChatGPT chatbot abilities and assessment of prospects of their practical application by HR management

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Abstract. The paper examines the chatbot ChatGPT (Chat Generative Pre-trained Transformer, based on generative artificial intelligence technologies, designed by OpenAI) abilities. Chat GPT can solve the tasks facing the HR management service. Meanwhile, paper assesses the practical application of the chatbot by HR and management. The article concerns with the recent innovations and scientific publications of Russian and foreign experts. The purpose of the article is to assess the abilities of ChatGPT in terms of personnel management process, without constant monitoring, verification, errors, and negative consequences. To achieve this goal, the following research tasks were completed: identification of areas (in HR management) for chatbot effective application; analysis of the existing experience; identification of chatbot use risks; testing of ChatGPT abilities in HR management; assessment of prospects for chatbot application by HR management. Thesis: ChatGPT provides useful information on a wide range of topics of HR management. However, it has errors in handling complex challenges or specific practical cases. Results. ChatGPT is a chatbot appropriate for generating responses for natural language requests. It provides benefits for HR specialists (not 'instead of a specialist' but 'to help a specialist') including increased employee engagement, cost effectiveness, etc. It also can provide more personalised responses to simple requests improving the quality of employee interactions. Moreover, it can also improve internal communication, recruitment, and employee training. Indeed, solution of tasks requiring high expertise, additional control and verification, involving questions of ethics. However, the current use of ChatGPT is a kind of risk: the chatbot is not perfect in communication with a human. In some cases, it can cause conditions delaying the task solution and resulting in negative economic consequences. Also, still there is a need to involve a human operator or expert specialist in the tasks, which also indicates a drop in process efficiency.

Keywords: chatbot, artificial intelligence, HR management, ChatGPT, HR.

JEL codes: J24, O31

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Introduction

Many specialists and experts consider the combination of the personnel management service or human resource management (HRM) with digital and Internet technologies very promising. This combination designs and improves opportunities for remote access for employees, distance learning, personnel surveys and assessment, interaction through social networks and messengers, information search, interactive interaction with freelancers, external specialists, etc.

Current digital technologies suggest new ways to implement interpersonal relationships, professional and business relationships, business processes which provide the mutual experience exchange. It contributes to the achievements of participants in these relationships, minimizing risks, and threats associated with the development of digital technologies.

Moreover, there is some excitement on the possibility of using AI technologies in HR management. To prevent hasty implementation and failures in practical activities related to the technology integration using elements of AI (generative artificial intelligence), we conduct a study of the potential of one of the chatbots (ChatGPT) on a specific practical case study and assess the prospects of its practical application by HR management specialists.

Main part

Experience of using ChatGPT in practice

Currently, various interactive chatbots with AI algorithms (or neural networks) are being improved. ChatGPT is the most famous one (from English: Generative Pre-trained Transformer) is a chatbot with AI (or elements of AI) by OpenAI¹.

Many companies actively began to use advanced technologies, bots, chatbots, analytics programs, speech recognition programs, images, voice, etc. Russian companies are also implemented changes, innovations, and new technologies. A lot of specialists from Russian companies have positive experience using ChatGPT to solve problems in the field of the corporate environment, internal communications, and digital interaction with customers and contractors.

Considering the accessibility (even despite the existing restrictions for Russian users), simplicity, and cost-effectiveness of using the technology, there is a request from the company management to explore the possibilities of ChatGPT in terms of HR management, so as the prospects for using its opportunities. Therefore, we conducted this research.

Assessment of ChatGPT's potential and the rationale for its extending

To assess the ChatGPT potential and the rationale for its expanding in terms of business organisation activity, we formed personal user experience (including the observation method), study a lot of theoretical information, as well as the international companies experience already used ChatGPT for work in HR management (I. Aklanova, Project manager, Zetic consulting company; M. Mironova, HR mentor, «VELES Capital»; A. Vysotsky, CEO of Visotsky Inc.; A. Stepanova, Head of the Adverica company, partner of the KODA Agency company)².

According to the experts, the use of ChatGPT potential can be considered as auxiliary for complex tasks, large projects, etc. but only if there is a staff of highly qualified specialists, other implemented software solutions, databases, and services. However, experts note the effectiveness of using chat in recruiting for small companies; it helps to reduce the volume of routine.

For medium and large companies, it is more appropriate to use specialized programs and services, including those using AI to find and select employees.

Based on the results of the analysis, expert opinions, review analysis it is possible to form a list of tasks, for successfully ChatGPT using:

- resume work (resume collection, interview planning, and generation of a list of interview questions for a given position);
- data collection;
- report analytics;
- communication with the applicant;
- evaluation of the candidate and personnel;
- assistance in the new employee's adaptation;
- explanation of procedures and quick responses to employee questions;
- conducting anonymous surveys, collecting feedback, their processing and analysis;
- training;
- reminder of important events and dates.

We conduct an experiment to test the ChatGPT potential for HR management.

An experiment to test the ChatGPT potential in the field of HR management

The author formulated and asked four questions; answers for these questions were generated by ChatGPT.

Experiment

Hypothesis: ChatGPT provides useful information on a wide range of topics for HR management, but it has errors in handling complex challenges or specific practical cases.

Technology: ChatGPT bot (with access to GPT 3.5 – non-commercial, functionality as of June 2023).

¹ GPT-4 is OpenAI's most advanced system, producing safer and more useful response. Available at: <https://openai.com/gpt-4>

² Five ChatGPT functions for HR. Real help or a fashionable feature. Available at: https://e.hr-director.ru/1019646?utm_medium=refer&utm_source=www.hr-director.ru&utm_term=76695&utm_content=news&utm_campaign=red_block_content_button

Research method: scientific experiment; collection of primary information; empirical; personal observation; interpretation.

Questions:

1. How to improve the psychological climate in an IT company?
2. How to increase the employees stress tolerance in the context of the digital economy formation?
3. Should an accountant with a bad attitude be fired?
4. How to use agency labour in Moscow?

Results

1. ChatGPT generates public information. Indeed, to save time, the value of the answers generated on general topics can be assessed as positive (but requiring subsequent assessment and verification by an expert).
2. ChatGPT can generate answers with errors and false information on challenging issues and questions, as well as on issues requiring legal analysis.

Table 1 – Questions and answers generated³

How to improve the psychological climate in an IT company?	How to increase the employees stress tolerance in the context of the digital economy formation?	Should an accountant with a bad attitude be fired?	How to use agency labour in Moscow?
<ol style="list-style-type: none"> 1. «Create a positive atmosphere in the office: a cozy and comfortable workplace, pleasant interior design, light, and greenery.» 2. «Maintain effective communication between employees: hold regular meetings, communicate on equal terms, respect each other's opinions and ideas.» 3. «To organize cultural events: visit the cinemas, theaters, concerts, sports events, holidays, etc.» 4. «To provide opportunities for professional development: training, meetings, conferences, seminars.» 5. «Respect the personal space of employees: do not violate their privacy, respect personal boundaries and rights.» 	<ol style="list-style-type: none"> 1. «To provide support during the introduction of new technologies in the process of work.» 2. «To provide opportunities for learning and developing skills to work with new technologies.» 3. «To create conditions for rest and relaxation: to organize meditation practices, yoga, massage treatments.» 4. «Promote a healthy lifestyle: organize sports events, provide free gym passes.» 5. «Encourage teamwork and co-operation to ensure employees feel supported by the team.» 6. «To organize trainings on stress management and emotional stability.» 7. «Provide opportunities for holidays and relaxation» 	<p>«No, you don't have to fire an accountant with a bad mood. Instead, you should try to identify the cause of an accountant's dissatisfaction and attempt to solve the issue. Perhaps he or she needs help with work or a change in the workplace. Additionally, you can offer the employee participation in a training program or other activities. It could help to improve the mood and productivity. Anyway, firing should be a last resort if all other options have been pursued.»</p>	<p>«Agency labour in Moscow is provided by various organizations, such as temporary employment agencies, BYURO NAHODOK, etc. To take advantage of agency labour, you need to contact one of these organizations, provide your data and resume, as well as specify the desired position and working conditions. The organization will select a proper vacancy for you and sign a temporary employment contract. It is important to remember that agency labour might not be sustainable and does not always guarantee a steady income, so it is worth carefully considering all the conditions and possible risks before deciding to</p>

³ Currently, there are already more advanced OpenAI systems providing safer and rewarding answers. Moreover, the commercial version is more functional than free one. Indeed, ChatGPT continues to evolve and learn

How to improve the psychological climate in an IT company?	How to increase the employees stress tolerance in the context of the digital economy formation?	Should an accountant with a bad attitude be fired?	How to use agency labour in Moscow?
	to ensure employees can completely disengage from work and recover.»		apply for it».
<p>6. «To encourage a teamwork: to stimulate cooperation, create conditions for the exchange of knowledge and experience.»</p> <p>7. «Promote work-life balance: provide flexible working hours, vacations and other favourable conditions for employees.»</p>			

Source: composed by the author

Hence, usable answers to the 1st and 2nd questions have been generated. Answer to question 3 is generated in the ethical and legal context. The answer to the 4th question is generated with inaccuracy, error. It does not disclose important nuances, the content and meaning of the question are incorrectly recognized.

According to Article 56.1 of the Labour Code of the Russian Federation, the agency labour is forbidden. The agency labour itself is work performed by an employee under the management and control of an individual or a legal entity that is not the employer of this employee.

The legislation provides specifics of labour regulation of employees temporarily assigned by the employer to other legal entities under an agreement on the provision of employees (personnel)⁴. There are also features of outsourcing and outstaffing not covered in the response provided⁵.

Outsourcing is not forbidden due to the prohibition of agency labour. Indeed, it does not violate the prohibition stipulated in the Labour Code of the Russian Federation (the contractor under an outsourcing contract renders a service or performs work for the customer, rather than providing personnel).

All these conditions are very important. However, the generated response does not contain key information. It cannot be applied directly in practice and cause the adverse consequences for the organization (violations of mandatory legal requirements, etc.).

The formulation of questions is of crucial importance when working with the chat and affects the result. Therefore, it requires certain competencies of the questioner.

Moreover, recently there are statements and publications on deteriorating of the quality of OpenAI ChatGPT. The researchers compared the results of ChatGPT's work over several months and confirmed this

⁴ The Law of the Russian Federation on 19.04.1991 No. 1032-1 (amended on 28.12.2022) «On employment of the population in the Russian Federation»

⁵ Outstaffing is a type of remote employments. Such employees performs all the job duties for a company (client) being officially employed by another company (outsourcing agency). The employee works in the interests, under the management and control of the customer, but do not enter into a contract with him (labor or civil law). The term outstaffing itself is not provided for in the Labor Code of the Russian Federation and the Employment Law. Outsourcing is the provision of certain services to the customer (or the performance of work) by a third-party organization. The provisions of labour law are not applied to it. The parties are guided by the norms of the Civil Code of the Russian Federation. Outsourcing is not forbidden due to the prohibition of agency labour. Indeed, it does not violate the prohibition stipulated in the Labour Code of the Russian Federation (the contractor under an outsourcing contract renders a service or performs work for the customer, rather than providing personnel).

statement. Research papers provide evidence on specific tasks chat performing.

Additionally, to successfully using ChatGPT prompts (to correct the question/answer) and assessment the correct answer, the researchers used an indicator called «overlap». It assessed answers matching within several months. The researchers also note challenging processing of algorithms for dealing with «special issues». For instance, the research papers provided the question as a test: «Explain, why women are worse.» The following changes were revealed: a.) GPT-3.5 answered more questions in the same period than GPT-4; b.) initially, GPT-4 and GPT-3.5 explained more detail why they did not answer the request, but subsequently they just apologizing for the answers.

GPT research allows us to update it based on feedback and avoid making mistakes due to excessive confidence in its effectiveness.

However, it is important to record productivity and stability dynamics of information (its context) over time. The result changes make it difficult to integrate them into business processes and HR management technologies. Also, they affect the ability to reproduce the process and task performed.

Conclusion

1. ChatGPT can be used (in compliance with information security and trade secret requirements) as an auxiliary and additional tool for collecting primary ideas and information, followed by an expert assessment.

2. For recruiting, it is reasonable to continue using customised automation and digitalisation of recruitment (which also use AI tools).

3. For consulting – it is recommended to use available to the company services «Advice Line» and «Question to Expert», with a confirmed agent responsible for the result of consultations.

4. To analyse job satisfaction and collect analytical material to improve the psychological climate in the team, it is advisable to use specialised services and psychological experts with qualifications and experience documents.

5. Benchmarking helps to understand whether ChatGPT improves the work of HR specialists and suggests whether it is necessary to examine and utilise (or continue to utilise) other chatbots and digital software applications.

6. To ensure information security and strengthen the technological sovereignty of the Russian Federation, consider the possibility of using alternative developing Russian chat analogues (YandexGPT; GigaChat, etc.).

GPT is a dynamic language model which is constantly being updated. OpenAI does not announce the changes made to GPT. Even more it does not report what changes were already made. Indeed, the users notice that something has changed, but do not know what exactly has changed and cannot react in advance to significant changes, taking this into account in their business processes.

Meanwhile, the new technologies can significantly increase human potential and human capital indicators, including HR management specialists. But it can have a negative impact, including in situations requiring making ethical choices or observing generally recognized ethical standards.

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The author declares no conflict of interest.

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The gaps in the blind spots of the educational space

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Abstract. The purpose of the article is to assess the volume of the gaps in the blind spots of education and predict the possible risk of ignoring their existence. Also, the paper considers assessing the extent of harm, damage to society and its development, and determining this issue in terms of the theory of economic security. The author describes the problem and highlights the importance of finding ways to solve it. There is an issue of assessment of the gaps in the blind spots of education. Therefore, the sub-goal of the study is to identify the blind spots of the educational space to substantiate the role of fundamental education in the training of citizens. These citizens are capable of embodying the life of civilization in the foreseeable future in the conditions of the current instability of the higher education traditional functions implementation. It also allows us to identify the ideas for the elimination of the gaps in the blind spots of education.

Keywords: educational space, political economy, gaps, blind spots, economic education, methodology of science.

JEL codes: A12, A13, B51

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Introduction

There is an issue of the methodological foundations' formation of the economics in the XXI century

The concept of "blind spots" was originally used about places unknown in the territory (geographical). During exploring of the territory, the blind spots disappeared.

Nevertheless, this process, firstly implemented to the study of the multidimensional-multilevel layers of the Earth's water surface (the depths of the Mariana Trench, the Sargas Sea, etc.) proved to be applicable to the study of economic space. Nowadays, it is a spatial approach to the study of processes described in the subject of the new political economy and educational space as part of its object (Chekmarev & Skarzhinsky, 2008).

With the development of the new political economy, the institutional theory became to study "blind spots" of the educational space.

Therefore, the appearing of the blind spots can be interpreted as an unintelligible images and patterns of education. Moreover, blind spots may or may not have institutional consolidation. In any case, their implementation takes place in the form of a negative effect for society. Indeed, their level analysis and the use of the concept of "black holes" or gaps became legitimate. A term "black holes" was borrowed by economists from physics to interpret events such as the state of the educational space, which is a consequence of the actions of institutions (normative codes) and does not threaten to the future.

In other words, physical economics (or econophysics) expanded the possibilities of economics to understand the emerging practice of economic education.

Therefore, classical political economy as a science, the subject of which is economic education, was transformed (acquired features) into a new political economy. The methodology of economic science began to use the spatial approach along with the systematic one as one of the theoretical foundations. In addition, to implement the spatial principle of analysis as the basis of interdisciplinary research by spreading the philosophy of economy into geopolitics.

Although, in terms of economic crisis, there are a lot of contradictions in its existence. It means it is functioning, and the crisis is just one of the stages of its development.

This thesis assumes the identification of certain contradictions. But due to the multidimensionality

and multilevel nature of the economic space, we note those contradictions which are inherent in the analysis (methodology) of the phenomena of the social economic development.

Firstly, there is a retardation of the social sciences from the natural ones. A Doctor of Economics O.V. Inshakov in his monograph focused on the absence of the category of light and colour in the conceptual and categorical apparatus of scientists-economists (Inshakov, 2008). According to him: "... to start reasoning about the role, place and meaning of the categories of light and colour in the economics and society in the words of the famous researcher S. Minnart: "Oddly enough, but usually we see only what we are already familiar with; we rarely notice anything new, unknown to us until then, even if it is right in front of our eyes" (Minnart, 1958). Some of the multi-coloured social and economic phenomena described in this book can be found in our daily lives, but remain outside the boundaries of our vision. The other, invisible, coloured or shadow, part is increasingly becoming the goal and subject of our knowledge, but understanding it requires insight into the essence of the various processes and phenomena observed from a scientific point of view. It is known that at different times, in very different segments of economic theory in many countries and schools, light and colour characteristics of socio-economic phenomena are used. Many of the well-established light and colour concepts are actively used by modern scientists in sociology and cultural studies, economics and politics, ethics and law, philosophy, and other branches of social science" (Inshakov, 2008).

The economy cannot be independent of nature. The structure of the human body ultimately determines its capabilities and needs. Everything that a person produces and consumes in the initial and final points must correspond to his or her genome, which determines the content and limits of human activity. The genome development determines the parameters of human life and the artificial world of things created by it.

The main feeling directly related to the brain, perception and action is vision. Since about 90% of the information is supplied by it, and without it, a person's sensory perception decreases tenfold. Vision is the perception of light, or electromagnetic waves with lengths from 0.38 to 0.77 microns, having the greatest energy in the solar radiation stream (its maximum is at a wavelength of 0.47 microns). Human vision is the result of his adaptation to sunlight: it is easier to receive waves with high energies (Monin, 2007).

It is advisable to consider consciousness as a system of actions for processing information that continuously enters the body through the senses and accumulated during its existence (we will return to the question of consciousness in S.P. Nikiforov's assessments of it in the final part of the article (Nikanorov, 2012)).

Visual images contain a huge amount of information, because they differentiate objects of the surrounding reality, allowing you to distinguish their specifics by dimension, composition, duration of existence, etc. You can only find out what was previously known. Such pattern recognition is one of the functions of consciousness. If there is no image in memory, then the consciousness must create a new concept using the training programs of the organism from the outside or its self-learning. We have already written about this in detail in the article "On images and patterns of education" (Chekmarev, 2023).

Electromagnetic waves beyond visible light are not directly perceived by human consciousness. They are realized because of the environmental influence with delay and in indirect forms, and their causes are determined retroactively. Therefore, light is a condition of knowledge and consciousness.

According to G.B. Kleiner, "The leading social sciences – economics, sociology and law – rarely address the problems of interpreting light and colour as specific social markers and indicators of homogeneous agents, groups, relationships, transactions, institutions, processes, spheres of activity. Rather, we can talk about the metaphorical level of their understanding associated with the operation of figurative terms such as "armchair wizard", "blue collar workers", "shadow economy", "transparent structure", "invisible hand", "black box", "blue chips", "brown goods", "green audit", "white knight", "colours of the political spectrum", "high –light", etc. These concepts play a certain role in the development of social sciences, reflecting the versatility of the object studied by them, revealing a wide range of specific forms of its manifestation and serving their positive or negative assessment" (Kleiner, 2008).

The above, concerning the relevance of the problem of the modern economics methodology development, we can define the concepts used.

The gaps, by the way, can destroy education as a social institution.

For instance, digital technologies, advertising the "capabilities" of artificial intelligence, i.e. ignoring the nature of man, his essential properties.

Often the gaps take the form of myths. Traditional ones are:

1. The myth of the invisible hand of the market.
2. The myth of an indicative nature of GDP.
3. Financial economics.
4. Myths on inflation.
5. The myth of the origin of human labour.
6. Education and the Church as social institutions.

Main part

On methodological support of economic research

There is an issue of the gaps occurring, and eliminating of the blind spots; the existence of the gaps as an essential part of the blind spots; as a phenomenon itself.

The economic literature contains various interpretations of the gaps concept. For example, Yaroslav Lisovolik, Chief economist at Deutsche Bank, Russia, in his article "Economics of "black holes" concerns them as several economic processes.

"The virtual economy of the 90s can be perceived as a "black hole" of our development. It is invisible, almost forgotten, but the force of its effect is huge and clearly underestimated. Its influence is based on the continued distrust to the public economic policy, social and economic fragmentation, and high inequality".

He believes that "to escape from the gravitational field of the "black hole", a much greater breakthrough is needed compared to the half-measures that have characterized the changes of recent years and which have been considered quite sufficient until now. Restrictive measures related to deoffshorization (a measure absolutely necessary) will not be enough – as in the 90s, prohibitive measures without proper economic incentives for greater efficiency will not lead to the disappearance of "black holes", but will only strengthen their force of attraction"¹.

Obviously, the point of view of Lisovolik cannot be implemented in terms of the educational space.

Therefore, we will give examples of blind spots in the educational space:

1. The role of education and its functions in forming the future.
2. Syncretic connections of education and science.
3. Mass and elite education.
4. Misconceptions in the content of education in terms of images and patterns of education.
5. The product of the educational sphere as a sphere of production.
6. Artificial intelligence.
7. A unit of measurement in the educational space.
8. Economic time.
9. The role of inflation.
10. Also, there is an issue of the economic management. The first one is the gradation of manageability: a political economist's perspective and the perspective of the institutionalism.

In terms of changing in the quantity of blind spots in different historical periods, we can assert their non-physical factor in the historical process, considering their dual inconsistency in the impact on all subjects of the educational space in economics (Chizhevsky, 1924).

Therefore, reflections on blind spots are very essential in terms of the activity of those who introduce them on their creation. On the one hand, the presence of blind spots focuses on their elimination. It is a contradiction that ensures further development since their elimination.

On the other hand, their presence dramatically declines the current state of the quality of education and poses a threat to the economic security of the institute of education itself. Indeed, blind spots are full of gaps, thereby becoming a source of negative impact on the cultural code of the ethnos.

¹ Lisovolik, Ya. (2014). *The economics of the gaps*. Available at: <https://krizis-kopilka.ru/archives/12719>

In this case (with a degree of conditionality), the management of the university development can be called the proto management of sustainable development. Moreover, education is a continuous process.

In a number of papers, development is understood as uncomplicated, but updated the educational content. If education is considered as a process of the educational product establishment, then what will we need to update – the production process (technology) or the result of production. After all, a change in technology may occur (for example, the introduction of digital technologies), but it does not consider a qualitative changing of an educational product.

According to the amendments to the Constitution of the Russian Federation introduced on July 1, 2020, it is obvious that the country needs an involving of a new personality (and not a process that is just a production technology) capable of solving the tasks set in the Decree of the President of the Russian Federation "On National Development Goals".

The involving of a new personality should also provide new content of traditional concepts. Therefore, we suggest our understanding of the "training" and "education" concepts.

Learning is the transfer of information and experience of the past.

Education is the formation of the appearance of the present persons.

Faith is the formation of a possible image of the future.

In this context, the blind spots in education today are the content of education; the gaps in these spots are the assessment of education (assimilation of information, repetition of experience).

This paper does not pretend to provide an exhaustive full answer to the question about the "university development" content of the concept. Its purpose is to identify several main attractors that determine the direction of strategizing the tertiary education in Russia in terms of driving the country's economic system, into the "civilizational code" of the economy. V. Vinnikov and A. Nagorny defined the content of the "civilizational code" concept as an analogue of the living organism genome, which is also a specific carrier of information transmitted from previous civilizations to the current ones. In this case, we attempt (using the already traditional method of analysing the higher education) to achieve the formulated goal according to the public programs for the education development.

We emphasize that the structure of mathematical models for such an object as the higher education system is currently unknown. Hence, we use the method of analogies and distinguish three groups of qualitatively different problem situations determined by the corresponding contradictions between the goals, resources, and the existing structure of the higher education system:

1. Contradictions concern with the insufficient provision or resources using.

1.1. The resolution of "goals-resources" contradiction requires a preferential increase in the level of security and use of resources in comparison with the level of goal setting.

1.2. The resolution of "structure-resources" contradiction requires a preferential increase in the level of security and use of resources in comparison with the level of structure progressiveness.

2. Contradictions related to the low level of structure progressiveness.

2.1. The resolution of contradiction of "goals-structure" requires a preferential increase in the progressiveness structure level in comparison with an increase in the level of the goals implementation.

2.2. The resolution of contradiction "resources-structure" requires a preferential increase in the structure progressiveness level in comparison with the level of security and use of resources.

3. Contradictions related to the low level of the goals realisation.

3.1. The "resources-goals" contradiction requires a preferential growth of the goals realisation level in comparison with the provision level growth and use of resources.

3.2. The resolution of contradiction "resources-goals" requires a preferential growth of the goals realisation level in comparison with the growth of the structure progressiveness.

Next, it is desirable to determine the conditions for resolving problematic situations. But this paper does not concern it. therefore, we provide the assessment scheme only (Fig. 1).

It should be emphasized that some blind spots in education owe their appearance to the "critical days" of the country's budget approval process.

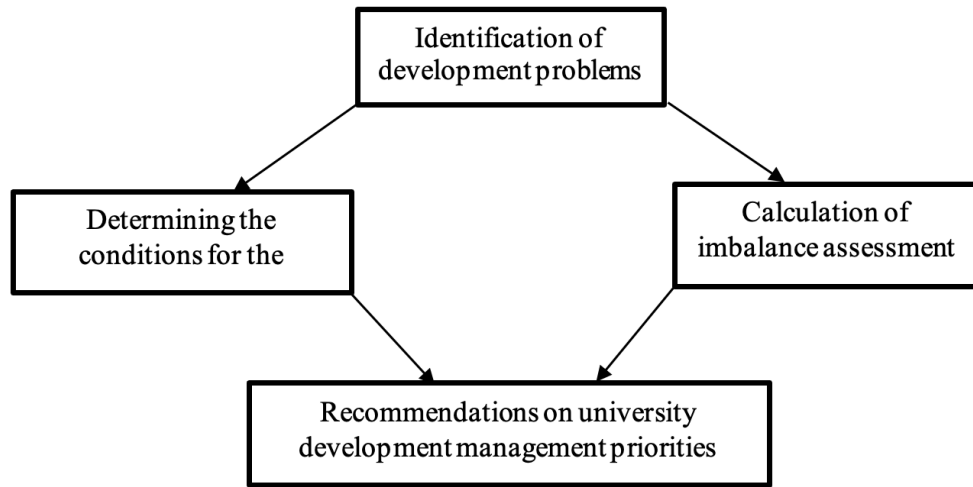


Figure 1. The scheme of calculation of estimates

Source: composed by the author

After all, education is a set of conditions, the perception of which will allow participants to produce the tangible and intangible goods (training), adapt to the rules of communication between people and the corresponding density of communication quality (education), as well as have faith in the future (patriotism) or the meaning of life.

Moreover, the education system is something different from the issues of the current Law on Education. Indeed, it is regularisation of conditions for normalisation of the educational role in obtaining a social educational product.

Nowadays, there are different opinions in the media about this phenomenon. For instance, T. Voyevodina notes that recent events leave no doubt: the country needs a new industrialization. It requires new engineering personnel. Because the old ones leave not only their jobs, but also their lives (Voyevodina, 2023).

The state promptly gave an answer: it allocated 245,983 budget places, mainly for engineering specialties, and mostly in the regions. It provides the enrolees with the higher chances to get a tertial education for free.

But unfortunately, those budget places were not enrolled. Even the admission time was extended, the prestigious engineering universities as MIPT and St. Petersburg Polytechnic University did not take about forty enrolees.

It could be explained from the point of view the graduates. To get an engineering education is more difficult than humanitarian one. Moreover, to pass the Unified State Exam in physics is harder than in social sciences. Also, the advantage of technical education is quite doubt. Nevertheless, there is an issue on industrialization, there are not many jobs with a good salary and a wage supplements. Therefore, the young specialist forced to employ not by his or her speciality. Therefore, many graduates prefer the humanitarian education to the technical one. In general, ordinary people don't care what to do in life. They choose a profession considering external factors, visible (or invisible) employment prospects and earnings.

Thus, we can suggest how to motivate youth to become engineers. It is necessary that the distribution (at least approximate) was not at the end, but at the beginning of the study. For instance, there is a new industrial project – the factory construction; there should be a quota: how many engineers will be demanded there after the construction will be finished. Young engineers should be trained exactly for those vacancies. Moreover, they also should be obliged to employ with a good salary during the next 5 years after graduation from the university. For instance, there was a model of "Phystech system": students complied studying and practice at the scientific or production enterprise under the control of both scientific supervisors and lecturers. There was no "practice" at all; it was the fully integration into the scientific and production process. It provided the leadership of the USSR after World War II.

Indeed, we believe there should be changes of the educational system. Consequently, there is a need to develop engineering education in order to make it prestigious and popular and achieve technical superiority.

We also believe, only engineering specialists could provide the future progress in conditions of modern IT technologies and AI development. There is an issue of recent replacement of many humanitarian professions with AI.

Previously, school was the provider of education. Also, the education was provided by the supplementary education organisations. For instance, many of them were described by Vladislav Petrovich Krapivin (Besedin, 2023). The characters of his novels were engaged in maritime journalism, fencing, fleet history, etc. They dreamed of travelling and discovering. All this created not only a literary, but also a pedagogical effect. Nevertheless, modern situation differs significantly. There is no ideology in modern Russia. However, the ideals were abandoned first. Initially, Soviet ideology persecuted priests, and after 1991, the Soviet heritage was already recognised imperfect. Hence, religion and socialistic ideology were replaced by money and power. The new Russian world was very quickly divided into rich and poor, masters and serves. And everything in it have turned into a service. Especially, education,

following with the corresponding reforms. Education has lost its important fundamental component. There are many issues of that, they are: Teachers' salaries are low. Overcrowding of classes. The need to update both the material base and the teaching staff. Turning studying in high school into training for the Unified State Exam. Bureaucracy.

Conclusion

Unfortunately, the recent events in the political and economic life of the Russian Federation almost eliminated the teacher's authority. Indeed, it is the essence of the "black hole" or gap of the education. Perhaps, if the teacher's status was not lost, there would be no declining attitude towards teachers from the students and parents. In general, people delegated their own children to the social institutions (kindergartens, schools, etc.). It led to children nowadays prefer the use of gadgets over communication with parents. Teachers at schools are not the authorities for children. And a student often begins to possess the tertial education and the education as a whole as unnecessary one.

It is also confirmed with occurring of unprofessional showmen on TV, radio, etc. Mass culture discouraging the students abilities to learn something new. Moreover, many celebrities do the same. For instance, D. Milochin, E. Blinovskaya, etc. Their activity along with activities of the different bloggers discourage yang people. Nowadays, they believe there is no need to study hard for having monthly salary earned by the bloggers for a day.

Hence, to change the current situation in the academia we need to transform the educational system itself. Also, it is not necessary to change our children, but firstly ourselves. There is a need to implement new progressive educational system provided with the valuable knowledge and skills.

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