

FEATURES, FACTORS, AND RISKS OF THE INFLUENCE OF METAVERSES ON BUSINESS DEVELOPMENT IN THE DIGITAL ECONOMY: RUSSIAN AND INTERNATIONAL CONTEXT

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ABSTRACT

The article systematizes approaches to defining the essence of metaverses as multidimensional spaces that unite many virtual worlds (where participants can interact with each other and surrounding objects), in which digital copies of the real world are created (including in business) and used for various purposes. Metaverses are a key trend in the development of the Russian economy and its industries and spheres and can help improve productivity and optimize business processes in the digital world. The authors of the article analyze some examples of implementing metaverse technologies (including augmented, virtual, and mixed reality, blockchain, and cryptocurrencies) in Russia and other countries. Factors that influence the development of metaverses (including regulatory, economic, technological, and social) are identified. Risks and limitations associated with the development of metaverse technologies are demonstrated (cyber threats and risks of protecting a large amount of data, the lack of a single monetary unit in metaverses or rules for converting metaverse means of payment into conventional means of payment, difficulties in financing the development of technological projects due to a long time to market, insufficient number of specialists in the field of AR, VR, and mixed reality, blockchain, and cryptocurrencies, and other risks). The authors also identify features of the influence of metaverses on business development in the digital environment. In virtual multidimensional spaces of metaverses, the transition to a new economy of impressions is accelerating, new opportunities for remote interaction are being created, the format of employee training and development is being significantly transformed, digital twins are being made through the formation of exact virtual copies of business organizations, etc. Conclusions and proposals are drawn on the need to consider the influence of regulatory, economic, technological, and social factors on the development of business in the virtual spaces of metaverses and existing and potential threats and dangers associated with the development of economic activity in virtual spaces to realize the potential of business in the field of the new technological phenomenon of metaverses.

Keywords: Users; Participants; Companies; Web platforms; Digital twins; Virtual reality.





CARACTERÍSTICAS, FATORES E RISCOS DA INFLUÊNCIA DOS METAVERSOS NO DESENVOLVIMENTO DE NEGÓCIOS NA ECONOMIA DIGITAL: CONTEXTO RUSSO E INTERNACIONAL

RESUMO

O artigo sistematiza as abordagens para definir a essência dos metaversos como espaços multidimensionais que unem muitos mundos virtuais (onde os participantes podem interagir uns com os outros e com os objetos ao redor), nos quais cópias digitais do mundo real são criadas (inclusive nos negócios) e usadas para várias finalidades. Os metaversos são uma tendência importante no desenvolvimento da economia russa e de seus setores e esferas, e podem ajudar a melhorar a produtividade e otimizar os processos de negócios no mundo digital. Os autores do artigo analisam alguns exemplos de implementação de tecnologias de metaversos (incluindo realidade aumentada, virtual e mista, blockchain e criptomoedas) na Rússia e em outros países. Os fatores que influenciam o desenvolvimento de metaversos (incluindo regulatórios, econômicos, tecnológicos e sociais) são identificados. Os riscos e as limitações associados ao desenvolvimento de tecnologias de metaverso são demonstrados (ameaças cibernéticas e riscos de proteger uma grande quantidade de dados, a falta de uma única unidade monetária nos metaversos ou regras para converter os meios de pagamento dos metaversos em meios de pagamento convencionais, dificuldades para financiar o desenvolvimento de projetos tecnológicos devido ao longo tempo de comercialização, número insuficiente de especialistas no campo de AR, VR e realidade mista, blockchain e criptomoedas e outros riscos). Os autores também identificam características da influência dos metaversos no desenvolvimento dos negócios no ambiente digital. Nos espaços virtuais multidimensionais dos metaversos, a transição para uma nova economia de impressões está se acelerando, novas oportunidades de interação remota estão sendo criadas, o formato de treinamento e desenvolvimento de funcionários está sendo significativamente transformado, gêmeos digitais estão sendo criados por meio da formação de cópias virtuais exatas de organizações empresariais, etc. Conclusões e propostas são elaboradas sobre a necessidade de considerar a influência de fatores regulatórios, econômicos, tecnológicos e sociais no desenvolvimento de negócios nos espaços virtuais dos metaversos e as ameaças e perigos existentes e potenciais associados ao desenvolvimento da atividade econômica em espaços virtuais para realizar o potencial dos negócios no campo do novo fenômeno tecnológico dos metaversos.

Palavras-chave: Usuários; Participantes; Empresas; Plataformas da Web; Gêmeos digitais; Realidade virtual.



1 INTRODUCTION

The relevance of issues related to business development in metaverses is high due to the rapid digitalization of the Russian and global economies, the increasing degree of uncertainty and unpredictability of communications between participants on multidimensional online platforms, and dynamic and complex results of economic activity in these areas of interaction.

The study aims to determine the factors, features, and risks of the influence of metaverses on business development in the digital economy. The research object is business in the digital economy. The research subject is the factors, features, and risks of the influence of metaverses on business development in the digital economy.

2 METHODS AND MATERIALS

To achieve the objective and solve research tasks, we used an integrated approach, including various methods and techniques. Among the main methods used in the study are analysis, synthesis, induction, and deduction which allowed us to consider and systematize the theoretical material. For a detailed examination of specific examples and cases, the monographic method was applied. The graphical method was used to present statistical data and research results, which contributed to a more effective analysis of the received information.

The theoretical basis for the study included scientific articles and publications selected in the Elibrary.ru and Google Scholar citation databases using the keywords “метавселенная” and “metaverse”, respectively. This provided a comprehensive analysis of the topic under study and international experience and achievements in this field.

We used systemic, integrated, and situational approaches, which contributed to a multidimensional study of the research object.

3 RESULTS AND DISCUSSION

Our study proved that the number of publications related to metaverses has been increasing over the last two to three years. Elibrary contains more than 750 publications associated with the term “метавселенная”: 1 publication in 2019, 0 publications in 2020, 30 publications in 2021, 330 publications in 2022, and 391 publications in 2023.

In most sources, metaverses are understood as constantly operating multidimensional



spaces that unite many virtual worlds, where participants can interact with each other and surrounding objects. The evolution of metaverses is based on the rapid development of augmented, virtual, and mixed reality, blockchain, and cryptocurrencies.

Such a technological leap leads to a significant complication in the online environment and the emergence and formation of the third version of the Internet (Web 3.0), in which there is a significant decentralization of networks and interactions based on these technologies (Lokhman et al., 2018; Panasenکو et al., 2022; Panasenکو & Lebedev, 2023; Suray et al., 2021). The term “sub-metaverse” refers to technologies that allow creating digital copies of the real world (including businesses) and using them for various purposes.

In other words, metaverses are virtual spaces that provide an experience indistinguishable from the real one but with various advantages, including the decentralization of economic processes, unique social interaction, a high level of security, a wide range of scenarios and worlds, accessibility, inclusivity, innovative services, freedom of creativity, self-expression of participants and users, and their active participation in the creation and management of processes inside metaverses.

Our analysis showed that the relevant scientific literature examines various issues and aspects of such a complex phenomenon as the metaverse. W. Xu considers emotional visualization in metaverses in cognitive contexts (Xu & Wang, 2023). Xu emphasizes that with the development and use of metaverses, communication between participants (users) is transforming, replacing traditional forms and becoming an innovative form of interaction in a new era, which unites artificial and natural intelligence and virtual and real worlds. The perspective of embodied cognition arises, and a method for designing various levels of metaverses is discussed. Being an integral part of interaction in metaverses, emotions can facilitate emotional exchange and enhance the interactive experience of users on unique digital platforms using various models, including social design models of metaverses based on emotional visualization, embodiment, symbolism, gamification, and resonance.

Other scientists explore the possibilities of metaverses in various spheres and industries. H. Kim (2024) analyzes the potential of metaverses in education, including in teaching the Korean language. Kim mentions that global interest in the science and technology of creating virtual spaces (metaverses) is high. In such an economic sector as education, as well as in other industries and economic spheres, online platforms that replace real spaces are in great demand as tools for learning, gaining technological experience, promoting goods and services, or entertaining users. Methods of teaching and learning foreign languages using metaverses are highly effective and efficient. They have several advantages since they increase communicative capabilities and can be applied, in



accordance with the student's traits, without any time or spatial restrictions.

Russian authors, including A.V. Igishev, E.V. Pikulya, and I.V. Romanova (2023), study current trends and prospects for the development of metaverse technologies in the Russian economy. The authors claim that the development and integration of metaverses in many areas of human activity is one of the most promising business trends during the active digitalization of the economy. This trend is observed in many developed countries and is gaining momentum in Russia.

A.N. Klimenkov (2023) dwells on the use of metaverse elements in business processes, analyzes companies responsible for the development of mainstream technological aspects of metaverses, considers methods to use metaverses in business and marketing, and identifies ways to transform the experience-based industry.

M.K. Gochiyaeva and D.Kh.M. Aidinova (2023) regard metaverses in the modern economy as a special world of opportunities for entertainment, education, and business. However, the authors note that users should be aware of potential risks and take appropriate measures to protect themselves before entering virtual worlds. The issue of creating a safe environment in metaverses is of particular importance.

D.S. Zagalskii, O.E. Kashkarov, and D.A. Moskvina (2023) study models for ensuring control over user access to metaverse resources, focusing on identifying threats and highlighting requirements for information security of metaverses. A.V. Minbaleev (2023) considers the concept and legal nature of metaverses.

Several authors analyze industry development in metaverses. N. Hourani (2023) analyzes metaverse technologies as one of the modern trends in hospitality business and claims that the hospitality sector is sensitive to emergencies since its functioning during the COVID-19 pandemic stopped as a result of total closures in the industry. Consequently, there is an urgent need for a new approach which would mitigate the consequences of crises (including those caused by economic sanctions). Thus, hospitality can be transferred to the virtual world (metaverse), where the idea of an interactive virtual (or digital) world can help replace the actual visit, without harming the hospitality industry in the real world.

We agree with the scientific statement that metaverses are a key trend in the development of the Russian economy and its industries and areas, which can contribute to improving productivity and optimizing business processes in the digital world. However, it is important to understand the factors and features of the influence of metaverses on business development in the digital economy and the risks, threats, and dangers that arise, which requires additional attention from management aimed at the effective development of business companies in complex technological environment of Web 3.0.



In addition to scientific publications, we also analyzed some practical examples (Binance Academy, 2024; HD ARTEL, 2022). Immersive technologies are beginning to be used in digital rebranding processes for metaverses by such technology leaders as Apple, Nvidia, and Qualcomm.

Other companies including Morgan Stanley, Coca-Cola, Adidas, Samsung, and SnoopDogg are involved in activities on decentralized metaverse platforms (for example, Decentraland has its own cryptocurrency MANA).

Nike, Forever 21, Gucci, Nascar, Ralph Lauren, and Vans use such platforms to create virtual worlds in which users can interact with their brands (for example, on the Roblox platform).

BMW is creating digital twins of its factories using the Nvidia Omniverse technology to calculate the economics of the enterprise and the consequences of possible changes in the logistics and production chains.

Microsoft is also involved in the development of business processes in metaverses, dealing with virtual offices and work environments in such complex digital spaces. Microsoft is creating permanent virtual workspaces for employees, providing them with a deeper level of interaction than standard professional communications.

Google views metaverses as an impressive evolution of the computer world with AR. Google has a lot of experience with AR due to Google Glass. At the end of 2021, Google also reorganized its VR and AR departments into a new Google Labs team with Project Starline, a holographic video conferencing tool for business workflows. Google focuses on connecting users through augmented avatars that combine the digital and physical worlds.

In Russia, the impetus for developing metaverse technologies is the Roadmap for the Development of End-to-End Digital Technology and VR and AR published by the Ministry of Digital Development, Communications, and Mass Communications of the Russian Federation in 2019 (Ministry of Digital Development, Communications and Mass Communications of the Russian Federation, 2019). It is an official government document that presents a plan and identifies directions, stages, and activities for solving tasks for subtechnologies (16 technological tasks), including the creation of a feedback interface for a 6D platform ensuring complete immersion in VR.

The implementation of the Roadmap will gradually create the most accurate digital twins of enterprises and equipment, speed up information processing several times, and introduce AR, VR, and mixed reality. In Russia, the most active connection to metaverses is being realized in the fields of education, tourism and hospitality, the fashion industry, trade in non-food products, healthcare, etc. (Mayorova, 2019).



In the economy of Moscow, new virtual and remote technologies are rapidly developing, including telemedicine, computer vision technologies, and artificial intelligence for diagnosing diseases and determining pathologies in human internal organs with high reliability. Such rapid development of technologies creates a solid basis for the development of metaverses and the unlocking of their potential for the country's economy, industries, and areas and companies', regional, and urban economies.

Russian companies in various industries are developing metaverse processes. For example, the MyTona game developer announced the creation of its metaverse. Other Russian companies are developing the simulations of virtual stores and fashion shows (fashion houses are opening digital platforms for brand lovers, producing virtual branded clothing so that metaverse users can wear their brands in virtual spaces, for example, in gameplay). In addition, Russian entertainment companies are holding virtual concerts, parties, award ceremonies, and other events.

Both large companies and small businesses can get involved in activities on the online platforms of metaverses due to a variety of innovative projects. They hold positions both in the real and digital business spaces. The key role is played by the technological competences of companies and their dynamic abilities to produce innovation, creativity, and immersion.

It can be argued that metaverses are a fundamentally new market for goods and services, as well as an opportunity to build a successful business in many areas and sectors of the economy. In the future, it is necessary to predict the influence of metaverses on business development in the digital economy. According to Advertising & Media Markets Insights by Statista (2024), the global metaverse market was worth \$65.5 billion in 2022. It is expected to reach \$936.6 billion by 2030. In the next five or six years, expert estimates of projected income indicate rapid growth in the digital economy.

According to the Value Creation in the Metaverse by McKinsey, investment in metaverses totaled \$57 billion in 2021, doubling to \$120 billion in 2022 (McKinsey & Company, 2022). According to the company's forecasts, the metaverse market could reach \$5 trillion by 2030. In the next three or five years, metaverses will be actively developed by such industries as energy, automotive, high technology, and tourism. The estimated income from participation in metaverses is presented in Figure 1.



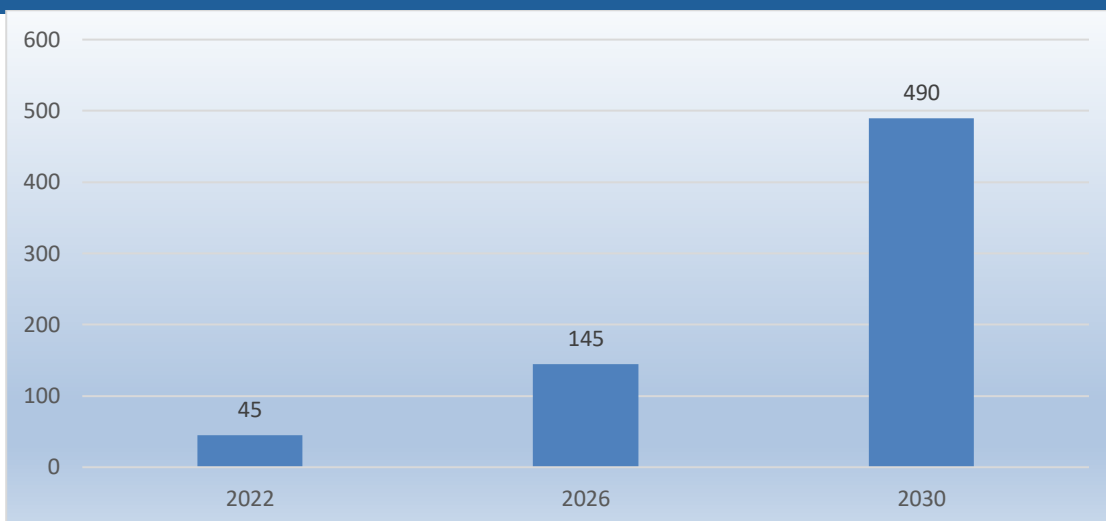


Figure 1. Estimated income from participation in metaverses, billion dollars (Statista, 2024)

According to Advertising & Media Markets Insights by Statista (2024), the estimated income from participation in metaverses will consist of income from e-commerce, remote work, and provision of virtual services in education, fitness, medicine, etc.

It can be argued that the economic role of metaverses will grow rapidly and evolutionarily corresponding to the next stage of business development in the complex technological environment of Web 3.0 (there are digital twins of users and participants, including business companies and their brands, in a newer version of the Internet, in which the physical and digital worlds are connected) (Statista, 2024).

As a result of our analysis of the theory and practice in the area under study, we identified several factors (primarily legal, economic, technological, and social) that influence the development of metaverses (Figure 2).



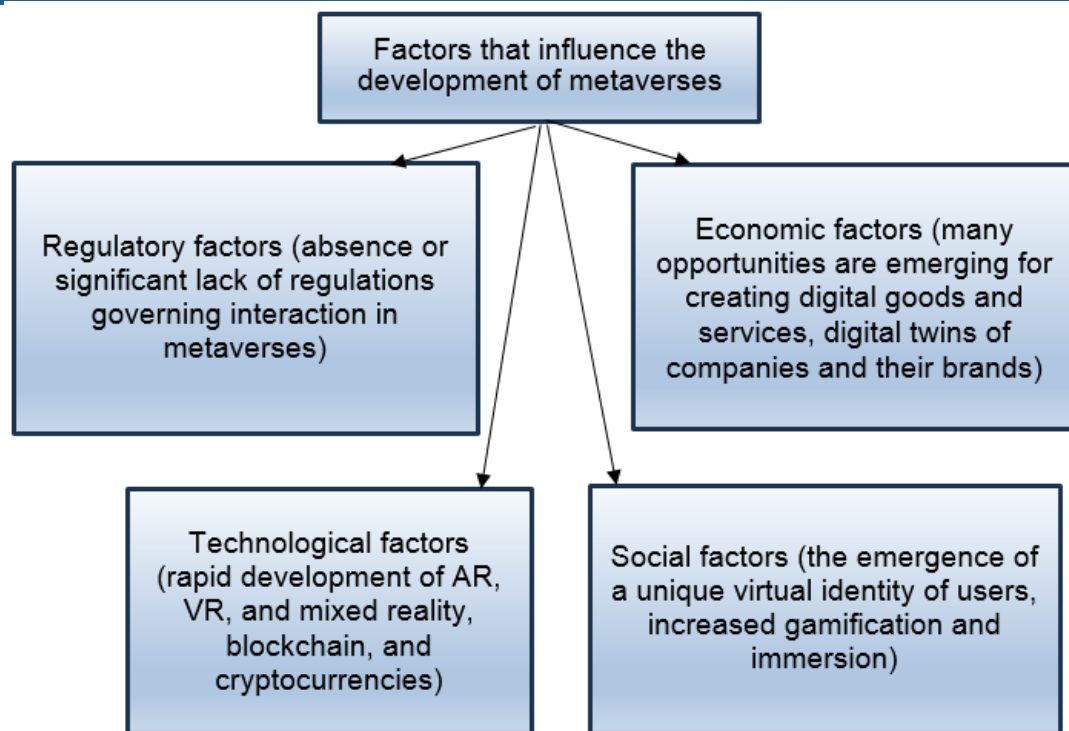
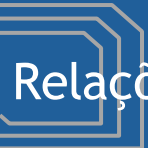


Figure 2. Factors that influence the development of metaverses

The factors indicated in Figure 2 create a complex, interconnected, and synergistic interaction, leading to the emergence of such a new qualitative phenomenon as the metaverse. It is difficult to overestimate the impact of any of the factors. A weak or wrong impact of any factor (for example, a lack of legal regulations in metaverses) will lead to the distortion of virtual space or an increase in potential risks, threats, and restrictions associated with metaverses.

We should mention the following risks and threats:

- 1) The formation of an alternative reality in the virtual spaces of metaverses will mean the emergence of a huge amount of data that will need to be protected using highly reliable security measures;
- 2) Metaverses use their monetary units, while traditional cards or means of payment do not work in metaverses, i.e., they cannot be linked or used to pay for virtual goods or services. It is necessary to create a common monetary unit, ensure the compatibility of such means of payment in metaverses, or convert them into regular currency (this is especially important for the development of economic activities of business organizations generating income in metaverses);
- 3) Today it is difficult to attract financing for the development of technological projects due to a long time-to-market (and the long period of return on investment);
- 4) The insufficient number of specialists in the field of AR, VR, and mixed reality, blockchain, and cryptocurrencies who can skillfully apply technologies in their work or use



them in everyday life as users;

5) The poor understanding of the features and possibilities of using AR, VR, and other metaverse technologies in the professional environment of business companies;

6) The high cost of creating high-quality AR/VR content and means of protecting big data in metaverses;

7) The lack of industry standards for designing business processes in metaverses and universal AR/VR devices, etc.

Considering the scientific and practical results obtained in our study, we also identified the features of the influence of metaverses on business in the digital economy. In our opinion, the key features are as follows.

First, metaverses accelerate the transition to a new experience economy in virtual spaces by providing new ways of interacting with business products and services. For example, with the help of metaverses, customer experience is personalized, new forms of art are created, and travel is provided to worlds and areas that cannot be reached in reality (for example, into space, the depths of seas and oceans, to mountain peaks, and other hard-to-reach places).

Second, metaverses create new opportunities for remote interaction, for example, the transition from 2D to 3D space will reduce the need for face-to-face communications and lower the costs of travel and logistics. This can significantly affect the structure of companies through the transfer of some divisions, services, or entire branches into virtual spaces.

Third, the format of training and self-development of employees can be significantly transformed. In metaverses, it will be possible to conduct remote training for new employees without the need to come to the office and simulate hard-to-reach and complex jobs, which is important for technological industries, for example, oil, gas, mining, aerospace, etc.

Fourth, the creation of digital twins by forming exact virtual copies of large corporations with a complex structure (for example, automobile factories, airline companies, heavy engineering, and robotics corporations) will generate a large amount of data in real time, introducing experimental changes and, based on the analysis of the results, making more informed management decisions, i.e., more accurately substantiate financial, marketing, advertising, or other projects, programs, campaigns, or business development startups.

Fifth, the influence of metaverses on business development in the digital economy will be especially powerful in the creation of unique technological competences of business personnel and their dynamic skills to produce innovations, support creativity, be immersive, and adapt economic activity to the complex technological environment of virtual spaces (metaverses).



4 CONCLUSIONS

Conclusions and proposals can be formed. In the context of digitalization, the economies of the world, countries, regions, and companies are developing a new market and niches in the virtual multidimensional space (metaverse). In this market, new opportunities are created for investment and development of virtual business by transforming management structures, training employees, transforming logistics and transport, creating and promoting virtual goods and services, applying immersive tools in marketing, advertising, and PR and a new approach to emotions and impressions of users and interaction with them. Both large corporations and small companies can participate in activities on metaverse platforms due to a variety of innovative projects. They occupy their niches and areas of business development both in the real and digital spaces. Business development in metaverses does not have any time or spatial restrictions. We need to consider the influence of regulatory, economic, technological, and social factors on the development of business in the virtual spaces of metaverses and the existing and potential threats and dangers associated with economic activity in metaverses to realize the potential of business in this new technological phenomenon.

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