The economic impact of digitalization and the creation of digital products on the development of the state

Abstract. The main components of the development of the digital economy as the next stage in the formation of a modern model of the production, technological and social system of society based on the results of the Fourth Industrial Revolution are regulatory regulation, infrastructure, network security (cybersecurity), training of professionals and the formation of technological platforms. This is exactly what the function of the state in partnership with business should be aimed at, the implementation of which requires an appropriate investment policy. The government must continue to strengthen the digital foundations by attracting investment in scalable, smart, and secure infrastructure capable of accelerating the pace of digital development. When implementing an investment strategy, it is important to identify sources in the field of investment - public and private, whose shares should be regulated by a special program «Digital Economy» and pay attention not only to large businesses that are interested in developing all aspects of the digital economy but also to small investors who are mainly represented by Portfolio Investment. An important component is to encourage investment in digitalization. To do this, in the field of investment activity to ensure the support of investment projects, it is necessary to form general rules for creating and evaluating special investment regimes: a list of new approaches to obtaining tax benefits, reducing insurance premiums for both private investors and investment companies implementing various projects, the development of specific measures of state support in one of the following forms: providing benefits for project financing; provision of benefits for the payment of property tax and land tax; compensation of investor investments through various tax revenues from the investment project, stabilization of regulatory and tax conditions.

Scientific novelty. The article examines the digital economy as an emerging phenomenon of the annual increase in the share of the world economy, in comparison with the raw materials and commodity part of it. The article considers the latest technologies and their impact on the traditional economy of various countries of the world.

The purpose of the article is to study the basic principles of digitalization of the economy, which allow the digital economy to become a full-fledged part of the globalized world.

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Економічний вплив цифровізації та створення цифрових продуктів на розвиток держави

Аннотація.
Актуальность роботи.
Основними складовими розвитку цифрової економіки як чергового етапу формування виробничої, технологічної та соціальної системи суспільства, заснованої на результатах Четвертєї промислової революції, є нормативно-правове регулювання, інфраструктура, мережева безпека (кібер-безпека), підготовка фахівців і формування технологічних платформ. Саме на це і повинна бути спрямована роль держави в партнерстві з економікою, реалізація якої вимагає адекватної інвестиційної політики. Уряд повинен ще більше зміцнити цифрові бази, залучати інвестиції в масштабовану, інтелектуальну та безпечну інфраструктуру, яка може прискорити темпи цифрового розвитку. При реалізації інвестиційної стратегії, важливо визначити джерела в області інвестицій, державних і приватних, чи дії повинні регулюватися спеціальною програмою «Цифрова економіка», і звернути увагу не тільки на великих компаніях, зацікавлених в розвитку всіх аспектів цифрової економіки, а й на розріджених інвесторів, представлених, головним чином, інвестиційним портфелем. Важливим компонентом є сприяння інвестиціям у цифровізацію. Для досягнення цієї мети в області інвестиційної діяльності, щоб забезпечити підтримку інвестиційних проектів, необхідно встановити загальні правила для створення і оцінки спеціальних розмірів інвестування: список нових підходів для отримання податкових лізь, скорочення страхових премій, так і для приватних інвесторів, так і для інвестиційних компаній, які здійснюють проекти, розробки конкретних заходів державної підтримки, в одній з наступних форм: забезпечення вигод для фінансування проектів; надання пільг зі сплати податку на майно та податку на майно; компенсація інвестицій інвесторів за рахунок різних податкових надходжень від інвестпроекту, стабілізація нормативних та податкових умов.

Наукова новизна. У статті розглядається цифрова економіка як феномен щорічного збільшення частки світової економіки в порівнянні з сировинною і товарною її частинами. У статті розглядаються нові тенденції та їх вплив на традиційну економіку різних країн світу. Метою статті є вивчення основних принципів цифровізації економіки, які дозволяють цифровій економіці стати повноцінною частиною глобалізованого світу.

Ключові слова: цифрова економіка; цифровізація; цифровий продукт.

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специалистов и формирование технологических платформ. Именно на это и должна быть направлена роль государства в партнерстве с экономикой, реализация которой требует адекватной инвестиционной политики. Правительство должно еще больше укрепить цифровые базы, привлекая инвестиции в масштабируемые, интеллектуальную и безопасную инфраструктуру, которая может ускорить темпы цифрового развития. При реализации инвестиционной стратегии, важно определить источники в области инвестиций, государственных и частных, что действия должны регулироваться специальной программой «Цифровая Экономика», и обратить внимание не только на крупные компании, заинтересованные в развитии всех аспектов цифровой экономики, но и на розничных инвесторов, представленных, главным образом, инвестиционный портфель. Важным компонентом является содействие инвестициям в цифровизацию. Для достижения этой цели в области инвестиционной деятельности, чтобы обеспечить поддержку инвестиционных проектов, необходимо установить общие правила для создания и оценки специальные режимы инвестирования: список новых подходов для получения налоговых льгот, сокращение страховых премий, так и для частных инвесторов, так и для инвестиционных компаний, которые осуществляют проекты, разработки конкретных мер государственной поддержки, в одной из следующих форм: обеспечение выгод для финансирования проектов; предоставление льгот по уплате налога на имущество и налога на имущество; компенсация инвестиций инвесторов за счет различных налоговых поступлений от инвестиционного проекта, стабилизация нормативных и налоговых условий.

Научная новизна. В статье рассматривается цифровая экономика как формирующийся феномен ежегодного увеличения доли мировой экономики по сравнению с сырьевой и товарной ее частью. В статье рассматриваются новейшие технологии и их влияние на традиционную экономику различных стран мира.

Целью статьи является изучение основных принципов цифровизации экономики, которые позволяют цифровой экономике стать полноценной частью глобализированного мира.

Ключевые слова: цифровая экономика; цифровизация; цифровой продукт.

1. Introduction

The introduction of the digital economy at the initial stage should occur simultaneously in the following three areas: technological, where all decisions of a technical and technological nature should be standardized, that is, be safe and certified; institutional and Economic (Frank, 2019), which provides for the organization of new management models and business models using smart things, Industrial Internet of things, blockchain technology, its institutional support, complying with the regulatory framework of socio-economic relations of society; production, which includes specific business applications that meet the requirements of management models of the second direction, which is based on the technical support and infrastructure of the first direction (Gobble, 2018).

Today, investment activity and the digital economy are becoming more and more interrelated, since the progressive development of digitalization of economic processes is impossible without significant investment investments, and the most effective investment tools are directly related to the digital economy (Karsten, 2021).

An important global trend of the current stage of investment policy is the establishment of a relationship between the strategy of digitalization and the strategy for the development of the digital economy, which has important consequences for investment, and investment also determines the development of digital technologies of network platforms (Hensmans, 2021).

The general pattern of digital economy projects is the focus on a specific consumer and the comprehensive use of information as a driving resource, taking into account the specific characteristics of a particular consumer in a particular place, and the global use of digital transformation technologies for real business processes (Kolk, 2020). Thus, these digital projects are characterized by very specific circumstances of their implementation in a specific place, and only if they accumulate positive economic results can they become the subject of standardization and other regulation (Lammi, 2021).

However, it is impossible to find effective answers to these challenges and achieve a technological breakthrough without state participation. This is also confirmed by the experience of countries that currently occupy the first lines of international digital development ratings. It is the state authorities there that act as the main driver of digitalization, implementing systemic policies in the innovation sphere, creating institutional conditions, and creating infrastructure opportunities for the development of new technologies, directly or indirectly encouraging their commercialization and stimulating demand for them. To receive investors’ funds, Russia must be an investment-attractive country (first of all, the rules of the game must be simple, clear and the same for everyone, there must be no corruption, property protection) (Lokuge, 2018).
2. Brief Literature Review

Industrial computer services is a unique subsector that is growing in all regions and is one of the main sources of employment in the ICT sector (Maltseva, 2019). Among developing countries, India accounts for the largest share (Matarazzo, 2021). The value-added generated in the production of ICT products mainly comes from East Asia (mainly from China), while the opportunities of other developing countries are still very limited. Over the past 10 years, global export services in the field of ICT and digital technologies have grown much faster than the entire export service as a whole, which indicates an increased digitalization of the global economy. In 2021, the volume of export services provided using digital technologies reached 2.29 trillion., which accounted for 50% of the world’s export service (Morgan-Thomas, 2020).

The number of technology companies is also growing among the world’s 100 largest multinational corporations (MNCs). According to researchers, there were 11 such companies in 2010 and 27 in 2019. At the same time, the average annual growth in the number of employees in technology MNCs was 5%, turnover - 5%, assets - 11% (Oliveira, 2021). According to other estimates, telecommunications and other MNCs did not grow.

Although IT is IT companies that have the largest capitalization. Five US companies with the largest capitalization in 2017. there are GAFAM, or Big Tech - technology companies (Google (Alphabet), Apple, Facebook, Amazon, and Microsoft). Their total capitalization exceeds 5.5 trillion., or more than 15% of US GDP, and the average capitalization is 3 times higher than that of other MNCs (Newlands, 2020).

Digitalization provides some advantages for the development of the economy. In particular, the potential of digitalization is confirmed in the OECD report: «technologies, intellectual programs and other innovations in the digital economy can improve the quality of services provided and help solve problems in a wide variety of areas, including health, agriculture, public administration, taxes, transport, education, ecology, etc.» (Oliveira, 2021).

Digitalization has a significant impact on employment and the labor market, in particular, it is a prerequisite for new opportunities to create new jobs. Although it should be added that data on the impact of digitalization on job creation is still very contradictory. Despite certain pessimistic forecasts regarding the limitation of reserves for creating new jobs, reduced employment, and rapid growth in unemployment in the world, the latest ILO report «prospects for employment and social protection in the world in 2019» records that until 2019 (before the COVID-19 pandemic) overall, the world experienced an increase in employment, although progress in reducing unemployment was not accompanied by proper improvements in the quality of jobs (Plesner, 2020).

3. Materials and Methods

Current data indicate that efficiency improvements and digitalization do not create new jobs in established companies and traditional sectors of the economy, but such places appear in technology companies.

The development of the Internet is beginning to change the situation for certain areas of the economy. First of all, we are talking about labor and entrepreneurial activities that are informational. The professional activity of such specialists as programmers, copywriters, designers, administrators of online stores and websites, internet marketers, call center employees, etc. does not depend on their actual location, since they can work remotely. Gradually, with the development of relevant digital platforms and communication technologies, doctors, psychologists, teachers, tutors, financial workers, and lawyers are switching to remote work (so far only partially). Instagram Facebook, etc., allows searching for professional information and earn income from your knowledge.

4. Results and Discussions

4.1. The technological nature of the digital economy

Instagram Facebook, YouTube, Twitter, LinkedIn, Instagram, etc. in recent years, such Internet-dependent markets as tourism, games and e-sports, media, and banking services have also been actively developed.

Governments of developed countries have been implementing special digital transformation programs for the economy and business since 2011-2013. The latter is based on several key technologies: artificial intelligence; robotization of production and business processes; multi-channel
collection and analysis of big data, the use of behavioral economics tools based on them - both for predicting and meeting the demand and desires of consumers and their active formation (Figure 1). At the same time, digital business transformation is a revision of corporate, business, functional strategies, and development models of business organizations.

In 2012-2016, many governments approved and began funding their national industry development programs 4.0. For example, in France, 800 companies were granted loans under such a program in 2018; 3,400 companies were diagnosed with production modernization, and 300 experts work in 18 regions. The Dutch government has identified 10 areas of accelerated R&D development. In the CIS zone, the leader is Kazakhstan, which has been successfully implementing its national program since 2017.

Figure 1:
Cognitive flow chart for the development of digital technology
Source: World Bank Data (2020)

In a narrow sense, the digital economy is the information economy:
• production of software products, the main resource, and factor of which is information;
• Internet economy: information technologies provide certain types of activities (Trade, banking, etc.) via the Internet;
• «cloud economy»: computer equipment provides ubiquitous, network access to the total amount of information resources that are based and accumulated remotely. Cloud solutions allow unlimited and lightning-fast scaling, as well as remote work; virtual economy: this is what makes it the main space of functioning of the Digital Economy; smart Economy: the latest computer programs provide the possibility of intellectual reality («smart home», «smart city», e-government, direct democracy, etc.).

In a broader sense, the digital economy is an activity carried out in any real Industry (Industry, construction, agriculture, education, medicine, etc.) using new technological products. The most appropriate concept for economic theory is «information and network economy», where attention is focused on the nature of the resource and the mechanism of organizational and economic relations. The latter is implemented through decentralized protocols and a social network. The technological basis of the network is platforms - a digital environment in which a special software and hardware complex with a set of specific services and functions provides opportunities for direct communication between consumers and manufacturers. Personal communication and economic connections are carried out through a network that already has not only centralized ordering but also decentralized ways of interaction. The most characteristic feature of network interconnection is digital platforms as a fundamental element of the information economy. It is on digital platforms that Blockchain appears as a database distribution technology (without a single center), supported by all participants. Based on blockchain transactions,
the local network currency Bitcoin appears, which is fundamentally impossible in the conditions of hierarchical connections of the monetary system.

4.2. Country-level Digital Transformation Index

The Digital Transformation Index, developed by The Independent British firm Vanson Bourne, is calculated as follows: the firm interviews business leaders-managers who have the right to make strategically important decisions for a business organization. In 2019, 4,600 business leaders from 42 countries took part in the survey.

According to the McKinsey Global Institute’s industry Digital Index, Europe is currently operating at 12% of its digital potential, Germany at 10% of its digital potential, the UK at 17%, and the US at 18%. In other words, even developed countries do not fully use their digitalization potential (Figure 2).

The ICT-Digitization index, developed by scientists, allows us to assess the real level of implementation of digital technologies and competencies at enterprises. The index makes it possible to assess the changes that are taking place and see in which direction digitalization is moving. Analysis of best practices and identification of digitalization leaders will allow market participants to analyze their experience in digital innovation, assess the level of development of digital technologies and competencies in the enterprise, compare their practice with other market participants, and determine general trends in digitalization.

Figure 2: ICT digitalization index of global economy, 2015-2020
Source: McKinsey&Company, available data from 2015 to 2020

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The enterprise digitalization index (ICT) is proposed to be calculated as the weighted average sum of three sub-indices:

1) subindex «infrastructure development» (IID - Infrastructure development) - reflects the degree of infrastructure development (degree of infrastructure development), Availability of internet access (Availability of Internet access), and quality of internet access (Internet access quality);

2) subindex «online expenses» (IoE - Online expenses) - includes expenses for online retail (Online trading) and online advertising (Online advertising);

3) subindex «user activity» (IUA - User activity) - calculated as a weighted average value of lower-level subindexes: activity of enterprises, the activity of consumers, and activity of state institutions. All subindexes are formed from weighted averages of several parameters that underlie them.

German economists (Scherer, 2020) in 2017, the following sequence of stages (phases) of digital transformation of the business model was proposed:

1. Digital Reality: the company’s existing business model is determined together with Value-Added analysis, while the interests of stakeholders and customer needs are studied. This provides insight into digital reality for this company in various fields.

2. Digital Ambition: based on digital reality, the main goals of digital transformation are defined in the context of time, finance, space and quality. Digital ambition postulates exactly what goals should be considered for a particular business model and its elements, how to prioritize the goals and dimensions of the business model.

3. Digital Potential: best practices and activators for the development of digital transformation are established. This serves as a starting point for designing a future business model. All elements of the business model should be logically combined.

4. Digital Fit: the design options of the digital business model are analyzed, evaluated and compared with the existing business model, and possible combinations of design elements are evaluated.

5. Digital Implementation: the developed digital business model is being implemented. At the same time, the development of a digital customer experience and a digital value creation network that describes integration with partners continues. Resources and opportunities are also defined at this stage.

4.3. Investments in creating digital products

The current stage of such changes is associated with the fourth industrial revolution (Industry 4.0) and is identified with the formation of the sixth technological structure, where digital technologies occupy a key place and cause systemic not only technological but also socio-economic changes (Porter, 2015).

It should be noted that digital technologies themselves appeared about 50 years ago from the point of view of a scientific and practical approach, but in the conditions of the digital economy they have become more advanced and integrated, spreading much faster and on a larger scale, accelerating the course of changing the picture of the world based on digital transformation. Today, digitalization is replacing informatization (while informatization is a component of digitalization), which forms a conceptual point of view that should be understood as a systematic approach to the use of digital technologies to increase labor productivity, the competitiveness of production and accelerate socio-economic development. In other words, a digital system must be created that can operate independently, has analytical and predictive functions, and solves problems by itself (however, today the task in the vast majority of cases is set by a person) (Scherer, 2020).

The phenomenon of the concept of «digital economy» in a generalized form is considered as a system of social, economic, and technological relations between the state, the business community and citizens, which functions in the global information space through the widespread use of network digital technologies that lead to continuous innovative changes to increase the efficiency of socio-economic processes. From the point of view of the subject of our research, in today’s conditions, this can be considered as a separate segment of the economy, which is a set of financial injections (investments) to ensure the growth of efficiency of existing business processes and competitiveness through the development of new technological solutions and the development of current technologies; the ability of businesses to invest in it to reduce the cost of their products and develop their portfolio of offers (Timberg, 2019).
In this context, it is possible to identify characteristic global investment trends that directly or indirectly affect digitalization:

1. Since 2015, there has been a steady trend of reducing investment flows on a global scale. Thus, according to the UNCTAD report «monitoring investment trends, 2019» (Trittin, 2019) in 2018, compared to the previous year, the attraction of Foreign Direct Investment (FDI) to the global economy decreased by 19% to USD 1.2 trillion. Compared to 2015 - by 1.6 times. Consequently, the global investment market has narrowed significantly in recent years, leading to increased competition for FDI, especially between developing countries and countries with economies in transition. In addition, cross-border investment in developed countries (by 40% compared to 2017) and countries with economies in transition (by 8%) sharply decreased, while growth (by 3%) in developing countries is a sign of a not sufficiently «healthy» state of the world economy and trade. Against the background of this trend, according to the framework conditions of the OECD (von Krogh, 2018) and the recommendations of UNCTAD for the states of the world (West, 2019), a set of measures for state incentives for investment activity is focused on the implementation of the concept of sustainable development and should ensure the correct construction of state investment policy and the effective functioning of certain sectors of the economy (financial, public and other sectors). Strong arguments in favor of developing a comprehensive investment policy framework for the development of the digital economy are available examples of the relationship between investment policies and digital development strategies of individual countries and companies, which can be the key to the fruitful integration of developing countries’ economies into the global economy and contribute to reducing the digital divide and meet the significant investment needs necessary for the implementation of the Sustainable Development Agenda until 2030.

2. The overall rating of global trends in the development of the digital economy, which methodologically begins on an integral assessment of the most significant analyzed indicators (the amount of investment, the number of significant scientific publications in this and related fields of knowledge, patents) and reflects the importance and relevance of the established directions of technological development of companies, industries and countries, not only allows you to compare different trends with each other and draw conclusions about the prospects for strategic development, but also make decisions about investing in new directions (Plesner, 2020). Thus, it is noteworthy that e-commerce has remained the leader in the global investment activity rating since 2015, but the technologies of distributed ledger (Blockchain), Smart power supply networks (Smart Grid) and Computer Vision (Computer Vision) showed significant growth rates. Thus, the investment attractiveness rating in 2018 concerning investments in new companies refers to the so-called end-to-end trends and reflects the level of readiness of investors to finance technology startups in specific areas (Figure 3).

3. In the field of digital business development, global digitalization is changing value chains, creating new hubs, and transforming sources of economic activity. The advantages of this process are to solve various kinds of socio-economic and technological tasks, including: attracting investment in the business sphere; the emergence of new products and new markets; reducing the cost of doing business; the emergence of new professions and jobs; increasing productivity, the efficiency of processes; increasing taxes; strengthening the diffusion of innovations, etc. In these circumstances, policymakers are tasked with finding the right balance between leveraging the benefits of openness and reducing the risks that are emerging at an unprecedented rate in the digital world. At the same time, businesses that do not require a significant physical presence is fully and relatively easily moving to digital platforms (services, banking and financial operations, software and application development, entertainment business, etc.). Less flexible industrial enterprises, many of which have not yet automated the business process management system, are significantly lagging in development. Companies operating in the B2B market strive for digitalization at least at the level of interaction with consumers. Local narrow-profile small firms are looking for solutions for business restructuring based on the introduction of digital business models to increase productivity.

4. Within the framework of the development of «Industry 4.0», digital production becomes a key aspect, and the competitiveness of companies is determined by the level of their digitalization. Of course, to become a digital enterprise, you need to invest in a digital asset. Digital occurs when digital technologies accelerate knowledge transfer, innovation in business, and increase productivity within the company through the supply chains of industries to achieve sustainable economic growth.
In addition, it has been empirically proven that investing in a digital asset is significantly more profitable than in a non-digital one. However, it is important to keep in mind that the digital enterprise is the product of another industrial revolution, and not the evolution of IT-based automation, on which the previous Industry 3.0 was based. In addition, although industrial automation systems were able to connect thousands of devices, manage them, collect and process data received from them half a century ago, today we need to change the very concept of data analysis and decision-making algorithm: the era of digital business is characterized by an unprecedented level of convergence of technologies, business processes, communications, artificial intelligence and various «smart» products.

5. An important role is played by digital platforms both commercial (electronic trade in goods, both through intermediary platforms and directly from the manufacturer; transactional digital platforms as a key way of doing business for some digital corporations) and non-commercial (not focused on making a profit and aimed at solving various types of social problems). It should be noted that with the development of the digital space and the emergence of new startups, e-commerce platforms are also expanding, including subscription companies (Netflix, Amediateka in Russia), taxi and transportation services (Uber), hotel and tour booking services (Booking.com, Airbnb), cloud service (Salesforce, Amazon Web Services) and many others. Among the conditions under which these platforms are formed is that a business founded based on digital data and platforms should be attractive to all parties: manufacturers, sellers, buyers, intermediaries.

6. Financial Innovation (fintech) is becoming the most important global phenomenon in recent years, and digital technologies, being the core of providing financial services, stimulate the penetration of innovations into the financial market. The volume of venture capital investments in fintech has increased 10-fold over the past 5 years, reaching the level of USD 20 billion a year, confirming the unprecedented interest in digitalizing financial activities. The growth of fintech brings

![Figure 3: Investment attractiveness rating in 2021 in million USD](source: Compiled by the authors)

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up-to-date issues with financial authorities regarding the expansion of regulatory and supervisory content, compliance of new types of digital financial services with existing rules, identification, assessment, reduction and monitoring of financial innovation risks. Today, more and more large financial organizations (to maintain market share) with the participation of the regulator initiate projects to create specialized platforms based on blockchain. For example, the Chinese fintech company Hande Financial Technology Holdings Co. Ltd (HDFH) has created a special investment fund to launch a global consortium of global digital banks on the blockchain, which plans to finance the creation of a leading digital bank, which will become the basis for launching a global consortium of global digital banks. The first step is an investment and digital transformation of the bank, then the consortium’s blockchain is launched, where the bank will become the central node. It is expected that the amount of funding will be about USD 1 billion. In addition to HDFH, Yillion Bank and Zhongguancun Private Equity & Venture Capital Association (ZVCA) will join the investment fund. The investment period will be 6 years, and it will take up to 2 years to withdraw investments. In addition, China’s financial regulators began to monitor the cryptocurrency market more closely after the hype around the blockchain began in the country, in particular, they began to monitor the implementation of the ban on cryptocurrency trading and ICOs and are preparing new restrictive measures.

5. Conclusion
The process of implementing megaprojects for the construction of digital countries (for example, «Smart Country»), Digital Cities («Smart City») is being deepened. Thus, to attract businesses willing to invest in Singapore, the government of the country has launched:
1) an initiative called «the future of Singapore», to develop and test new ideas and solutions in the field of Urban Planning, Public Administration, Health and consumer goods and services;
2) five-year Smart Nation programs;
3) the RIE Research Program;
4) financial sector development programs;
5) entrepreneurship development programs;
6) educational programs.

The Singapore government is committed to increasing its digital expertise and plans to export it in the future and will allocate Singapore USD 2.4 billion (or 1.68 billion of Singapore dollars) over the next 4 years on the digital transformation of the economy and ensuring its future competitive advantage. The authorities have planned USD 56.43 million to expand the digital capabilities of small and medium-sized businesses.

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