Chapter

Digital Economy in the Post-COVID Period: Changes, Communication Processes and Development Prospects

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Abstract

Topicality: Without a doubt, the COVID-19 pandemic has made significant changes in consumer behavior, further strengthening the transition of the global system from the classical economy to the digital economy. In the context of the pandemic, consumer behavior has become even more digital: initially it was associated with health safety standards to limit social face-to-face contacts, and later consumers could not imagine their life without online aggregators of food delivery, documents, clothing, etc. *The goal of the research*: to conduct a theoretical review of the features of the development of the digital economy and communication strategies of management before the COVID-19 pandemic and already in the post-COVID-19 period. *Methods of research:* comparative analysis, methods of generalization and classification, historical analysis. *Results of the research:* the study made it possible to form a theoretical overview of the scientific material and ideas for preparing for a statistical analysis of the global macroeconomic indicators of the digital economy. *Practical application:* The chapter will be useful for the relevant government agencies (in Russia, for instance, the Ministry of Digital Development) for developing practical recommendations on a broader digitalization of management systems.

Keywords: digital economy, post-COVID-19 period, communication channels, consumer behavior

1. Introduction

Large-scale transformations in the context of the development of end-to-end digital technologies create prerequisites for exacerbating national security problems, form challenges to the triad of interests of the individual, society, and the state. The processes of digitalization, the digital economy are rapidly replacing the old way of activity of modern society. Keeping in mind that, on the one hand, thanks to information technologies, the efficiency of most sectors of the economy and public administration increases, the opportunities for interaction of subjects of legal relations expand through new end – to-end digital technologies, like artificial

intelligence and robotics, and the speed of developing and making managerial decisions increases. At the same time, on the opposite side, at the moment there is a positive trend of growth in the number of cyber attacks. According to analytical data, the products of such programs as Kaspersky and Cisco detect more than 700 million online attacks per quarter worldwide and block about 20 billion network attacks per day [1]. The above allows us to state the improvement and transformation of a new type of malicious activity of attackers by automating cyber attacks, including using artificial intelligence technology and machine learning in order to 'bypass' the known means of protecting information (data) [1].

The long-term experience of developed countries shows that success in the development of the economy and society can only be ensured by new knowledge and scientific and technological progress [2]. The transition to innovative technologies, especially in organizations with a high scientific component in added value, requires new methods in the information support system, support for knowledge bases, and employee motivation programs. Knowledge management and the organization's ability to learn become a key management competence. Knowledge is the ability of an organization to improve based on the information received about new technologies and the dynamics of internal and external factors. This is facilitated by the SAP Knowledge Management system – a knowledge management platform.

Information technologies of enterprise management based on the ERP system allow you to effectively solve the problems of enterprise management, based on the strategy of its development [3]. This requires a single integrated platform that covers all business processes of the enterprise and combines the latest management and information technologies. Improving corporate governance becomes a key strategic task for the development and life of any enterprise, which digital technologies help to solve, especially in the post-COVID-19 period.

The motivation of the authors to conduct the study is related to the desire to systematize and possibly predict the development of digital management and communication solutions in the new conditions after COVID-19 global pandemic, when most of the working population experienced a rethinking of the paradigm of their economic and socio-communicative activities.

The current chapter consists of the following key parts: the methodology of the research with a brief explanation of applied research methods; main 'body' of the article, including the historical background (Section 3.1) of digital economy development; Section 3.2. assesses the role of digital technologies in the development of the economy; Section 3.3, analyzing the role of communication strategies for the development of the efficient management solutions and selection of resources within various economic, technological, and social obstacles; in Section 3.4 the authors are conducting a preliminary forecast of the future of digital economy and management solutions in the post-COVID-19 period; the final part of the research is a 'Conclusion', where the results of the study are summarized.

2. Methodology

The research is based on the system and comparative analysis, a dialectical method, as well as classification and generalization methods. Special attention is paid to the system and predictive approach which allows to reveal and characterize the perspectives of digital economics and communication management within the post-COVID-19 era. The historical analysis of the digitalization of economics is also applied. The study is interdisciplinary in nature.

3. Main part

3.1 Digital economy development: historical background

Digital technologies are a significant component of knowledge management, and it is important that their application is a part of a system-wide approach to managing the entire R&D system. The knowledge economy and the digital economy are becoming an increasingly important driver of global economic growth and play a significant role in accelerating economic development, increasing the productivity of existing industries, creating new markets and industries, and achieving inclusive, sustainable growth.

The circulating knowledge and information are changing not only the life of each person, but also economic and political systems. Successful digital companies combine technical knowledge with the creative talent and understanding of their customers. The accumulation of knowledge increases the efficiency of interaction with suppliers, consumers, competitors, and partners. The creation of new knowledge based on the integration of existing knowledge increases the overall level of scientific and technological development of the country and society as a whole. The storage and dissemination of knowledge is carried out on the basis of information systems and contributes to the increase of productivity, flexibility and competitiveness of enterprises.

Micro-level competitiveness is associated with such major factors as resources, external competition, demand, and cross-industry linkages. It is necessary to emphasize the role of intra-company marketing and management in creating development strategies, quality products and production efficiency in general.

The use of digital resources (including general technologies), connected in an integrated global network, allows enterprises to rapidly make decisions in choosing an attractive market segment for the promotion of R&D, operating with the necessary amount and quality of data. The development of information technologies and the digitization of information have changed the processes of economic management. The considered functions and the role of information and communication technologies stimulate the quantitative and qualitative growth of the modern economy. But the question arises about the role and place of the 'electronic economy' itself, based on the use of digital technologies. Should the 'digital economy' be considered as a qualitatively new economic activity that has replaced the previous 'outdated' classical economy, or is it developing within the framework of this economy, but has a cross-cutting, penetrating character in all spheres of socio-economic life?

American scientists began the development of digital technologies in the mid-twentieth century and relied on mathematical concepts proposed in the 17th century by the German mathematician Gelfried Leibniz, who developed a binary computing system.

There are three stages of the development of the digital economy.

At the first stage (the beginning of the second half of the twentieth century – the middle of the 1990s), the base of the electronic economy was born, the global Internet was created, and telecommunications technologies and means of communication were developed.

The second stage (mid-1990s - 2005) is characterized by the penetration of the Internet into all spheres of human society, including not only science, technology and business, but also the service sector, financial monetary relations, culture, management, and other branches of the digital economy are electronic commerce, money, marketing, insurance, and other types. Along with the real business entities, virtual banks, shops, and offices have been created.

The third stage (from 2005 to the present moment) is characterized by the mass appearance of virtual goods and electronic money, the development of commodity turnover processes, including the service sector. The process of separating the digital economy from the real sector of economic activity is being formed.

Over the last decades of the XX century, computers have increased their speed and the volume of processed and stored information many-fold. In 1981, Microsoft developed the MS-DOS operating system for its personal computers. In 1983, an improved IBM PC/XT personal computer was created by IBM. In 1983–1993, the global computer network Internet and E-mail were created, which were able to be used by millions of users around the world.

In 2005, IBM developed the BlueGene supercomputer with a capacity of over 30 trillion operations per second. In the 1990s, the Internet had brought together most of the existing computer networks. Since 1995, the globalization of society has begun. The emergence of IP protocols for mobile phones allowed them to be integrated into the Internet, which was the beginning of the development of electronic mobile business.

Information resources have become available to every member of society. Since 2000, electronic modeling has become an integral part of the intellectual activity of mankind. The comparison of the 'electronic brain' with the human brain had led to the idea of creating learning computers – neuro-computers that are used for image recognition, perception of human speech, handwritten text, etc. It is necessary to recognize the inevitability and objective nature of the emergence of the digital economy in the world economy in the second half of the twentieth century.

Today, technical modeling and technical normalization of production processes and models are moving into the field of a strict process of production and economic management, and in general are the task of the manager, not the technical specialist. The performance of any qualified specialist today can be improved many times thanks to the technologies of working with structured digital information. The data allows you to digitize the surrounding business reality and build high-level models for deep retrospective business analysis, when the decision-making time is limited to seconds.

The data opens up new facets of events and phenomena, helping practitioners and confirming or refuting theorists' hypotheses. In turn, it is digital data that forces the economy to bear significant costs and to rebuild the infrastructure that is extremely necessary for their poor use. Data centers, high-speed communication networks, sensors, distributed computing power—the technical side of the universal process of digital data globalization. Subject applications, complex algorithms, trainable neural networks, cryptographic protection, maintaining the integrity of data units, production cloud servers, interactive infographics, indicator panels-all this is a broad front for the development of data collection and digitization processes.

Data transmission networks for secure and public schemes are being actively developed. An increasingly important role is played by open data from states and communities, as well as data from private businesses offered for joint use. The key factor of digital transformation in the activities of market participants is the development of digital culture. It is obvious that at the present stage of socio-economic transformation of society, the environment imposes its own characteristics on the institutional structure of society, causing the need for the formation of fundamentally new concepts and approaches.

3.2 Digital technologies and digital economy development

The development of digital technologies should be considered as a reaction of mathematicians, physicists, economists, businessmen to an acute public demand

or challenge associated with the impending stagnation or impasse with the development of the world economy. The fact is that during this period a contradiction had arose and had become increasingly apparent between the huge potential of the latest knowledge and technologies accumulated as a result of the scientific and technological revolution in research, production, social and other spheres, and the limited opportunities for interested organizations and individuals to access this knowledge. It was impossible to solve the problem of access, completeness and speed of transmission of the necessary information online without the use of electronic networks, new software modules, and information systems.

These technologies have become the basis of a new way of life – the digital economy. In various publications, speeches of scientists and specialists at international economic forums and conferences, in program documents of socio-economic development of the economy and regions, the revolutionary role of digital technologies in the management of the country, regions, production and management decisions is rightly emphasized.

However, there are often questions about the obsolescence of the classical real economy and the need to replace it with a digital economy. According to the authors, this will allow Russia to become one of the leading industrial countries in a short time. It should be noted the undoubted role of information systems in the development of the world economy in the twenty-first and subsequent centuries in the following areas:

- providing access to interested organizations and citizens to obtain information about the latest technologies in various areas of economic activity, dispersed among their numerous owners around the world and creating mechanisms for their acquisition and use in the online mode;

- creating new types of economic activities using digital technologies, including the Internet, telecommunications technologies and communication channels, in-house information systems, virtual goods and services, electronic money, insurance, smart cities, and others.

A digital economy by itself, without the real and raw materials sector, without production, which turns raw materials into products, without agriculture and transport, cannot exist. But on the other hand, the modern real economy will not be able to provide economic activity without using the achievements of digital technologies. The digital economy should not be limited to the role of a separate branch of economic activity based on digital technologies, but should be considered as a way of life that affects all types of activities, including public administration, economy, business, education, social sphere, and medicine.

The main components of the digital economy are the basic infrastructure of e-business, e-business processes (methods of implementing business processes using ICT) and e-commerce transactions (sales via the Internet).

Transactional systems enable managers to gain a deeper understanding of technologies, regional features, and customer needs, allowing them to make informed decisions based on real data, rather than assumptions. This will have a positive impact on the development of cluster structures. Companies are transforming not only functional work, but also rethinking how functional blocks interact and how the boundaries of the firm and its activities evolve.

3.3 Communication strategies and management

And now we would like to clarify the essence of the communication strategies as an element of communication and strategic management on the example of

technology companies (as they are front-runners of the digital economy), as well as to analyze the future of communication processes for the companies operating in the post-COVID-19 era.

Communication has always been an integral part of both government and corporate strategy. However, they have not always been central and aimed at providing only a response to an event. From this point of view, the purpose of communication has been to maintain methods and mechanisms of decision-making, as well as to inform about the meaning of intentions and decisions, successes or to explain failures in the activities of corporations or authorities.

The strategic approach to communications implies going beyond the traditional set of categories such as target audiences, messages and information products and shifting to the impact on the socio-psychological structures of society, as well as on the fundamental processes underlying the problems of state security and ensuring its national interests [4].

Socio-psychological structures of society as well as social behavior are embedded in the basis of our society. They directly influence the mechanisms of socialization with other people, the establishment of links between groups of people, the unification of people with similar needs and aspirations [5]. According to the same principle, company employees establish their relations with the workplace, supporting and developing social interaction with colleagues. And in the same way, companies themselves act as communication actors, interacting with global organizations and institutions.

As such, communication not only helps corporations create and maintain a productive environment, but also provides a library of common needs, values and relationships. Communication processes in the global business environment, as a specific type of communication on the international stage, are highlighted as a separate area of research. On the other hand, when it comes to new and innovative ways of transmitting a company's messages, the perspective changes from the perception of communication as a marketing tool to communication as a tool for solving problems and providing effective solutions.

Here strategic communication acts as a kind of satellite for the development and implementation of organizational strategies. Such strategic communication is communication that ensures the development and implementation of the strategy of a social subject with the help of its special - communication - resources, means, tools [6]. It becomes strategic when it is included in the development and implementation of power relations between the organization and its environment and is aimed at achieving long-term strategic goals of the organization.

The theoretical perspective is changing from the classical marketing approach, where communication is seen as a tool to advance towards communication as a human resource, as a kind of motivation for positive change. This aspect also brings to the fore the approach of using social media as an internal and external channel. Nowadays, people are more concerned about solving and discussing disagreements or even creating new ones through multifunctional Internet channels [7].

In recent years, the development of the technology industry has become increasingly important, and in this context, the change in communication methods in a high-tech company. Research on communication methods in organizations tends to focus on the impact of globalization on team dynamics; it discusses how communication within and between virtual teams is inevitably complicated by geographical, political and cultural constraints; communication problems include lack of co-location, declining trust, inability to find common ground and communication barriers [5, 8–13]. These challenges are faced by both groups and their leaders, as well as by companies themselves as global communicative actors in managing interactions on the international stage.

One of the objectives of communication strategies is to conduct dialogs with different target groups and improve communication related to company brands. In terms of internal communication, strategic communication reaches employees and leads to internal ideas, creating communities with external stakeholders and engaging them in idea generation processes. In terms of impact, the focus should be on what the audience knows, how the audience feels, and how organizations respond. Thus, the audience's perception of the organization is expressed in the total amount of experience gained by people or other organizations in contact with the company.

In this vein, Emily Goldman [14] highlights the following conditions for effective communication strategies:

1. Key messages must be understandable and adapted to many and disparate target audiences (rather than one narrow audience);

2. The impact on the target in a communication strategy is continuous over a long period of time (rather than sporadically at a given point in time);

3. The focus of the impact should be the interests and needs of the recipients, not the senders;

4. Messages, decisions and actions are aligned and work together to achieve the strategic goals.

Thus, the role of strategic communication is to improve the experience and activities of individuals by integrating an effective communication system into the company's vision [15]. Although communication is discussed in an organizational context, the exact nature of communication practices in the technology industry leaves room for research. Describing high-tech organizations as social and Technology systems, it is also important to systematically understand the relationship between social and Technology elements. This is largely due to the pace of Technology innovation as well as the pace and scale of globalization [5]. Today, the main working resource is information, whether it is used at the interpersonal level within small groups or at the international level between organizations - the ultimate goal is successful and effective interaction.

After examining the general conditions for the effectiveness of communication strategies, the research area should be narrowed down to the concept of strategic communications in the corporate sector. The main factor here is the continuous growth in diversity, differentiation and fragmentation of target audiences and communication channels, again caused by the development of digital technologies [16]. It is important to understand that if different types of communication (be it PR, marketing or CSR) acquire common goals, the strategies to achieve them will be similar. There is a tendency to mix genres that frame key messages and synthesize communication channels and forms of message delivery.

For public figures and organizations, it is increasingly important that their communication be targeted and informed as strategic organizational communication in today's world becomes increasingly virtual and international [17]. Strategic communication should be the «focal point for communication scholarships « and its study offers real changes in society and its organizational principles.

According to S. Ganguly, research in strategic communications focuses on how organizations create and communicate with others: clients, employees, investors, government officials, and media representatives [18]. Strategic communications also investigates how an organization presents itself as a social actor in society in terms of creating a social culture and discussing social issues. In other words, strategic

communication focuses on how the organization promotes itself through the targeted activities of its managers, employees and communication specialists [5]. Many organizations recognize that different communication disciplines (e.g. management communication, marketing communication, public relations, social marketing communication and technical communication) have common goals, objectives and strategies in achieving similar goals. Organizations seek integration, efficiency gains through synergy, effectiveness and reduced duplication. Thus, strategic communication provides managers and members with targeted communication activities to achieve the organization's mission.

The expected result as integral aspect of communication strategies can be attitude, belief or knowledge; it can also mean changing or creating something. Global social change and technology advances make it possible to integrate interpersonal and mass communication methods and technologies, and reduce the role of intermediaries (especially the media) between the senders and receivers of key messages, in other words, between communicators and the target audiences [19].

Another aspect of communication strategy was underlined by G. Murphy, that messages are always interpreted by their recipients not by themselves, but within a broader and more permanent communication system [16]. The result of communication can be influenced by basic values, social and political structure, culture, level of economic development and living standards. In such a system, communication becomes a tool for social groups to construct social reality. If the communication system works well and social reality is created, it aims to support itself, even in the face of external influences and information attacks. People living within a certain social reality automatically seek to maintain the existing structure and configuration of meanings and values. Therefore, they tend to interpret key messages in a way that corresponds to the reality they are used to, rather than the way the sender of the message intended.

Despite the seemingly unambiguously positive effect, the contradiction that the desire of the communicative system to reproduce its meanings and values leads to the fact that the constant repeating and inspiring of clear, unambiguous and simple messages can lead to the opposite of the desired result and undermine the trust in the sender of these messages [20]. In such a situation, each side of the communication begins to appeal to its own values, asserting its rightness, and the conflict is not only not solved, but deepened even further [21]. A possible approach to achieving the goals of strategic communications in relation to a society based on other values is to focus on hacking into the communication system that is characteristic of that society and the social reality it has constructed, rather than on creating convincing key messages, although this is also important. The result should be a more dynamic, perhaps chaotic, movement in which existing meanings and values are destroyed, transformed or replaced by new ones.

Summing up the study of the phenomenon of communication strategies, we can distinguish its generalized characteristic.

- At the heart of a successful communication strategy is an accurate understanding of the target audience by its segmenting and targeting at least by the criterion of expected response.

- A meaningful and clear definition of the desired image of the future through positioning - a clear indication of the benefits that the current strategy offers.

- Use of key branding concepts, which is understood not so much as a trademark, but a set of perceptions related to the company in the minds of consumers. Any interaction between the consumer and the company, its representatives, affects the way the brand is perceived by consumers.

- All public actions and speeches of the company should be synchronized in such a way that on their basis it would be possible to create a single, consistent and clear key message for the target audience. All actions should be aimed at improving the attitude of key audiences towards company policy.

- The communication strategy should demonstrate its ultimate goal of meeting the needs and expectations of the target audience. Here, under the demonstration of good intentions is a factor of consumer consciousness management. The degree of satisfaction is a critical factor in the further perception of the company by the target audience.

- A successful communication strategy implies the ability to respond to external factors in a timely manner and the ability to flexibly restructure actions while maintaining the ultimate goal.

- Using the experience of social marketing communication campaigns, including the use of effective commercial marketing technologies to change the non-commercial behavior of target audiences.

Rapid access to valuable information is the way to use existing scientific and technological resources to accelerate economic growth. The circulating knowledge and information affects not only the life of each individual, but also economic and political systems. For digital transformation, the interaction of personnel, effective cooperation, knowledge bases and technologies are important, otherwise it is impossible to achieve success in the future. It is profitable to create an intelligent specialist by developing a unique technology, and the information sphere helps him to conduct research and select ideas faster and better.

The basis of the economy is the production of goods. Without production, there can be no trade, no exchange, no consumption. Production requires natural, industrial, and human resources. Information systems, databases, and generated knowledge bases help guide the analysis and selection of resources. Due to the fact that resources are limited, they need to be used with maximum efficiency. This means that with the minimum use of the corresponding resources, the maximum result should be obtained. For the development of the economy, it is necessary to have the most favorable legal, economic, organizational and other conditions for economic interaction with the external economic environment. The need to create an open economy means that the technical, structural, investment and social policies of the state should be guided by world indicators and standards, and foreign economic activity should become an organic part of the economic activities of domestic enterprises. The greatest difficulties on the way to an open economy are the underdevelopment of market relations and the lack of an effective mechanism for external economic relations. Innovation economy — a type of economy based on the flow of innovations, profit is created due to the emergence of unique technologies, the intelligence of scientists, the information environment, but not by material production. For the successful implementation of optimistic forecasts and the long-term strategy of the country's economic development in the high-tech sector, it is necessary to simultaneously solve key tasks: to ensure the modernization of the existing technological base, to intensify innovation activities and to introduce information technologies. The digital economy has a huge potential to promote economic development. From the point of view of improving the ways of managing innovation processes, the nature of modernization should be organizational and economic and aimed at the development of knowledge-intensive industries with the help of its own scientific,

technical and innovative potential. High-tech industries should become the innovative core of the development of Russian industry.

3.4 Prospects of digital economy and management solutions in the post-COVID-19 period

In this part of the study, we would like to consider the prospects for the development of the digital economy on the example of the experience of Russia and China.

Digitalization is called one of the main directions of economic recovery, which has been pretty battered by the crisis provoked by COVID-19. It had become a real salvation, which had allowed us to survive self-isolation, when the safety of the nation's health came first, pushing the problems of the economy into the background. The sudden need for digital services had launched a powerful impetus for the development of the field of digital technologies in principle.

Over the past six months, there has been a strengthening of the position of digitalization in many sectors of the Russian economy, but the most important interest concerns the further vector of development of the digital economy. In other words, we are all wondering when the 'digital state' will 'cover' Russia.

Experts, in turn, say that the digital future has already arrived, it's just that almost no one noticed it. The processes of digitalization had developed long before the pandemic that began in 2020: services such as online shopping, mobile banking applications or ordering food existed a few years ago [22]. Another thing is that the demand for these offers was small and not so acute. The pandemic has created a high demand for digital economy tools and, accordingly, new technological developments.

Despite the additional impetus that COVID-19 has provided for the development of the IT industry, many developer companies specializing in the development of digital technologies have suffered greatly. Most of them have reduced their income by 40–60% [23], and budgeting for the creation of innovations has stopped altogether. The leaders of the IT industry, like other representatives of the economy during the pandemic, had found themselves in a difficult situation. The Government of the Russian Federation had made a number of decisions aimed at supporting and further developing such companies. In particular, such a legislative norm as a 'tax maneuver' for IT companies has come into force from January 1, 2021 [23]. Taxes for companies accredited as developers of digital technologies, as well as those engaged in the sale and implementation of software, are significantly reduced. Even the income tax from January 1, 2021 for IT specialists have fallen from 20–3%. This is an unprecedented measure for the IT market.

More targeted support measures have also been taken for developers who create and implement domestic solutions. First of all, we are talking about traditional grant programs. One of the most important anti-crisis measures in this direction is to reduce the share of the company's own funds in co-financing the project: the rate has fallen to 20% of the total amount. By the end of 2021, grant support will amount to almost 7 billion rubles. These measures should directly help development companies not only survive the difficult time of economic recovery, but also lay the foundation for the further development of the entire IT industry [1].

Digitalization has penetrated deeply even into such a conservative industry as healthcare. And we are not talking about high technologies that have long been successfully adapted in medicine for performing operations, but about the very paradigm of the doctor-patient relationship. During the pandemic, the number of requests for online appointments with a doctor had increased, and this, in turn, led to the development of telemedicine consultations. To a certain extent, it was a bold, but timely experiment, the results of which allow us to talk about a possible revision

of certain procedures for providing medical care. The next step in the development of digitalization in the field of healthcare is making a diagnosis during an online consultation. At the moment, it is impossible to do this: without a full-time examination of the patient, palpation of his problem areas, the doctor cannot determine the cause of the disease. But remote dispensary observation of the patient is quite possible today.

One of the most interesting areas of digitalization development in the healthcare sector is the possibility of using telemedicine technologies in a non-medical organization. This is necessary so that the doctor can receive the patient while at home, in a cafe or in the park. To do this, it must be provided with a stable Internet channel with high speed and security, so that patient data and medical history do not leak into the network. According to experts, the further development of digitalization in this sector of the economy will be associated with this direction.

Today, not only medicine, but also many other sectors of the economy are reviewing the usual work strategies [24]. Nevertheless, the year 2020 has forced all of us to use various digital services much more intensive. A well-built, full-fledged digital infrastructure will help to maintain the interest of the population in digital services and maintain the high demand for the services offered. Further development of the economy is impossible without it. Russia is already among the top 10 countries in terms of the intensity of use of digital public services and ranks 25th in the index of online services. This year, along with these indicators, the consumption of entertainment, educational services and telemedicine has also increased significantly, not only in cities with millions of people, but also in small regional centers. This means that Russia has a unique chance to enter the top ten actively digitalizing countries.

The main stop signal for digitalization is still local legislation, therefore, regulatory initiatives are important for the effective construction of a digital state and its economy. The good news is that the Russian Government is beginning to pay more attention to such programs, ensuring, in fact, that the Russian Federation reaches a new level of consumption on the one hand, and the development of digital skills among the population on the other. Digital literacy, the penetration and increase in the number of professionals in the field of information services and technologies, the increased interest of developers in creating new tools and services, as well as the ability of people to use them, can ultimately affect the growth of the country's GDP.

The contribution of digitalization to GDP growth is indeed a characteristic indicator in the modern world. The experience of China, one of the most advanced countries in the field of technology development and integration, is a vivid proof of this. According to the president of the Center for China and Globalization (CCG), adviser to the State Council of the People's Republic of China Wang Huiyao, the digital economy had accounted for more than 36% of China's total GDP in 2019 [1], which is almost almost 36 million yuan. The pace of its development continues to grow.

The basis of the digital economy in China is the electronic industry, mobile applications and online services. At the moment, another component of it is actively developing – telecommunications, which implies the construction and operation of appropriate infrastructure, the introduction of various Internet services to the market to simplify and improve the positive experience of consumer services. Despite the modest share among other sectors of the economy, it is the development of telecommunications that is most closely associated with the growth of the welfare indicator of the population of China.

Strengthening the digitalization of state management systems has become one of the most important areas for investment in the development of China's digital economy. Taking into account the huge number of people living in the country and,

accordingly, the high demand for the use of these services, the Government supports programs that make public services more convenient and targeted. Much attention is paid to the collection and storage of big data, since big data directly affects the speed of digitalization of state management systems and allows us to get as close as possible to the format of the digital state. To a large extent, the pandemic had contributed to the active process of deploying a new digital infrastructure for its creation.

Speaking about the infrastructure that will allow the processes of the digital economy to function efficiently and smoothly, we should focus on investing in the implementation of a large-scale key project for the deployment of 5G networks and other information and communication technologies, as well as the development of ABCD Technologies, whose name contains the first letters of such digitalization tools as artificial intelligence, blockchain, cloud computing and data centers. Such program for the implementation of these tasks is designed in China until 2025: it is predicted that in five years numerous base stations will be built in China for the operation of the 5G network, which will allow connecting up to 5 billion terminal devices to the high-speed Internet [1]. The scale of investments will exceed two trillion yuan. The development of these technologies will become a new impetus for the further formation of the digital economy of China as a whole, and ultimately will lead to a healthy and stable growth.

4. Conclusion

The pandemic has really accelerated the transition of many processes to the digital format. The sharp growth of Internet traffic and demand for Internet services once again proves this: Internet use and bandwidth of broadband networks increased by 70% and 30%, respectively, and cloud video services-by 20 times [1]. This new situation for the world will help humanity to understand what kind of infrastructure and what government programs can become a support for the development of states, focusing on the development of technologies that will form the basis of the process of adaptation of our countries to constantly changing conditions. Many states have already thought about these issues and have taken a number of appropriate measures. For instance, the development of new infrastructure in China has become the basis of the large-scale Digital China project, 5G technologies have become the engine of the economic growth in South Korea, the strategy for the development of artificial intelligence had been developed in the UAE, the Giga Society Strategy had been released in Spain, the call to switch from road construction to the construction of broadband networks had been made in the UK. Russia does not lag behind these advanced countries either.

Russia is facing the task of achieving digital maturity in key sectors of the economy and social services. In order to compete at the global level in the field of communication technologies, it needs to strengthen its position in the areas of 4G/5G, as well as form a network basis for the Internet of Things (IoT).

In this regard, a number of recommendations to accelerate the digitalization of Russia could be proposed. The first is the introduction of digital technologies in priority sectors of the economy, such as the oil and mining industries, which will improve production and create new opportunities for the entire cycle chain. The second is to strengthen state support for the development of 5G, artificial intelligence and cloud technologies in industry. And the third is the improvement of ICT education and the training of digital personnel, the development of digital competence of the population.

The digitalization of the Russian economy is just beginning, and in order to accelerate this process and achieve success in it, a comprehensive approach is

needed – from the active participation and support of the Government, to full immersion in the processes of forming a new infrastructure of all market participants. Currently, it is possible to achieve success only through cooperation and openness to change and innovation.

As a result of the formation of a 'new reality' [25] and the growth of innovations, the burden on IT departments has increased in the business environment. Today, technical specialists must ensure the effective functioning of the entire corporate infrastructure [26], maintain a high level of cybersecurity [27] and uninterrupted operation of applications for customers and remote employees. In such conditions, the basic needs of IT specialists are, first of all, access to real-time data, visibility of processes and understanding of the state and performance of the entire technical stack [28].

Analytical tools, artificial intelligence, simulations and new options for organizing a remote workflow can protect people and reduce possible losses in the short term. Digital and online distribution channels, in addition to personalization and dynamic planning of value chains, will help businesses recover as soon as possible after passing the peak of the crisis. Various options for deep analysis and business restructuring based on the use of digital technologies will increase the sustainability of the business in the future.

PID's application [29] (a tool for evaluating business projects and processes) allows you to accurately determine all the priorities, levers and indicators necessary for the successful implementation of the project, as well as reduce costs and increase profits by digitalizing business processes.

The transition to Customer Service 4.0 [30] allows for the analysis of big data, virtualization, cloud and bionic computing, the Internet of Things, augmented reality, etc. create a proactive, deeply personalized, dynamic and interactive customer service system at all stages-from product offer to post-warranty service.

Digital technologies can significantly help businesses respond to new challenges at various levels-from organizing the work of front-end and back-end offices to maintaining and increasing the level of satisfaction of consumer expectations. However, in the current situation, the urgency of measures to minimize cyber risks is increasing. In the context of the transition to remote operation, it is necessary to review the priorities of the cybersecurity policy.

5. Limitations and further research

The study has potential limitations that should be noted.

Firstly, the problem of defining digital economics is very broad and challenging. That is why in the current paper this question might not be fully reflected than if this problem was a subject of a separate research. Secondly, the COVID-19 pandemic is not over yet, so possible forecasts and conclusions regarding the further development of the digital economy are preliminary. In this regard, the study is rather theoretical in nature in order to systematize the available opinions and data. In the future, the study will continue in the direction of statistical analysis of the main macroeconomic indicators of the digital economy for the period 2019–2021, and a predictive method will be applied to form four scenarios for the development of the digital economy (positive, negative, current, optimal).

Conflict of interest

The authors declare no conflict of interest.

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References

[1] Chebotareva A. A., Danilina E. I., Chebotarev V. E. (2020) Electronic Passports of Citizens as a Personal Essential Attribute During the Pandemic. Proceedings of the Research Technologies of Pandemic Coronavirus Impact (RTCOV 2020). Advances in Social Science, Education and Humanities Research, volume 486.ISBN 978-94-6239-268-7.ISSN 2352-5398.DOI: https://doi.org/10.2991/assehrk.201105.083

[2] Holla, K. & Titko, M. (2018). *Crisis Management. Theory and Practice*. London: IntechOpen.

[3] Sheena I. Sapuay; Bobby D. Gerardo; Alexander A. Hernandez (2019). Dynamic Third-Factor for Enhanced Authentication in Human Resource Information System. 2019 IEEE 7th Conference on Systems, Process and Control (ICSPC 2019), 13-14 December 2019, Melaka, Malaysia. DOI: 10.1109/ICSPC47137. 2019.9068077.

[4] Paul, C. (2011). *Strategic Communication: Origins, Concepts, and Current Debates*. US: Contemporary Military, Strategic, and Security Issues.

[5] Bogdanov, S. (2017). Strategic communications: conceptual approaches and models for public administration. Public administration, 61, 132-152.

[6] Chatham House (2011). *Communication for Strategic Change: Principles, Practices and Prospects*. Retrieved 10 November, 2019, from https://www.chathamhouse.org/events/view/177771

[7] Indrajit, R. E. & Chan, K. C. (2016). *Crisis Management*. Jakarta: The Preinexus Publisher.

[8] Garcia, H. F. (2017). *The Agony of Decision. Mental Readiness and Leadership in a Crisis.* New York: Logos Institute Best Practices Series.

[9] Jordan, J. (2011). *The Four Stages of Highly Effective Crisis Management: How to Manage the Media in the Digital Age*. Cleveland: CRC Press.

[10] Reuter, C. & Kaufhold, M. (2017). Fifteen years of social media in emergencies: A retrospective review and future directions for crisis Informatics. Journal of Contingencies and Crisis Management, 26, 5-17.

[11] Sohn, Y. J. & Lariscy, R. W. (2013). Understanding Reputational Crisis: Definition, Properties, and Consequences. Journal of Public Relations Research, 26, 23-43.

[12] Akamah, H. & Hope, O. H. (2015). *Tax havens and disclosure aggregation*. Calgary: Journal of International Business Studies.

[13] Farnsworth, K. & Fooks, G. (2015). Corporate taxation, corporate power, and corporate harm. The Howard Journal of Criminal Justice, 54, 25-41.

[14] Goldman, E. (2010). *Power in Uncertain Times: Strategy in the Fog of Peace*. Redwood City: Stanford University Press.

[15] Hallakhan, K. & Holzhausen, D. (2007). Defining Strategic Communication. International Journal of Strategic Communication, 1, 3-35.

[16] Murphy, G. (2015). *Communication Strategy. A best practice guide to developing communication campaign*. London: IPA.

[17] Beldad, A. D. & Laar, E. (2017). Should the shady steal thunder? The effects of crisis communication timing, pre-crisis reputation valence, and crisis type on post-crisis organizational trust

and purchase intention. Journal of Contingencies and Crisis Management, 26, 150-163.

[18] Ganguly, S. (2016). *Communication media, systems and strategy*. Retrieved 10 November, 2019, URL: https://aladin.uil.unesco.org/paldin/pdf/course02/unit_13.pdf

[19] Casey, R. & Gallagher, H. (2016). *Communication Practices in Technology Companies.* Dublin: Dublin Institute of Technology.

[20] Capelos, T. & Wurzer, J. (2009). United Front: Blame Management and Scandal Response Tactics of the United Nations. Journal of Contingencies and Crisis Management, 17, 75-94.

[21] Allen, B. J. & Loyear, R. (2017). *Enterprise Security Risk Management. Concepts and Applications*. Brookfield: Rothstein Publishing.

[22] Trotta, A. & Dell'Atti, S. (2016). *Reputational Risk and Reputational Crisis in the Banking Industry: State of the Art and Concepts for Improvements*. Switzerland: Springer International Publishing.

[23] Digital economy of France and Russia: forecast analysis // https://zen.yandex.ru/media/id/5d3d76f9ec575b00be402a52/cifrovaia-ekonomika-franciia-i-rossiia-prognoznyi-analiz-5ef228e1211879584d8d583f

[24] Arntz M., Gregory T., Zierahn U. (2016). The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. OECD Social, Employment and Migration Working Paper No. 189. Paris: OECD Publishing.

[25] Post-COVID-19: New leadership for a new normal. URL: https://home.kpmg/au/en/home/insights/2020/08/post-covid-19-new-leadership-normal.html [Electronic resource]

[26] Ratha N. K., Connell J. H., Bolle R. M. (2021) Enhancing securityand privacy inbiometrics-basedauthentication systems. Ibm Systems Journal 40(3):614-634. DOI: 10.1147/sj.403.0614.

[27] Petit N. (2017) Law and Regulation of Artificial Intelligence and Robots: Conceptual Framework and Normative Implications // https://ssrn.com/abstract=2931339. 31 p.

[28] Hack the Stack: Using Snort and Ethereal to Master the 8 Layers of an Insecure Network, 2006. URL: https://www.sciencedirect.com/book/9781597491099/hack-the-stack

[29] Wen Yu (2018) PID Control with Intelligent Compensation for Exoskeleton Robots. 1st Edition, Elsevier BV. https://doi.org/10.1016/C2016-0-04547-3.

[30] Application of machine learning and artificial intelligence technologies in information security // https://www.antimalware.ru/analytics/ Technology_Analysis/machine-learning-and-artificial-intelligence-in-is [Electronic resource]