

Social and Economic Effects of Digital Transformation

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Abstract. The intensive development and spread of digital technologies in recent years has significantly changed the face of key sectors of the economy and the social sphere. More and more organizations are seeking to transfer business processes to the digital environment, thereby significantly reducing transaction costs and significantly increasing the volume of economic activity. A giant, virtually barrier-free, market is emerging on the Internet with truly global competition and very high dynamics of all its elements (companies, products and services, consumers). Under such conditions, the ability to process and analyze large amounts of data becomes an important factor in competitive advantage. The sustainability and prospects for business development are determined by the ability to respond to changing customer needs many times faster than even some 20-30 years ago and quickly bring new products and services to the market through electronic sales channels. Today, the market value of many companies is largely determined by "digital assets" (the size and loyalty of the Internet audience, brand awareness and reputation in cyberspace, etc.).

1 Introduction

Despite the often quite similar prerequisites, barriers and expected effects, the digital transformation of industries is uneven. The so-called digital divide in the level of mastering digital technologies exists both between industries and within each of them - between the leaders of this process and outsider organizations [1]. Among the main factors of differentiation of the pace and models of digital transformation of various industries, we note the following.

1. Development agenda, existing problems and tasks. Each industry plays its own unique role in the economy or social sphere. In any of them, an individual, largely historically determined set of the most significant problems, challenges and tasks is formed, and its own development agenda is formed. There are many obvious examples here. Thus, for the fuel and energy complex and the chemical industry, the task of reducing the negative impact on the environment is urgent [2]. To solve it, certain digital solutions are in demand, including those that provide monitoring and control of the environmental situation and prompt response to emerging emergency situations. In the electric power industry, one

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of the features is the uneven consumption of electricity. New digital solutions for power system management and distributed energy technologies help to balance supply and demand, distribute energy more efficiently and quickly. Agriculture is significantly dependent on weather and natural conditions. The intellectualization of agriculture (for example, through the introduction of the concepts of precision farming, deep processing, smart farms, etc.) makes it possible to mitigate the growing agro-climatic risks [3]. This kind of industry specificity largely determines the features of digitalization, as well as the prevailing trajectory and speed of digital transformation.

2. Business models and place in the value chain. Today, digital transformation is more associated with end-user markets, where an integral requirement of competition is the improvement of consumer experience, including through the personalization of products and services. It is in these conditions that digital platforms and ecosystems, as well as radically new business models based on them, with which the very emergence of the concept of “digital transformation” is associated, have rapidly spread [4]. Recently, however, in most industries, the importance of the end consumer and the creation of a “value proposition” aimed at him has been growing. Companies are becoming customer-oriented, developing new services and digital channels of interaction with customers and contractors. This trend is now affecting not only organizations and industries that interact directly with consumers (B2C), but also those that have traditionally been focused on the business sector (B2B) [13]. And yet, for B2B industries, the main benefits of digital transformation are still in the area of economic efficiency and institutional changes (for example, supply chain optimization). Such industries are usually characterized by high resource intensity and long investment cycles. In this regard, the effects of digital transformation become tangible only in a relatively long term.

3. Technological level and digital maturity. Digital transformation requires the development of new technologies and the corresponding restructuring of business processes. The transition to advanced solutions occurs gradually and is possible only if there is an updated material and technical base. In our country, relatively mature digital technologies are already quite widespread, and the infrastructure is developed [5]. In particular, more than 70% of organizations have broadband access to the Internet. At the same time, among the industries considered in the following sections of this report, the minimum share of organizations with broadband access is in agriculture (74.3%), the maximum is in the financial sector and healthcare (93.8 and 92.4%, respectively). At the same time, the latest technologies spread in industries much more slowly.

5. Features of the formation and use of data. The volume of generated and processed data is growing at an enormous pace. Their involvement in the turnover allows to increase the efficiency of the economy, the quality of products and services in various fields. According to the Big Data Association, the development of the big data market can lead to an economic effect of 3 trillion rubles. by 2024 [6]. During the pandemic, the attention of governments of leading countries to big data, especially in the field of medicine, has increased. For example, many innovative products and services can only be created based on the combination of data from many patients (for example, images for training AI to recognize diseases).

The widespread and active development, as well as the diffusion of new digital technologies, are currently significantly changing the structure of the main foreign trade activities and sectors of the socio-economic sphere [4]. An increasing number of organizations are moving their business into the digital sphere, while significantly reducing transaction costs and increasing the results of their functioning. Through the use of digital technologies, a vast and practically barrier-free market is being formed in global networks with strong competition and the dynamics of the development of its elements (IT companies, digital pricing, services, products, digital consumption). In the digitalization

market, the main factor of competitive advantage is the company's ability to analyze (process and analyze) big data [5]. The prospects and sustainability of the functioning and development of a business are determined by its ability to respond much faster than it was before (25–30 years ago) to rapidly changing consumer needs and quickly deliver new (innovative) products (services) to the market using electronic channels. dissemination of information, advertising and direct sales [12,14]. The author in the article notes that the scale of digital transformation in the development of new digital technologies and business models differs significantly for various foreign economic activities. For example, in the field of retail and financial services, they have been widely used for more than 10 years, and the pandemic of the early 2000s significantly increased this transformational trend [7]. In some of the most "conservative" foreign economic activities, we see the opposite picture, where platform digital solutions require not only technological adaptation to digitalization processes, but also significant organizational and structural changes, as well as the restructuring of traditional business processes to digital ones. But, despite significant industry differences, the unevenness and peculiarities of the introduction of digital technologies, all experts in this field reflect a single point of view, expressed in a high assessment of the need and importance of digitalization in the socio-economic development of the state [7].

6. The structure of the industry and the economic situation. In Russia, as in leading countries, large companies are leaders in digitalization. On the contrary, small and medium-sized enterprises are lagging behind in terms of the pace of implementation of new digital solutions. In general, industries with a high level of concentration, dominated by large businesses with access to significant investment resources, show greater progress in digitalization. At the same time, in various industries, the introduction of digital technologies and, moreover, digital transformation require different investments, including in terms of volume and timing of implementation. For example, in retail, where a huge number of small and medium-sized companies operate along with large players, large investments in the creation of e-commerce services are often not required, which opens up opportunities for a wide range of enterprises to introduce new business models of interaction with consumers [8]. At the same time, in many sectors of the economy with a high concentration, digital transformation is associated with rather high costs. And yet this does not allow us to talk about equalizing the opportunities of large and small companies. The former are certainly much larger. As for the social sphere (education, healthcare), public administration, the implementation of digital transformation here is relatively more dependent on budget financing.

2 Research Methodology

Currently, successfully completing industrialization and moving to Industry 4.0, the country is digitizing all types of economic activity, creating and developing new innovative products and technologies at an accelerated pace, which are dominated by digital platforms, artificial intelligence, informatization and automation [8]. Significant opportunities in this direction have a policy of import substitution. Despite the significant industry specifics and the uneven introduction of digital technologies, almost all researchers and experts agree in the highest assessments of the importance of digitalization for socio-economic development. Many authors note that this process has virtually no alternative even in the most technologically inert industries [11]. Moreover, the more "strong" term "digital transformation" has recently become widespread, which, in our opinion, reflects the growing expectations of radical shifts and effects from the introduction of a new generation of digital technologies. As a result, many industry-specific digital transformation strategies have been adopted in recent years in the European Union, the UK, the US, Canada, Japan,

the Republic of Korea and some other countries. They represent a new stage in the digital economy agenda, combining the development plans of individual technologies with their specific applications. Thanks to various government support measures, including the latest generation (regulatory sandboxes, living labs, virtual test sites, etc.), new breakthrough solutions are emerging. For example, in the UK, the catapult center program provides infrastructure for prototyping and demonstrating new technologies, including virtual production sites, test sites for testing devices for the Internet of things [9-10]. This, in turn, expands the opportunities for cooperation between participants at different stages of the life cycle of digital products and services.

3 Results and Discussions

The digital maturity assessment system includes more than 110 indicators, many of which are calculated on a monthly basis. The data sources are state information systems. The use of administrative data from relevant ministries and departments makes it possible to take into account industry specifics and, in particular, to assess the progress in the implementation of state support measures in the field of digitalization. In fact, a multi-level control system has been formed that functions in real time [15]. In terms of scale, it is difficult to find an analogue in the practice of public administration in recent years, especially given the number and variety of activities of the departments and organizations involved. At the same time, the economic sanctions that followed in the spring of 2022, including restrictions on the supply of high-tech products and the temporary cessation of the activities of many foreign companies in our market, jeopardize the implementation of previously planned plans. We still have to find answers to the emerging strategic challenges, but even now there is an obvious need to assess the “form” in which the domestic digital economy has met new realities, to outline ways to solve emerging problems. This report systematizes global trends in the spread of digital technologies and Russian industry initiatives in the field of digital transformation. Based on data from federal statistical observation, as well as monitoring the digital maturity of economic and social sectors, quantitative estimates of the parameters of the development of the digital economy in our country in the period 2019–2021 are presented [16]. The first generalized assessments of the negative consequences of economic sanctions imposed by a number of Western countries in the spring of 2022 against the Russian high-tech sector are given, as well as recommendations on state policy measures for the digital transformation of a number of sectors of the economy and the social sphere in the current conditions. Sectoral digital transformation strategies are designed to play a bridge role between various technology policy initiatives. In the system of technological development planning documents, it is the strategies that determine the contours of industry demand, taking into account the tasks of the state and business priorities, the gaps between the solutions offered on the market and the needs of the sectors, and provide for measures to overcome them. With obvious differences in the prerequisites for the digital transformation of industries (including the initial level of their digital maturity, scale and significance in the country’s economy, the specifics of processes and business models, etc.), most strategies provide for the development, implementation and dissemination of tools and digital solutions such as : state information systems (GIS); platform, ecosystem solutions and marketplaces; electronic document management; digital communication channels with consumers and service recipients; new industry business models based on digital technologies; customized intelligent services for consumers and industry workers [17].

The technological basis of digital transformation is also similar for all industries. Most of them include plans for the introduction of AI, big data analysis, and wireless technologies. At the same time, there are a number of specific solutions that complement

the basic list. Thus, as part of the digital transformation of industry, it is planned to implement projects in the field of new production technologies, robotics and sensors, virtual and augmented reality technologies, etc. In agriculture, as well as in the field of ecology and nature management, it is planned to use unmanned aerial vehicles, remote sensing of the Earth, etc. The basis of digital development in construction will be technologies of information modeling, spatial analysis, telemetry, etc.

From our point of view, the key feature of digital transformation, which distinguishes it from similar concepts, in particular, is qualitative changes in business processes and activity models, primarily arising within digital platforms, and significant socio-economic effects from their implementation. Digital transformation is not only the introduction of digital technologies, but also the transformation of many horizontal and vertical business processes, optimization of operating procedures, change in established models and formats of interaction between participants in value chains. New technological solutions require complementary investments in improving organizational practices, developing employee competencies, a culture of working with data and digital solutions [14].

4 Conclusions

Based on advanced digital technologies, a wide range of solutions are being formed that are used in almost all sectors of the economy and the social sphere. Some digital technologies have clearly defined industry specifics (BIM, industrial robots, etc.), while others can be used everywhere to solve common problems. Some of the solutions have already been implemented (smart meters for collecting data on water and electricity consumption, etc.), some are not yet widely used and require comprehensive modernization ("smart grids", "digital substation", "smart field" in the fuel industry).

In most sectors of the Russian economy and social sphere, digitalization is at a relatively early stage. Until now, the structure of investments of organizations of various types of activity, which account for two thirds of the internal costs of the digital economy, is dominated by equipment. In the leading countries, the limit of economic growth at the expense of physical capital has been reached. In recent years, intangible (digital) assets of companies have become a new driver of digitalization, such as the size and loyalty of the Internet audience, brand recognition and reputation in cyberspace, digital platforms, software products and related intellectual property.

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