NEW GROWTH OPPORTUNITIES THROUGH DIGITALIZATION AMID THE COVID-19 PANDEMIC

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Abstract

The purpose of the article is to review the results of digitalization during the pandemic. Based on the analysis of statistical information, the authors note that the pandemic has changed the structure of costs for the digital economy, increased access to the Internet, caused the new platform business models development, and strengthened the "contactless" economy. Based on growth theories, the authors identify the main prerequisites for economic transformation and new growth opportunities due to the advantages of digital resources, increased knowledge, innovation and expansion of human capital.

Keywords: *digitalization, COVID-19 pandemic, economic growth, knowledge capital, human capital*

1. INTRODUCTION

The corona crisis has exacerbated growing inequality, excessive financialization, debt burden, expanded the scope of digital technologies and remote services, accelerated changes in Russian economic and innovation policy in the context of the national program "Digital Economy". In response to the challenges of the COVID-19 pandemic, new platform business models have emerged. The most significant were Zoom video communication services, MS Teams, Skype, as well as solutions in the field of digital marketing, control of remote workers, remote monitoring of equipment, decision support systems, information security solutions. The popularity of wearable devices has significantly increased among the population. The pandemic has become a driver for the development of online learning platforms and new applications: digital classrooms and the Internet of Things. To ensure the stability of economic ties and the continuity of business processes, remote communication and information security systems, supply management solutions, electronic commerce and digital currencies have become particularly important. A wide array of contactless services has developed and the "contactless" economy has intensified [Technologies against a pandemic, 2021]. Digital technologies simplify the efficiency analysis of the company and individual technologies against the pandemic of processes, allow effective control of the work of employees, increase the speed of decision-making, open up new opportunities for monitoring their execution. Forced digitalization and the increased need for online services caused, in turn, an explosive growth of the market in the segment of equipment for the organization of cloud environments. In Russia, as in the world, the pandemic has changed the structure of gross domestic expenditures on the digital economy. In 2020, the share of organizations in their volume decreased from 59.9% in 2019. to 55.7%, of households - increased by more than 4 percentage points (from 40.1 to 44.3%). In the conditions of remote operations, the population paid additional costs for goods and services related to digital technologies - about 1 trillion. In 2020, the population's expenditures on telecommunication services (+6% compared to 2019) amounted to 58% of the total household expenditures on digital technologies. Spending on the purchase of computing equipment increased by almost a third (30%) in the first year of the pandemic. The expenses of organizations for the purchase of machinery and equipment have increased significantly: related to digital technologies (by 1.5 times), digital content (by 3 times), employees' training (by 4 times). The ratio of costs for the development of the digital economy to GDP increased from 3.7% in 2019 to 3.8% in 2020. [The pandemic has changed the structure of costs for the digital economy, 2021.] 80% of households in Russia (as well as in the USA) have access to the Internet. Almost 90% of the adult population of Russia (as in Estonia and the Czech Republic) have at least once used the Internet in 2020. The daily audience of the Russian Internet has reached almost 77% of

the adult population, increasing by more than 4 percentage points. This is comparable to Italy and France [Digital Economy, 2022].

At the same time, people see a cut in jobs in the economy's traditional sectors in the digital transformation. Business attitudes towards optimizing work processes contribute to the spread of these concerns. The main barriers to digitalization are the lack of regulatory documents, the insufficient level of digital literacy of the population and the introduction of digital technologies. In the information technology market as a whole, there is a decline due to a decrease in business spending on innovation. Small and medium-sized enterprises often do not have the ability to meet the costs of digital transformation. In this regard, a research question arises that reflects the purpose of this article: What results has digitalization achieved during the pandemic and what resources can take key positions in increasing the aggregate productivity of factors and economic growth rates? To find an answer to this question, we will analyze statistical information about the results of digitalization and review new growth theories.

2. MATERIALS AND METHODS

The informational source on the results of digitalization was the publications of the Institute for Statistical Research and Economics of Knowledge of the Higher School of Economics. A graphical method was used to perform statistical analysis in the work. At the first stage, they performed a statistical analysis of the digitalization results in Russia during the pandemic: the use of fixed and mobile Internet in economic sectors and households, the use of digital technologies in organizations and technologies of the CovidTech group, digital transformation of public administration processes. At the second stage, they summarized the domestic problems of digitalization during the COVID-19 pandemic. At the third stage, they carried out a review of new theories of economic growth in terms of technological changes in the economy. At the final, fourth stage, they highlighted the main prerequisites for economic transformation and new growth opportunities due to rapid digitalization in the conditions of COVID-19.

3. RESULTS

The current stage of Russia's scientific and technical policy in the field of digital technologies has been traced since 2017, starting with the development of an Information Society Development Strategy, when financial and information conglomerates of companies received a significant impetus to development (Mail.ru, Sber, Yandex), expanding the segment of its activities into services and retail. Immediately before the start of the pandemic, digitalization priorities were identified within the framework of the national Digital Economy program: public services (biometrics, digital passports, electronic signatures), education (electronic textbooks, remote learning and knowledge control), medicine (electronic medical records, telemedicine), electronic document management, digitalization of public services for business, reduction of government employees, personal security (CCTV cameras, face recognition systems).

Both Russian and foreign researchers have already considered the impact of the pandemic on the global economy in several areas. Among them there are the impact on global value chains, changes in trade relations between countries, and the strengthening of the role of digital technologies. By the end of 2020, the global economy fell by 4.3%, and consumers sharply reduced spending, but the costs of online services, on the contrary, increased sharply [Kituyi, 2021]. In Russia in 2020 online sales accounted for 3.9% of retail trade turnover (in 2019 it was 2%), while the largest share falls on the largest cities with a population of more than 1 million people. In total, 100 of the largest online retailers in Russia delivered 719 million orders in 2020, which is almost twice as much as in 2019. Online exports from the country increased by 42% [Mamedyarov, 2021]. In April 2020, consumer spending, according to Amazon, increased by 35% compared to the same period last year, in 2023 Amazon will be able to produce 70 billion gross domestic product – more than 3 times more than in 2019 [Del Rey J., 2020]. The gradual introduction of measures to fight the pandemic has led to a sharp

increase in the load on telecommunications networks. Overall, Internet traffic increased by about 30% [Reynold, 2020]. The use of Facebook and WhatsApp has grown by 50%, and platforms such as Zoom and Netflix have attracted tens of millions of new paid subscribers [Sinibaldi, 2020]. At the same time, the pandemic has slowed down the development of the new 5G communication standard, which, on the one hand, negatively affects research in the field of unmanned transport, but gives regulators additional time to develop policies on standards for the use of frequencies, with which widespread difficulties were observed before the pandemic [Mamedyarov, 2021].

According to the HSE Institute for Statistical Research and Economics of Knowledge [Russia's Internet infrastructure during the pandemic, 2021] at the very beginning of the pandemic, in the second quarter of 2020, fixed Internet traffic increased by 34.2% compared to the same period in 2019, which is almost 20 percentage points higher than the previous three years. As can be seen from Figure 1, the leaders of fixed broadband Internet access in 2020 were higher education (88.4% of organizations), healthcare and social services (82.5%), the information technology industry (81.2%).

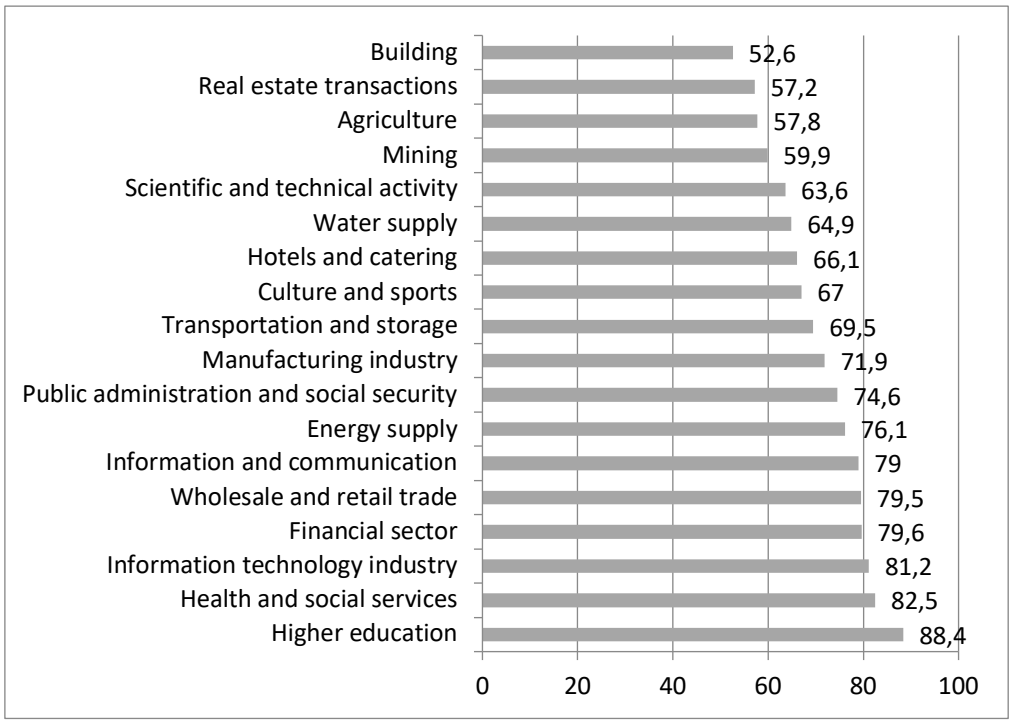

Fig. 1. Fixed broadband Internet access in organizations in 2020

Source: obtained by the authors according to the collection "Digital Economy: 2022", p. 49

The volume of data transmitted over wired communication channels for the 1st quarter of 2021 increased by 42.6% compared to the same period in 2020. Mobile Internet traffic during the most severe lockdown (2nd quarter of 2020) increased by 51.9% compared to the same period last year. After the relaxation of quarantine measures, the intensity of mobile Internet consumption remained almost at the same level. By the end of 2020, the growth rate of subscribers slightly increased compared to 2019 and amounted to 3.7% (23 units per 100 people of the population). In the foreign countries - leaders in the number of fixed broadband subscribers - Switzerland (47.6 units), France (44.6 units), Denmark (44.2 units), the Netherlands (43.1 units), Norway (43.0 units) and the Republic of Korea (42.8 units) – the results are twice lower - within 1.7%. The number of subscribers of mobile access in 2020 increased slightly (by 3.3%) due to the closure of retail communication salons during quarantine and the closure of borders. In Switzerland, Finland, and Germany, the growth rate was about 1%. Austria (+15.9%), Estonia (+7.6%), Lithuania and Poland (4.7% each) managed to maintain

strong dynamics. In 2020, the share of high-speed Internet subscribers increased by 8.3 percentage points compared to last year.

According to a study by the HSE Institute for Statistical Research and Economics of Knowledge [The behavior of Russians on the Internet in the year of the pandemic, 2021], in 2020, the daily Internet audience exceeded three quarters of the adult population of the country (76.7%, +4.1 percentage points compared to the previous year). In recent years, the growth of the indicator has been mainly due to persons of older age groups. In 2020, three-quarters of Russian adults made calls via the Internet (76.6%), participated in social networks (75%), corresponded via messages (69%). Social networks are gradually giving way to messengers. In 2020, every third (35.7%) adult Russian made online purchases, 57% of the population used online banking operations. The share of people who used the Internet for training has almost tripled and reached 9.6%. As can be seen from Figure 2, the most popular areas of Internet use in organizations are the use of e-mail (76.5% of organizations), searching for information on the Web (75.8%), banking and other financial transactions (58.8%).

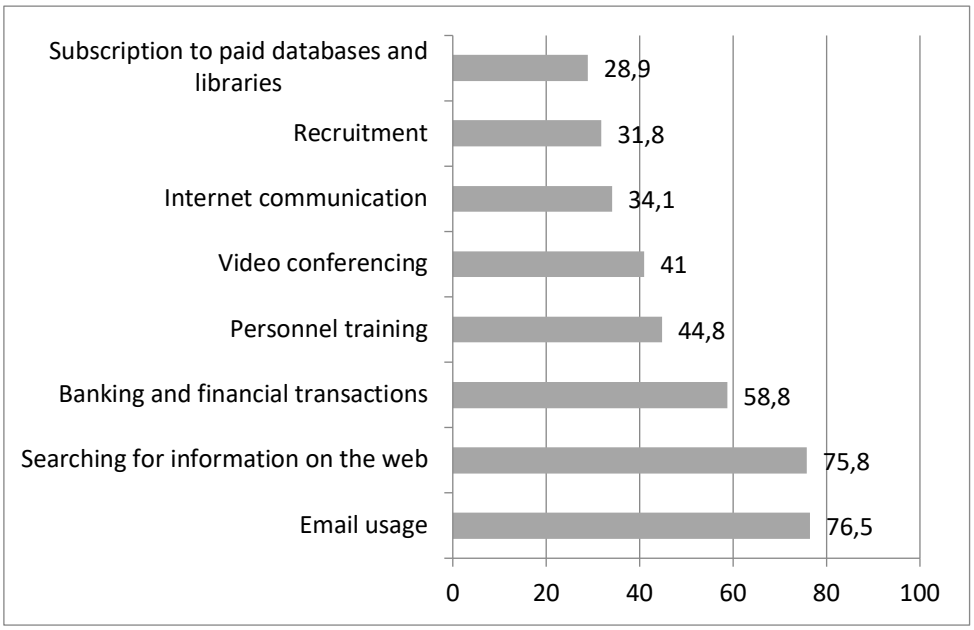

Fig. 2. Directions for using the Internet in organizations in 2020

Source: obtained by the authors according to the collection "Digital Economy: 2022", p. 52

Among digital technologies, the most popular are cloud services (25.7% of organizations), technologies for collecting, processing and analyzing big data (22.4%), digital platforms (17.2%) [Digital Economy, 2022]. The new technological direction has even developed to prevent the spread of COVID-19, – CovidTech [Artificial Intelligence is the core of digital solutions of the COVID-19 era, 2021]. The core of CovidTech solutions is formed by artificial intelligence technologies (17.9%), wireless communications (15.4%), robotics and sensors (4.6%). Figure 3 shows a close direct correlation between fixed Internet access in organizations and the use of cloud services and digital platforms.

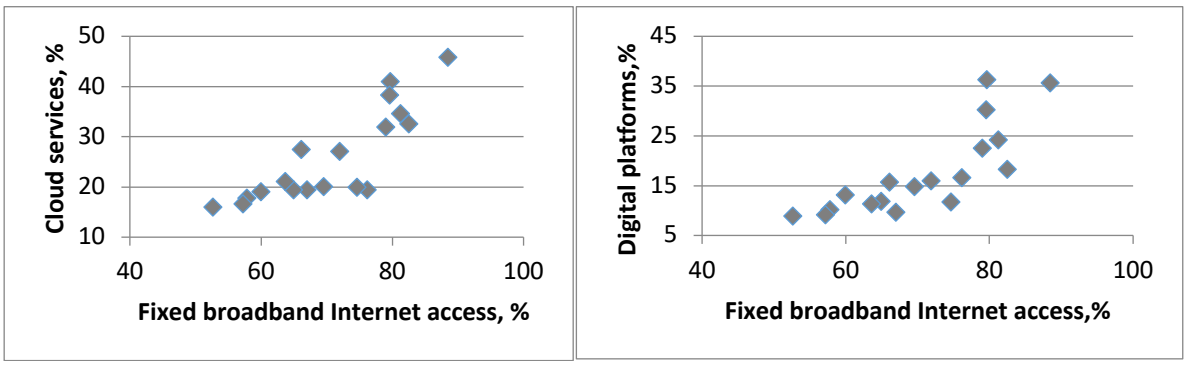

Fig. 3. Correlation field between the fixed broadband Internet access and cloud services / digital platforms in organizations in 2020

Source: obtained by the authors according to the collection "Digital Economy: 2022", p. 49, p. 55

"Integrated digital solutions" has become widely used - developments combining elements of advanced technologies and business models, including information and communication platforms, marketplaces, applications for e-commerce and business process virtualization. The pandemic has accelerated the digital transformation of public administration processes in Russia, a huge number of public services for citizens have been transferred to online formats. As can be seen from Figure 4, in 2020 81.1% of the population aged 15-72 years received state and municipal services in electronic form. However, 55.7% of the population prefer a personal visit and personal interactions when receiving state and municipal services. Among the sectors of the economy, energy (53.1% of organizations), manufacturing (52.7%), information and communication (52.1%), water supply, sanitation, waste disposal (49.3%) are the leaders in obtaining electronic public services by organizations.

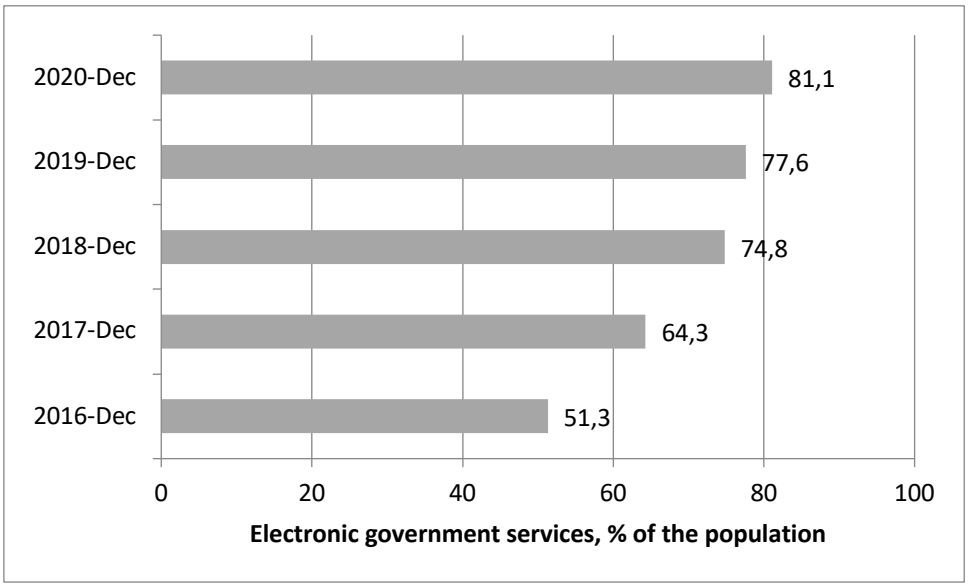

Fig. 4. Receiving electronic state and municipal services by the population

Source: obtained by the authors according to the collection "Digital Economy: 2022", p. 68

In general, traditional and less knowledge-intensive industries (agriculture, construction, industry) were less affected by the pandemic. The growth of capitalization and investment activity occurred in

the segment of ICT corporations. The largest companies, by investing in the diversification of online services, have turned into large Internet hubs that control vast segments of Internet infrastructure, from cloud services and software production to end services and platforms. The uninterrupted operation of the telecommunications infrastructure has provided an opportunity for the sustainable functioning of the economy and the social sphere. Russians turned out to be ready for the gradual integration of everyday life into the digital space (remote work, zoom conferences, online shopping, making an appointments with a doctor), but the habit of interacting offline prevents drastic changes in the behavior of the majority of the country's population. The growth of digital solutions based on artificial intelligence is constrained by their higher cost, the duration of development, data security issues, barriers to use, insufficient maturity level in front of technologies that have already proven their effectiveness for solving the problems of economy's traditional sectors and social sphere. In Russia, the growing demand for digital technologies in general is combined with a possible slowdown in the field of robotics and sensors, wireless communication technologies, virtual and augmented reality technologies, quantum technologies.

4. DISCUSSION

The pandemic has caused the acceleration of technological changes in all spheres of life, and especially in the economy. Technological changes overcome the limiting effects of accumulation that arise due to their transversality and the rise in the cost of production factors. As an individual company invests in the accumulation of knowledge, the stock of internal knowledge increases. This process indirectly increases world experience, increases the productivity of factors, hence the external effect of knowledge accumulation [Romer P., 1986]. Robert Lucas [Lucas, R., 1988], as an external externality, defined human capital as a set of skills that can expand indefinitely and have a decreasing return on output. Robert Lucas has shown that an economy in which the rate of accumulation is proportional to the reserves of human capital, in the long term, is growing at a pace that exceeds the pace of technological progress. The "technology" of human capital production determines the growth rate of the economy. An important distinguishing feature of knowledge is that it is a non-competitive product, since two or more manufacturers can use the same technology at the same time. For this reason, the advantages that new knowledge gives do not depend on those who have accumulated this knowledge [Arrow, K., 1962].

In the conditions of innovations monopolization, economics with higher savings rates grow faster, since they allocate (endogenously) more resources for R&D, interchangeable consumer products improve in terms of quality in competitive conditions, a process of "creative destruction" is formed [Schumpeter, Y., 1995], since innovations of the present are transferred to innovators of the future and products of higher quality do not allow lower-quality goods to compete. Productivity growth due to innovation occurs faster in countries with large labor resources, and economies of scale are relevant here. However, most technological changes bring only minor product improvements and only some - "technologies of wide application" [Bresnahan, T., Trajtenberg, M., 1995] - become disruptive and generate the development of many additional production factors and the workplaces reorganization.

The review of the digitalization results during the pandemic and new growth theories carried out in the article allows us identifying the main prerequisites for economic transformation and new growth opportunities due to rapid digitalization in the conditions of COVID-19. Firstly, thanks to networkingization, datification, algorithmization and platformization, technological changes overcome the limiting effects of accumulation and accelerate the average growth rate of the economy. An increase in the stock of internal knowledge indirectly increases world experience, increases the productivity of factors and forms the external effect of knowledge accumulation. Secondly, human capital, as a set of skills, receives a powerful impetus to their endless expansion and, in the long term, to economic growth at a pace exceeding the pace of technological progress. Thanks to platform business models, the "technology" of human capital production is transformed. Thirdly, technological changes increase the accumulation of knowledge and innovation as a source of productivity growth. Their uncompetitiveness and accessibility lead to equalization of prices for production factors and convergence of growth rates. Platform solutions as "technologies of wide application" generate the

workplaces reorganization and the replacement of labor with capital, tracking any changes in economic entities, commercialization of public life and global integration of institutions and companies. Innovators - owners of digital platforms, having monopoly power, increase profits and digital inequality.

5. CONCLUSIONS

Innovative technologies and innovative systems in the context of the pandemic and its limitations have received new challenges. At the same time, in the conditions of the turbulence of the corona crisis market, small companies are struggling for short-term survival, while large producers and economies with higher savings rates allocate more resources to innovation, have greater growth potential and opportunities for sustainable development. Traditional and less knowledge-intensive industries (agriculture, construction, industry) were less affected by the pandemic, and knowledge-intensive sectors of the economy responded to its challenges being ready. The segment of households turned out to be quite flexible in the use of digital technologies, but the habit of offline processes among the older generation remains predominant. The COVID-19 pandemic leads to the enlargement and globalization of economies, including in the information and communication technology industry. The importance of private companies in the digital environment has increased and regulation is increasing, which contributes to the market concentration of digital services and their appreciation. The programs of the Russian national project for the development of the digital economy are aimed at the public sector, covering a wide range of digital technologies that require modernization of production and investment. The state, small and large companies and households have become participants and witnesses of digital transformation as an unprecedented combination of technology, geopolitics and environmental problems. Digital innovations in the economy are becoming a key factor in ensuring the well-being and resources of future generations as an economic component of the sustainable development concept.

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