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# DIGITALIZATION OF THE ECONOMY AS A FACTOR OF SUSTAINABLE STATE DEVELOPMENT AGAINST THE BACKGROUND OF LARGE-SCALE MILITARY AGGRESSION (UKRAINIAN EXPERIENCE)

## ABSTRACT

Digital technologies are currently one of the main engines of growth and technological development of the global economy. The introduction of digital technologies contributes to the competitiveness of various sectors of the world economy, the creation of new business opportunities in terms of connecting to digital global value chains, the emergence of new markets and niches, and the accelerated introduction of new digital goods into the global market. The digitalization process does not happen simultaneously in different countries of the world, so there is a certain gap in the degree of digitalization of national economies, which gives rise to digital inequality and, as a consequence, increasing the dependence of countries on developed countries. Politics, legal norms, traditions and culture, the level of economic development achieved, the level of education, and the country's own technological base, as well as many other factors, play an important role in the digital transformation of a country's economy.

As a result of the digital transformation of the global economic architecture, new contours of the digital economy are emerging, characterized by the exponential growth of data flows. The formation of the digital market space contributes to increasing competitiveness primarily in the industrial sector through the creation of new products and their service system, which leads to the emergence of new market segments. In other words, the digital market, in fact, is a modern mechanism providing a rapid transition from national markets limited by state borders to a single global market. This situation requires a study of the economic aspects of digitalization in the context of sustainable development of our state, which determines the relevance of the chosen research topic.

The purpose of the article is to assess the impact of digitalization on the economy through the example of Ukraine and its directions in peacetime and under martial law.

Assessment of digitalization and its impact on the economy was carried out on the basis of open data, in particular GDP per capita, indexes of global and digital competitiveness, digital induction, and sustainability index were used. During the study, the following scientific methods were used: analysis and synthesis, the method of establishing cause-effect relationships, and graphical methods.

As a result of the study, the main trends in the digitalization of the national economy and its risks were identified, focusing on the shift in emphasis from service to military goals of digital transformation. A conclusion was made about a significant breakthrough in the digital economy in Ukraine and further development regardless of Russia's military invasion of Ukraine. The state of Ukraine was analyzed with the help of digitalization indices and the confirmation of the need for further monitoring of the digitalization of the Ukrainian economy and the study of its impact on the rate of economic growth was identified on their basis.

**Keywords:** digital transformation, global competitiveness index, digital competitiveness index, stability index, digital technologies, economic development, digitization

**JEL Classification:** O33, F43

## INTRODUCTION

The creation of a digital, technology-driven economy can be the engine of economic growth that most countries in the world need. The potential economic benefits of digitalization of production and economic activity are great - first and foremost, it creates new sources of income and frontiers of economic opportunities for the country. This economic upswing leads to improved global competitiveness and better living conditions for the population.

At the same time, the digital transformation of the economy is twofold. On the one hand, it generates potential risks in the form of qualitative changes in society, in the structure of production and the economy as a whole, requiring economic actors to take effective measures to reduce costs; on the other hand, it creates a mechanism to minimize these risks, which is based on the progressive opportunities provided by the digitalization process.

The duality of the process of digitalization of the economy is manifested in the creation of a qualitatively new workforce and the displacement of workers with skills and professions. This dialectical contradiction can be resolved by creating socio-economic conditions related to the adoption of new cyclical business models and the introduction of customer relations between the subjects of the economy.

While the economy is emerging as a new post-industrial phenomenon; the types and methods of coordination of economic relations are changing, society and its needs are being transformed. This type of economy is based on the intellectualization of production, and it is knowledge and competencies that form a large added value of products. Therefore, in recent years there is an active application of information and communication technologies, which creates the basis for increasing the intellectual components of the product, and the basis for this is the activity of creation, preservation and use of knowledge. The main drivers of the irreversible digitalization of the economy are such new phenomena that define today's social reality, in particular mobile devices and applications, geolocation and its application in logistics and other areas of state functioning, cloud services, the Internet of Things, interfaces between the individual and the computer, digital identification of goods and subjects, 3D printing, development of artificial intelligence.

According to the Concept of development of e-governance in Ukraine, approved by the Cabinet of Ministers of Ukraine on September 20, 2017, № 649-r, the introduction of e-governance is a basic prerequisite for the development of an effective digital economy and digital market in Ukraine and its further integration into the EU Digital Single Market (EU Digital Single Market Strategy). In 2018, the Concept of development of the digital economy and society of Ukraine for 2018-2020, the Digital Agenda of Ukraine was formed and the action plan for its implementation was approved. The National Security Strategy of Ukraine, approved by Presidential Decree No. 392/2020 of September 14, 2020, establishes digital transformation among the directions of foreign and domestic political activities of the state to ensure its national interests and security, which will ensure the provision of administrative services through a secure single window using modern information technologies and the formation of digital literacy, cyber resilience and cyber security of national information inf Also in the National Economic Strategy to 2030, approved by Cabinet of Ministers Resolution No. 179 of March 3, 2021, the digital economy is defined as one of the drivers of economic growth in Ukraine, and one of the benchmarks, principles and values in economic policy is the construction of an effective digital service state and compact state institutions. The Law of Ukraine "On Stimulating the Development of the Digital Economy in Ukraine" provides the basis for further digitalization of the country. Consequently, the formation of the digital economy is one of the national interests aimed at economic growth and prevention of the shadow economy and the prevention of corruption. Of course, digitization of all sectors of the economy will not be easy, but without digitization, it is impossible to fully integrate into the global economy. The digital state is defined as one of the national programs of the Recovery Plan for Ukraine, presented in Lugano.

## LITERATURE REVIEW

Digital technologies (hereinafter referred to as "DT") are currently one of the main drivers of growth and technological development of the global economy. The introduction of DT contributes to the competitiveness of various sectors of the world economy, the creation of new business opportunities in terms of connecting to digital global value chains, the emergence of new markets and niches, and the accelerated introduction of new digital goods into the global market. The flow of digitalization does not occur simultaneously in different countries of the world, and as a result, there is a certain gap in the degree of digitalization of national economies, which gives rise to digital inequality and, as a consequence, the increasing dependence of developing countries on developed countries.

Policies, legal formalities, traditions and culture, the degree of economic development achieved, the level of education and the country's own technological base, and many other factors play an important role in the digital transformation of a country's economy (Kotova et al., 2020).

The use of innovative technologies for the digitalization of the economy implies the emergence of some special influencing factors (Parida et al., 2019; Royko, 2017). The main factor or way to achieve the effective implementation of innovative technologies towards the implementation of the digital economy is the automation of processes, and maximum efficiency is important to ensure the automation of transactions (Heimerl and Raza 2018; Watanabe et al. 2018).

Digitalization is the key to catalyzing change in the industry and social well-being (Mondejar et al., 2021). Economic and policy imperatives and technological innovation combine to drive growth in the digital economy (Bukht and Heeks, 2017). Beier et al. (2017) investigating the impact of digitalization in China and Germany concluded that it is dangerous for the social policy of the state because the automation of production processes leads to the release of personnel.

As Yao (2019) points out, China is second in the world after the United States in attracting venture capital investment in virtual reality, autonomous driving, wearable technology, educational technology, robotics and drones, and 3D printing. China ranks third in attracting investment in big data and artificial intelligence. Digitalization in China has affected key economic indicators (notably GDP, labor force, money supply, domestic credit, exports and foreign exchange, and the gold reserve).

A reasoned review of the empirical literature on the relationship between Internet use and well-being led Castellacci and Tveito (2018) to conclude that the directions through which the Internet can affect well-being are as follows: it changes patterns of time use, creates new activities, facilitates access to information, and acts as a powerful communication tool.

According to Parviainen et al. (2017), digitalization implies a significant transformation of operating systems and, as a consequence, a revitalization of the economy. Mičić (2017) argued that the development of private and public ICT sectors is based on increasing investments of European countries in digital transformation, and this usually has a positive impact on economic growth as well as economic indicators - GDP, productivity and employment. Pradhan et al (2019) substantiated the relationships between venture capital investment, ICT infrastructure, and economic growth based on annual data from 25 European countries. Also, another group of researchers confirmed that ICT infrastructure has a positive impact on economic growth (Toader et al. 2018).

The role of government in the digitalization of the economy is noted by Marinković et al. (2018). Bart (2016) notes that digitalization processes have an ambiguous impact on the economy.

There are also isolated studies of the impact of digitalization on the state of national economies, in particular:

- middle Eastern economies compared to Organization for Economic Cooperation and Development (OECD) economies - Habibi and Zabardast (2020); in the Middle East and North Africa (MENA) and Sub-Saharan Africa (SSA) - Bahrini and Qaffas (2019);
- development of African economies - Myovella et al. (2020).

Kibik, et al. (2022) pointed out the need to adapt to the conditions of complex digitalization, which requires enterprises to be innovative in their operations and relevant to determine the vector of innovative transformation. Vasylytsiv et al. (2022) investigated the areas targeted by state policy in the development of the digital economy of Ukraine and came to a conclusion about the average level of development (favorable condition) of the digital-technological environment. Also, digital technologies can serve as tools to combat corruption and create conditions for intensive economic growth (Surovicova et al. 2022).

According to a study of the relationship between digitalization and sustainable development in the EU, digitalization is related to employment through education and gender equality; education depends on R&D expenditure, and gender equality also depends on R&D expenditure; R&D expenditure is also closely related to responsible consumption and vice versa, and responsible consumption is closely related to R&D expenditure (Burinskien'e and Milena Seržant'2022).

The analysis of scientific sources revealed the substitution of the concept of digitalization of the economy with concepts close in content: "digitization", "digital economy", "Industry 4.0". Nevertheless, these categories are largely similar, they are connected by a common process of digitalization of the economy, but, in our view, we cannot equate them.

A review of studies has shown that digitalization has a positive impact on economic growth. However, the academic research discourse lacks the study of the Ukrainian case of digitalization, especially its emphases in peacetime and wartime.

## AIMS AND OBJECTIVES

A number of studies on the impact of digitalization on the economy, the impact of digitalization in the context of individual countries does not reflect the methodological apparatus for evaluation and requires further research. The main purpose

of this study is to characterize the impact of digitalization on the economy through a set of indicators and, by the example of Ukraine, to highlight its directions in peacetime and under martial law.

Achievement of this goal is possible after solving the following tasks:

- analyze the indicators of digitalization and economic growth, including those where there is a representation of Ukraine;
- characterize the impact of digitalization on the Ukrainian economy and formalize the risks that can increase or decrease this impact, especially in times of war;
- characterize digitalization in Ukraine in peacetime and wartime.

## METHODS

A logical-heuristic approach was used for the evaluation because in order to achieve the goal of the study it is necessary to assess the level of digitalization of the country's economy and study its impact on economic growth, as well as to analyze the risks that offset the positive effect of digital transformation.

As a modern trend in the development of the world economy and society, digitalization affects different countries in different ways. Each country's place in the global community depends on the degree of digitalization's impact on national economic and social life. In order to assess the degree of digitalization coverage of any country, indirect or direct indicators are used to measure it. In particular, the economy of the country will be evaluated by (GDP per capita; Indices of global and digital competitiveness).

Indicators indirectly evaluating digitalization as a trend include, for example, the Networked Readiness Index NRI (Networked Readiness Index), a comprehensive indicator developed back in 2001, that characterizes the level of development of information and communication technologies in different countries of the world. For indirect assessment of the trend of digitalization, it is used because ICT plays a leading role in the development of innovation, increasing productivity, competitiveness, i.e. increasing the efficiency of the economy and improving the quality of life. Since most new ICT is based on digitalization, it means that the index of network readiness implicitly reflects the penetration of digitalization in all spheres of life, i.e. reflects the manifestation of the digitalization trend.

The impact of digital transformation on the rate of economic growth was studied on the example of Ukraine. The choice of this country was influenced by the fact that its economy, which began its transition to the market type only in 1990, is characterized by a fairly high level of digital development, comparable to the leading mature markets. At the same time, the development of Ukraine's digital economy is characterized by a change in focus as a result of Russia's military aggression.

## RESULTS

Digitalization is now a recognized global trend of economic and social development, so it is important to measure the impact of this trend on the economies and societies of different countries. Digitalization can be seen as a trend of effective global development only when the digital transformation of information covers business, science, the social sphere, and the ordinary life of citizens. Another requirement is that it is advisable to ensure the effective use of the results of digitalization, which will be available to users, in particular not only to specialists, but also to ordinary citizens, so it is important to form digital education and digital competencies in the population.

The pandemic, while negatively affecting the national economy, has accelerated its digital transformation, spurred technological progress, and increased employment opportunities through remote work. It should be noted that, like any other large-scale phenomenon, the digitalization of the economy has an ambiguous impact on the country's performance. Their sources are two main effects; the emergence of new types of risks and threats specific to the digital economy, not related to its technological features; In the transition to the digital economy there is an institutional transformation, which can destabilize sustainable and effective socio-economic development.

At the same time, the digital transformation of the economy is twofold - creates a mechanism to minimize these risks, which is based on the progressive opportunities provided by the digitalization process.

The duality of the process of digitalization of the economy is manifested in the creation of a qualitatively new workforce and the displacement of workers with traditional skills and professions. This dialectical contradiction can be resolved by

creating socio-economic conditions related to the adoption of new cyclical business models and the introduction of customer relationships between economic actors.

The process of digitalization promotes not only the creation of new jobs but also norms of social behavior based on the use of digital technologies, which allows a higher level of trust between the subjects of the economy. All this will be crucial for the successful digital transformation of society.

Traditional drivers of economic growth are increasingly giving way to digital technologies for the following reasons:

First, prior to the emergence of the digital economy, economic growth was driven by a number of factors, including traditional industries, dynamic exports, investment from abroad, labor cost advantages, and funding from international funds. But, with the digitalization of the economy, these drivers are beginning to weaken. Second, countries and effectively integrated economic regions and unions are becoming the most attractive for investment.

This allows developing countries to partially narrow the economic gap compared to developed countries, significantly improving the standard of living and quality of life of the population.

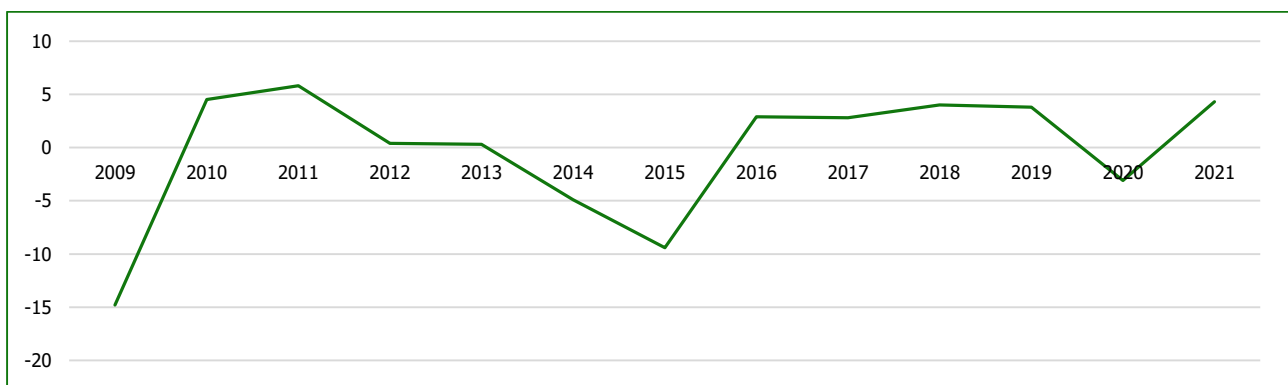
Third, labor costs are also increasing due to higher requirements for education and professional competencies, which can become a serious problem in the context of limited resources. Nevertheless, the digitalization of education solves this problem by forming conditions for training highly qualified personnel and drawing them into economic relations and, as a consequence, reducing unemployment.

Fourthly, the application of digital technologies provides unprecedented productivity growth in all areas of social production.

The digital economy has some advantages over tangible commodity-money exchanges, such as the speed of delivery of goods or the instant delivery of services. Also, an advantage of the digital economy is the lower cost of producing and executing transactions (Kotova et al., 2020). At the same time, electronic goods are virtually inexhaustible and exist in virtual form, while tangible goods are almost always limited in quantity and much more difficult to access.

According to the official reports of the World Bank, the economic growth rate in Ukraine in 2020 is significantly reduced (Figure 1), in particular as a result of the pandemic.

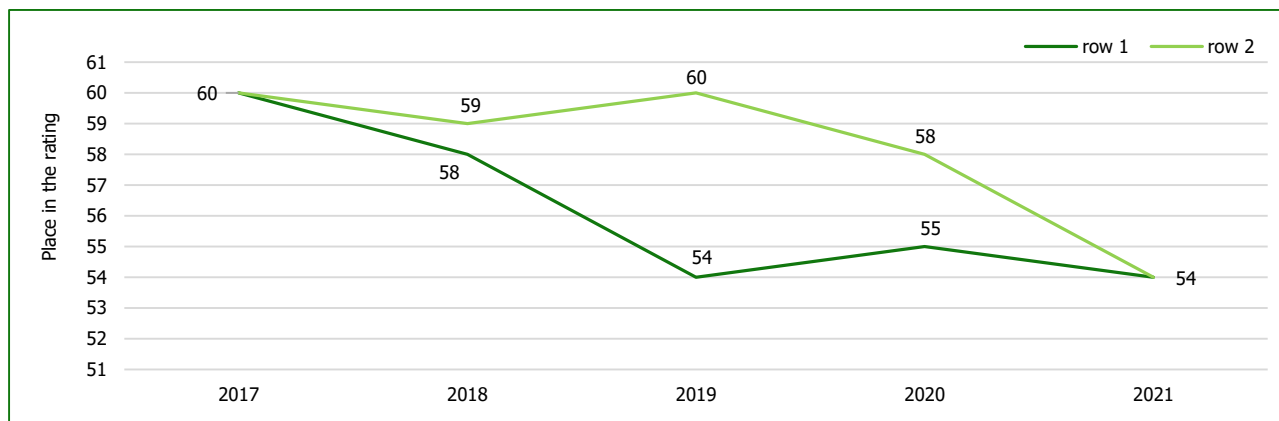
First of all, it is necessary to assess Ukraine's ranking in terms of GDP per capita, since the generally accepted way of measuring economic growth is to measure changes in the output or real income of the population (Aleksandrova et al., 2022). The UN System of National Accounts offers three indicators for calculating growth: GDP, real gross income, and real gross national income. Data from official World Bank reports indicate that economic growth weakened significantly in 2020, in particular as a result of the pandemic. Figure 1 shows a graph of the GDP growth rates per capita of Ukraine in 2009-2021.



**Figure 1. GDP growth per capita (annual %) – Ukraine.** (Source: summarized by the authors based on the World Bank (2022))

The chart above shows that in 2021 Ukraine's real GDP grew by about 7.4% compared to the previous year. There is no clear trend from 2009 to 2021, given that it was negative in 2009, 2014-2015, 2020, and only 2018-2019 and 2021 show an upward trend of nearly 4%. Given this, we can accept that the country as a whole has mixed dynamics of GDP growth, allowing us to characterize the situation on this indicator as unsatisfactory.

The second stage of the research involved the analysis of the data of the World Digital Competitiveness Index (WDCI) on digitalization, the Global Competitiveness Index (GCI). Figure 2 shows the dynamics of their values for Ukraine.



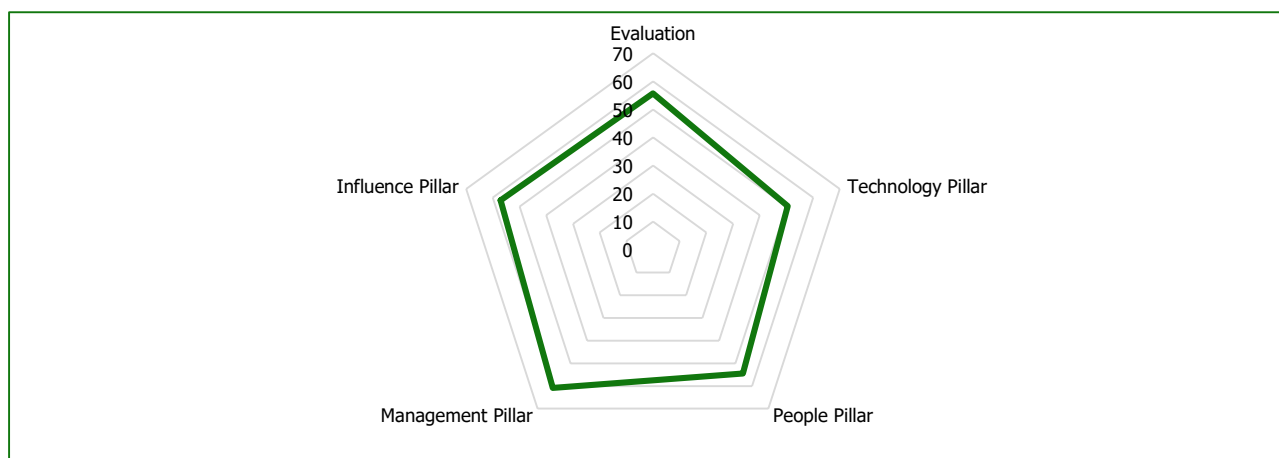
**Figure 2. Global (row 1) and digital (row 2) competitiveness indices 4.0.** (Source: developed by the authors on the materials of the World Economic Forum (2022))

In the overall GCI and WDCI Ukraine ranks relatively high (54). Analysis of the country's GCI position shows that its scores range from 54 to 60 (average level).

The analysis of GDP per capita and GCI data allows concluding that in general Ukraine has ambiguous dynamics of economic development, which is expressed in a positive change of GDP in 2021 and improvement of the country's competitiveness indicators. The high level of ICT adoption in Ukraine (38th place) indicates the expected positive impact of economic recovery on the spread of ICT. In order to confirm or refute this assumption it is necessary to take into account digitalization indicators and the stability of the macro environment (Aleksandrova et al., 2022).

The ambiguous dynamics of economic development is evidenced by the analysis of data on GDP per capita and GCI, in general, Ukraine is characterized by a positive change in GDP in 2021 and the improvement of the country's competitiveness indicators. The high level of implementation of ICT in Ukraine (38th place) indicates the positive impact of economic growth on the spread of information and computer technologies. To verify this statement, it is necessary to take into account the indicators of digitalization and the stability of the macro environment.

For this purpose, the next step was the study of a group of indicators reflecting the level of digitalization in Ukraine. According to the Global Connectivity Index, Ukraine occupies an average ranking position (52nd place out of 79). To compare the level of digitalization development in Ukraine and a number of other countries, it is advisable to analyze the Networked Readiness Index (NRI) (Figure 3).

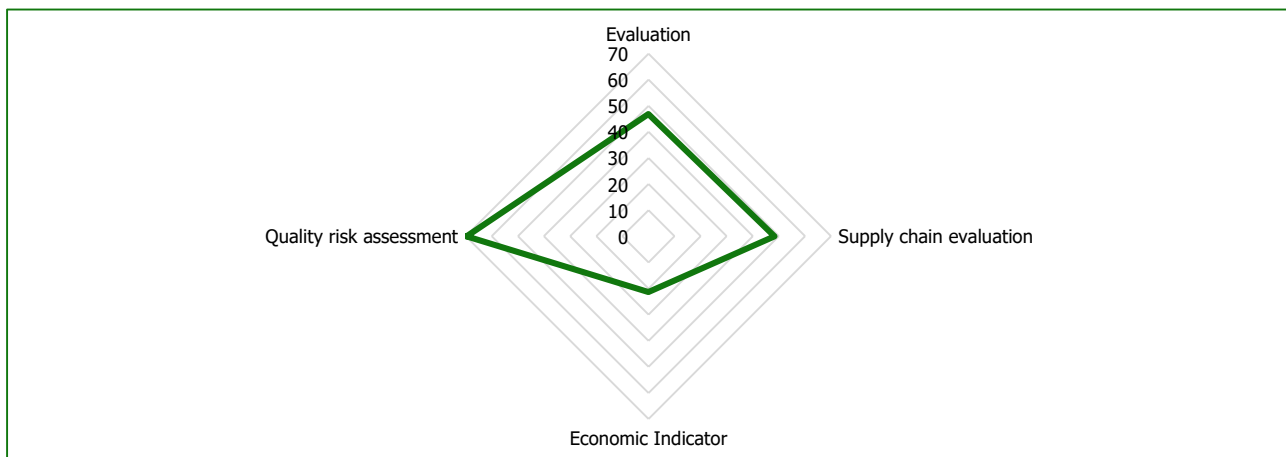


**Figure 3. Performance Overview.** (Source: summarized by the author for The Network Readiness Index (2022))

In 2021, Ukraine ranked 50th out of 130 countries in the world with a total score of 55.71, which means the sufficient condition of the processes of digital transformation. Ukraine has good results in the components "Influence", "Management" and "People", but the component "Technology" requires improvement. At the same time, Ukraine has the highest position among the lower-middle-income countries, even ahead of some other upper-middle- and high-income countries. However, it is significantly behind all EU countries. In order to compare with the level of digitalization of the EU, work is underway to join Ukraine to the DESI index.

Ukraine's place in the FM Global Resilience Index (GRI) is 46.8, which corresponds to the 75th place out of 130. It should be taken into account that this is an integral characteristic, which determines the position of the country in the rating and averages the factors affecting sustainability. Specifically, the GRI combines 12 key sustainability factors, classified as related to economic factors, risk quality factors, and supply chain factors (Aleksandrova et al., 2022). The fourth parameter, the country ranking describes the overall situation in the context of sustainability. Figure 4 below shows how the scores differ depending on the factors considered.

The analysis of Ukraine's rating in the FM Global Resilience Index (GRI) showed an average level of 46.8, which corresponds to 75th place out of 130. It determines the country's position in the ranking and averages the factors affecting resilience and characterizes 12 main resilience factors (e.g., economic factors, risk quality factors, and supply chain factors). The fourth parameter, the country rating, characterizes Ukraine's overall situation in the context of sustainability (Aleksandrova et al., 2022).



**Figure 4. Sustainability index.** (Source: developed by the authors based on FM Global (2022))

The state of Ukraine's economic system can be characterized as weak due to the low value of the economic indicator only 21.4 out of 100, while the two main sustainability factors (risk quality and supply chain) received 69.7 and 48.3. The low economic indicator was obtained due to low values of productivity, political risk, the high energy intensity of the economy, and the high rate of urbanization. In 2022, these characteristics are unsatisfactory due to the crisis and military actions against Ukraine.

Consequently, the analysis showed a high motivation of the macro environment and the readiness of the population for digital transformation, which even in the context of the unsatisfactory state of the economy and digital infrastructure has a positive impact on the economic growth of Ukraine.

The modern economy is characterized by such trends and technologies that cause both positive shifts in the components of economic growth due to the digital transformation of society and cause the emergence of limitations to further growth.

This thesis is based on three factors. First, digitally competitive economic actors are on the rise in modern manufacturing and are effective in the real sector. However, practice shows that the economic boom does not always continue. Indeed, there are signs that there are growth constraints in society, such as negative demographic trends, which reduce the positive effects of a growing skilled workforce. However, Ukraine is taking many measures to address this, in particular developing digital education.

Second, we are on the threshold of the fourth industrial revolution, in which new technologies will radically transform the labor market and the economy as a whole. These revolutionary changes will stimulate the growth of production and promote the emergence of new professions, such as big data scientists, robotics engineers and new technology developers, and so on. Today, the digitalization of the economy is driving the emergence of new professions, new business models, and new market segments.

However, this process also creates major challenges at the same time. Digitalization is the basis for increasing productivity in the economy, but it can also negatively affect the labor market because it requires digital competencies and the formation of a support system for lifelong learning.

Third, new ecosystems are being formed due to the transformation of the national economic system under the influence of digitalization. This stimulates the development of new digital strategies and toolkits for future digital transformation.

As digitalization increasingly disrupts traditional society, there are growing concerns about its impact on social factors such as job losses, changes in wages, inequality, the use of health-saving technologies, resource efficiency, and personal and community safety. In this regard, economists conduct a detailed quantitative and qualitative analysis of socioeconomic indicators, calculate projections of the potential benefits of digitalization for industries, and identify

Digitalization acts as a catalyst for employment growth in many industries. Thus, while potential inequalities and wage disparities persist, some action is required to prepare the workforce for a digital future; the impact of digitalization is becoming increasingly significant, and the implications of digital transformation extend beyond the labor market.

The military environment in which Ukraine's digital economy operates has made it difficult for the IT sector to operate. Indeed, the conditions make it difficult to fulfill export contracts (95% of which have been retained), find new orders, and make it impossible to invest in development. In contrast, this industry continues to develop dynamically, in contrast to other sectors of the economy and directs the income received (export earnings only for the first half of 2022 \$3.74 billion, exceeding by 23% the previous year) in support of the army and humanitarian aid. Currently, the share of IT services in the export of all Ukrainian services was 37% and the export of computer services from Ukraine is growing every year. It is the only export industry that is now operating at almost pre-war levels. And most importantly, more than 90 percent of the companies have kept their customers.

Now Russia is trying to attack not only with missiles but also with cyberattacks, trying to prevent access to digital services and interfere with government agencies, energy, logistics, and healthcare. To strengthen protection, some institutions have moved central databases abroad (notably Prozorro) and tested for vulnerabilities in information systems (notably the Ministry of Digital).

The development of digitalization for creating a digital state and restoring economic growth in war has been slowed by cyberattacks on the information systems of institutions, businesses, and organizations; blackouts and damage to Internet backbones caused by enemy action, and a decrease in IT specialists as a result of migration and military service. The content of digitalization itself has changed during the war, shifting the focus from service delivery to the formation of defense capabilities (Table 1).

**Table 1. Directions of Ukraine's digital transformation.** (Source: Author's development)

Before the war	Amid war
<ul style="list-style-type: none"> <li>▪ Digitalization of administrative services The State in a Smartphone Program;</li> <li>▪ Diia;</li> <li>▪ Diia.pidpis;</li> <li>▪ COVID Certificates;</li> <li>▪ E-malyatko;</li> <li>▪ E-Support;</li> <li>▪ Diia.Digital Education;</li> <li>▪ Digital education: educational miniseries;</li> <li>▪ Reforming IT education;</li> <li>▪ Legalization of virtual assets;</li> <li>▪ Application of electronic system for procurement;</li> <li>▪ Special legal and the tax regime for technology companies - Diia City;</li> <li>▪ Cybersecurity;</li> <li>▪ Sanctions from Ukraine to prohibit the use of Russian IT products;</li> <li>▪ Subventions for the purchase of laptops for teachers;</li> <li>▪ Diia.Center (CNAP);</li> <li>▪ Increasing the availability of broadband Internet access in rural areas;</li> <li>▪ Notification when credit history is verified, or a new loan becomes available;</li> <li>▪ Electronic identification;</li> <li>▪ Electronic (remote) education and healthcare (including telemedicine);</li> <li>▪ Distance agreement and electronic commerce.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cyber defense against cyber attacks;</li> <li>▪ Powerful IT army;</li> <li>▪ Chatbot e-Enemy (collecting information about the location of the enemy);</li> <li>▪ Identification of dead enemies and their surroundings through the use of artificial intelligence and social engineering;</li> <li>▪ Increasing access to the Internet through the use of Starlink satellite Internet technology;</li> <li>▪ A crypto-fund to raise funds for humanitarian and military aid;</li> <li>▪ Military tech (drone army);</li> <li>▪ An electronic finance and supply management system for all civil-military administrations;</li> <li>▪ E-Document;</li> <li>▪ United24, replenishing the Army's "Come Back Alive" relief fund</li> <li>▪ Diia. Business;</li> <li>▪ Ability to purchase military bonds through e-Diia service;</li> <li>▪ Updating of e-support considering the presence of internally displaced persons and obtaining the status of IDPs in Action;</li> <li>▪ E-Assistance affordable lending program;</li> <li>▪ E-Help, Interaction platforms;</li> <li>▪ Digital interaction platform for business relocation assistance;</li> <li>▪ Compensation for damaged/destroyed property through Diia;</li> <li>▪ "Air alert" app and map of air alerts;</li> <li>▪ "Diia.TV", "Diia.Radio".</li> </ul>



Even under military conditions, Ukraine continues to shape a secure digital future with the EU, in particular, we are talking about such steps by our government:

- activating a digital visa-free visa with the EU and Ukraine's participation in the competitions of the European Union's Digital Europe Program until 2027;
- creation of conditions for joining the European free roaming zone;
- a public-private partnership to accelerate the restoration of facilities destroyed by war and the construction of new facilities related to the post-war restructuring of Ukraine's economy;
- strengthening of motivation to invest in domestic Internet infrastructure, and telecom companies (IT heartland of Europe);
- involvement of countries and international institutions in the restoration of damaged infrastructure and critical projects;
- implementation of the marketing of economic recovery in Ukraine based on the creation of a marketplace platform Made with Bravery;
- programs of "digital lend-lease".

Their details are presented in the National Informatization Program for 2022-2024, approved by the resolution of the Verkhovna Rada of Ukraine No. 2360-IX of July 8, 2022, and in the Recovery Plan of Ukraine.

## DISCUSSION

Over the past more than four decades of the 4th industrial-technological revolution, the modern economy at all its levels (nano-, micro-, meso-, macro-, mega- and global economy) has become increasingly technological, digital and even cloud-based. The digital sector is the core of the digital economy, but the field of the digital economy is said to go beyond that, encompassing a number of new digital business models. Nevertheless, the digitalization of the economy has an ambiguous impact. In particular, it is a question of government support for digitalization processes and their implications. Indeed, both the supply side of the market (labor market, education, research and innovation, infrastructure) and the demand side (wages and social policies) become the main challenge. At the same time, the social cost of the adaptation process is quite important. (Bukht and Heeks 2017; Heimerl and Raza, 2018).

The World Bank also notes the lack of market mechanisms and competition, digital competencies of businesses and citizens to develop the digital economy. Their impact can be negative for the economy due to a significant imbalance in the implementation of technological change due to the low level of participation of countries in the global economy and labor market performance. The analysis shows the need to consider the ability to access information and computer technology and the degree of business readiness to recognize the digital economy and its current role, which is fully consistent with the findings of Beier et al. (2017) and the World Bank report (2016).

The digitalization of the economy not only affects industrial production and services but ensures efficiency and efficiency in the use of resources. It is also significantly distorting certain sectors of the economy and employment, which assesses the level of business readiness.

The main limitations of the study are represented by the set of indicators and the specificity of the market, its representation in the indices of digitalization (Aleksandrova et al., 2022). The authors tried to fill the gaps in the existing studies regarding the specifics of digitalization under martial law.

The thesis that the digitalization of the Ukrainian economy is a positive fact of the development of our state is also confirmed by Raeskyesa and Lukas (2019); Maiti et al. (2019).

Digitalization of the economy is a driver for the formation of an innovation ecosystem and a new culture of innovation. New sources of growth and transformation of traditional and non-productive spheres ensure the development of the modern economy. However, the lack of development of technological platforms, as well as the rather low digital literacy of the population does not fully ensure the economic growth and security of the state (Bondar-Podhurskaya, Glebova, 2020). However, the epidemiological situation in the world, which provoked an increase in the need for digitalization of the economy in 2020, showed its importance for the development of Ukraine. The development of digitalization gives impetus to the development of all spheres of activity, especially in such an unstable environment in the world.

## CONCLUSIONS

Digital technologies are of great infrastructural importance for the economy, including Ukraine, because they do not create information by themselves, and do not make decisions taken qualitatively and effectively. In addition, the spread of digital technology requires quite substantial funding. This direction has already become an integral part of the Plan for the Recovery of Ukraine in the post-war period. Further digitalization of Ukraine's economy will provide a much-needed innovative breakthrough and allow it to become the "digital heart" of Europe. Ukraine's accession to the EU, in particular to its digital market, including through participation in the EU Digital Europe program, will significantly revitalize the IT industry in Ukraine and form a corresponding synergy between the sectors of the national economy and restructure the labor market.

With the spread of the coronavirus and war, it is digital technology has become the basis of Ukraine's economic development. Military actions against Ukraine, as well as the pandemic, have only further intensified the development of the digital economy, moving ever closer to the EU Single Digital Market, reforming the IT sphere, and attracting additional funding as part of the Ukraine Recovery Plan to increase sustainability in the post-war period. Along with this, Ukraine's digital experience of overcoming bureaucracy, domestic corruption, and abuse is being sought by developed countries, particularly the digitalization of administrative service delivery, cybersecurity, and the country's domestic startups, tech, and government ecosystems.

The results of scientific intelligence show that the positive impact of digitalization on the economy is possible only when the economic environment is ready to realize such a transformation (this can be assessed by the index of sustainability and its components). In turn, the readiness of businesses and the population to adopt innovative digital technologies is important. Consequently, in order to develop an effective digitalization strategy for a country, three aspects must be taken into account: the rate of economic growth, the situation and the sustainability of the environment. The indicators proposed in this study provide a qualitative consideration of the processes of digital transformation and their impact on the economic growth of Ukraine. Subsequent studies will focus on a comprehensive quantitative justification of the relationship between digitalization and the rate of economic development.

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## ЦИФРОВІЗАЦІЯ ЕКОНОМІКИ ЯК ФАКТОР СТІЙКОГО РОЗВИТКУ ДЕРЖАВИ НА ТЛІ МАСШТАБНОЇ ВОЄННОЇ АГРЕСІЇ (УКРАЇНСЬКИЙ ДОСВІД)

Цифрові технології (далі – ЦТ) на сьогодні є одним із основних двигунів зростання й технологічного розвитку світової економіки. Упровадження ЦТ сприяє підвищенню конкурентоспроможності різних галузей світової економіки, створенню нових можливостей для бізнесу в розрізі підключення до цифрових глобальних ланцюгів доданої вартості, появи нових ринків і ніш, прискореному впровадженню нових цифрових товарів на світовому ринку. Процес цифровізації не відбувається одночасно в різних країнах світу, тому існує певний розрив у ступені цифровізації національних економік, що породжує цифрову нерівність і, як наслідок, посилення залежності окремих держав від високорозвинених країн. Політика, правові норми, традиції та культура, досягнутий рівень економічного розвитку, рівень освіти, власна технологічна база країни, а також багато інших факторів відіграють важливу роль у цифровій трансформації економіки країни.

У результаті цифрової трансформації глобальної економічної архітектури з'являються нові контури цифрової економіки, що характеризуються експоненціальним зростанням потоків даних. Ці зміни вимагають постійного моніторингу й пошуку шляхів стабілізації, що визначає актуальність обраної теми дослідження. Метою статті є оцінка впливу цифровізації на економіку України та напрямів у її розвитку в мирний час і в умовах воєнного стану.

Оцінка цифровізації та її впливу на економіку здійснювалася на основі відкритих даних, зокрема використовувалися ВВП на душу населення, індекси глобальної та цифрової конкурентоспроможності, цифрова індукція, індекс стійкості. У ході дослідження використані наукові методи: аналіз і синтез, метод установлення причинно-наслідкових зв'язків, графічні методи.

У результаті дослідження визначені основні тенденції цифровізації національної економіки та її ризики, звернено увагу на зміщення акцентів зі служби на воєнні цілі цифрової трансформації. Зроблено висновок про значний прорив цифрової економіки в Україні та її подальший розвиток незалежно від воєнного вторгнення росії в Україну. За допомогою індексів цифровізації проаналізовано стан України та на їхній основі виявлено підтвердження необхідності подальшого моніторингу цифровізації української економіки й вивчення її впливу на темпи економічного зростання.

**Ключові слова:** цифрова трансформація, індекс глобальної конкурентоспроможності, індекс цифрової конкурентоспроможності, індекс стійкості, цифрові технології, економічний розвиток, цифровізація

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