

The Impact of Digitalisation on Ukraine's Economic Development

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Abstract

The incorporation of digital technologies into all aspects of life is a prominent subject of scientific discussion. Many researchers consider digitalization as a crucial factor in socio-economic advancement, although there is still much to be explored on this topic. The unequal progress of spatial development has a detrimental effect on the digitalization levels of different countries, including Ukraine, which highlights the need for the country to establish strategies for implementing digital innovations to promote its economic growth. Given the significance of this research topic, the objective of this study is to determine the essence and potential impact of digitization and digitalization on Ukraine's economic development. To achieve this goal, it is imperative to define the concept of digitalization in the economy, assess statistical data on innovation development and prospects in Ukraine, identify priority areas for incorporating digital tools into the Ukrainian economy, and outline possibilities for further economic development in light of digitalization trends. Analytical, synthetic, systematic, and generalization methods were utilized to achieve this goal. By conducting this research, we have gained a comprehensive understanding of the intricacies of digitalization. Additionally, we have critically analyzed the existing state of digital development within the Ukrainian economy, while also pinpointing potential avenues for future growth. These opportunities arise from the deliberate incorporation of digital tools within Ukraine's economic and industrial sectors.

Keywords: Digitalization of the Economy, Economic Development, Innovations, Prospects, Opportunities, Material Production, Service Sector, Artificial Intelligence, Digital Technologies, Financial Resources

Introduction

Ensuring the socio-economic progress of a country is of utmost importance to both its leadership and population. The degree of socio-economic advancement is crucial in determining the

stability and autonomy of the nation, the societal standing of its citizens, the fulfillment of individuals' rights to a decent life and self-actualization, as well as the potential for further enhancements in key economic indicators. Presently, various concepts have emerged within these frameworks, alongside the incorporation of contemporary economic approaches, with the objective of fostering the growth of the digital sphere and bringing about beneficial transformations in the digital landscape.

Regional development is shaped by a variety of internal and external factors, which encompass aspects within the region itself as well as factors at the interregional, national, and international levels (Soltovski et al., 2020; Popović, 2020; Rybalchenko et al., 2022; Schuh et al., 2020). Moreover, the course of development is influenced by global forces, and straying from these forces can impede advancement. Currently, the global landscape is witnessing the rise of the digital economy, which places individuals at the center as producers, carriers, and consumers of information and innovations. In light of this, the socio-economic model of regional development that aligns with global trends and embraces the features of digitalization will gain increasing significance in the near future.

In order to maintain ongoing advancements in the realm of digitalization, it is of utmost importance to possess a comprehensive comprehension of the essence and attributes of the digital economy. This includes recognizing its unique features and assessing the potential impact of introducing specific elements on development. This knowledge is vital in order to devise effective strategies for public administration to manage digitalization processes and establish a strong mechanism for overseeing the digital economy in a contemporary nation-state (Ostropolska, 2021; Hurzhyi et al., 2022; Reardon et al., 2023;

Sermuksnyte-Alesiuniene et al., 2021).

To tackle this task, we need to examine the core nature of the digital economy, considering the swift progress of contemporary information technology and inventive ways of conducting business, which are speeding up the pace of life. Consequently, consumer expectations are evolving to prioritize more efficient and convenient purchases of superior goods and services.

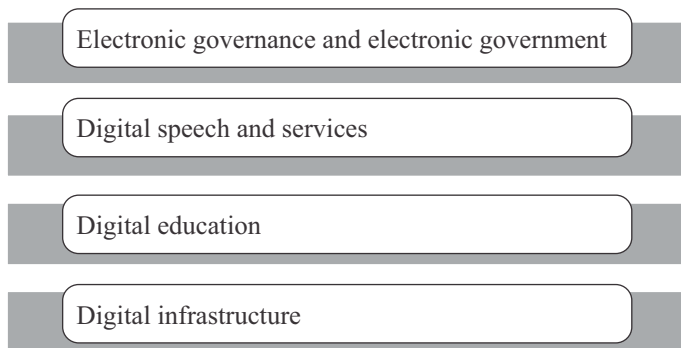
Hence, it is essential for companies to modify their manufacturing processes in order to fulfill the increasing needs of customers. However, traditional approaches such as production automation may not be enough to accomplish this. Instead, new solutions are necessary to effectively manage business processes and enhance the company's competitiveness. Implementing digital models that can expedite decision-making, expand production opportunities, and improve quality control has become instrumental in the development of various sectors and strategies. These changes require a blend of technical, scientific, and entrepreneurial efforts, as well as a creative approach.

Business digitization offers solutions to a range of issues faced by modern enterprises. These solutions include enhancing operational efficiency, reducing production costs across the board, improving competitiveness, fostering employee growth, expanding business reach, and exploring new sectors of the economy.

This brings up the concept of "digital maturity," which points out that utilizing digital technologies effectively provides ample opportunities for companies to progress further. In due course, "digital maturity" becomes a widespread gauge. Concurrently, all processes linked to the establishment of the digital sphere determine the key areas where improvements are needed, taking into account the identified

shortcomings. Furthermore, digitalization has the potential to foster economic expansion, as indicated by the Gross Domestic Product (GDP). There are diverse scientific and practical methodologies aimed at evaluating the digitization of the economy, focusing on the following principal domains for implementing digitalization in the economy - Fig. 1.

Figure 1. Areas of implementation of economy digitalisation



Source: development of the authors

The definition of the digital economy is changing as information technology progresses. With the rapid development of the information sphere, interpretations of digitalization are also evolving quickly.

To conduct a thorough study, it is necessary to have a deep understanding of what is referred to as the "digital economy." By examining scholarly literature, different ways of interpreting the concept of the digital economy can be identified.

Firstly, it is crucial to highlight the foundational approach for comprehending the digital economy, as discussed by Chen et al. (2022), Golubchikov et al. (2022), and Novikova et al. (2022).

This approach entails perceiving the digital economy through the lens of network technologies, with its development characterized as the digitization of pre-existing non-digital information. This period signifies a shift in how we view the information economy. Notably, economic information plays a crucial role in the contemporary economy (Aleksieienko et al., 2020; Czifra et al., 2020; Kontokosta et al., 2021).

Table 1 categorizes modern interpretations of the term "digital economy" into different groups, closely resembling the fundamental definitions. The Organisation for Economic Co-operation and Development's understanding aligns with these definitions, defining the digital economy as markets that utilize information and communication technologies to exchange information, digital goods, or deliver services online (Shkarupa et al., 2022).

Table 1. Contemporary understandings of the term "digital economy"

Group of definitions of the digital economy	The essence of the digital economy, according to the approach
The approach of the latest information management	The initial category consists of contemporary methods that are still in the process of being perfected and concluded. Within these approaches, the digital economy is presented as a nascent technological framework that relies on information and introduces a fresh approach to utilizing it.
The approach of innovative socio-economic relations	The second category comprises of scholars' methods in comprehending the digital economy, in which it is defined as a collection of social and economic connections that rely on the utilization of digital technologies and digital goods. This viewpoint aligns with the World Bank's perspective, which characterizes the digital economy as a framework of economic, social, and cultural interactions that hinge on the utilization of digital information and communication technologies.
Approach to implementing digital technologies	The third viewpoint proposes that the digital economy ought to be comprehended as the "present phase of inventive activity exemplified by the utilization of digital technologies."

Source: Developed by the authors based on Banalieva&Dhanaraj (2019), Caietal. (2022), Martinetal. (2022), Oneshko& Pashchuk (2021), Strielkowskietal. (2020), Yangetal. (2022)

To summarize the analysis of the digital economy's definition, it is crucial to recognize that many approaches share similarities and emphasize the need for innovative techniques and contemporary tools in management and development. Due to the various interpretations in academic literature and uncertainties, further examination is required to understand the digital economy's characteristics and its impact on regional economic development. This will help determine the future scope of the digital economy. Examining the components and structure of the digital economy is essential as technology progresses, leading to changes in its content. Therefore, assessing the present structure is necessary to avoid unnecessary complexity and align with the current state of affairs.

The modern understanding of the digital economy is influenced by several theoretical frameworks, such as the theory of economic development stages, human capital theory, the theory of scientific and technological progress, and the theory of the virtual economy (Sousa et al., 2021). Essentially, the digital economy signifies a stage of economic progress marked by innovation driven by knowledge and the use of state-of-the-art advancements in science and technology, particularly information and communication technologies and computer networks. (Baghmar & Agarwal, 2014).

Scholars identify key elements within the digital economy, such as electronic markets and economic sectors, platforms

and competencies-building technologies, as well as a distinctive ecosystem that encompasses legal regulations, IT infrastructure, human resources, and cybersecurity (Bulkot, 2021). Furthermore, the digital economy encompasses distinct components, including big data, artificial intelligence, quantum technology, wireless communication technologies, virtual reality, and augmented reality.

Methodology

The study focused on examining the potential pathways for economic development using modern digital tools and the overall growth of the digital sphere. The analysis of existing scientific literature aimed to identify opportunities for leveraging contemporary digital technologies to enhance the economic landscape and advance the state's economy as a whole. The research drew upon the works of prominent domestic and international scholars, including recent literature from the past five years to ensure timeliness, as well as classic scholarly works from the early 21st century. Throughout the exploration of the topic, particular attention was given to defining the essence of the digital economy and discerning its potential impact on the Ukrainian economy.

Findings

By analyzing the evolution of digital technologies, it becomes evident that the global digital economy has undergone four major stages of development (Table 2).

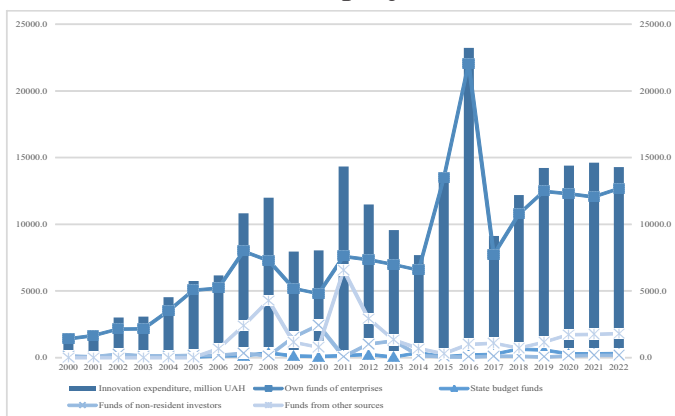
Table 2. Stages of formation of “digital economy”

Stage	Features of utilizing digital technologies
Stage 1	The birth and further development of the Internet
Stage 2	Development of the network community
Stage 3	Establishment and development of e-commerce
Stage 4	Application of digital technologies in material production, work with big data

Source: Developed by the authors based on Bartelsman et al. (2019), Corsi et al. (2020), Doroshenko et al. (2023), Ionescu et al. (2023), Lucato et al. (2019), Micozzi & Yigitcanlar et al. (2022)

Consequently, through analyzing these data, it becomes feasible to identify the growth level of Ukraine's digital economy and evaluate the extent of innovation. Such an examination is crucial to comprehend the present condition of the digital economy and to make well-informed choices concerning future investments and policy formulation in this field (see Figure 2).

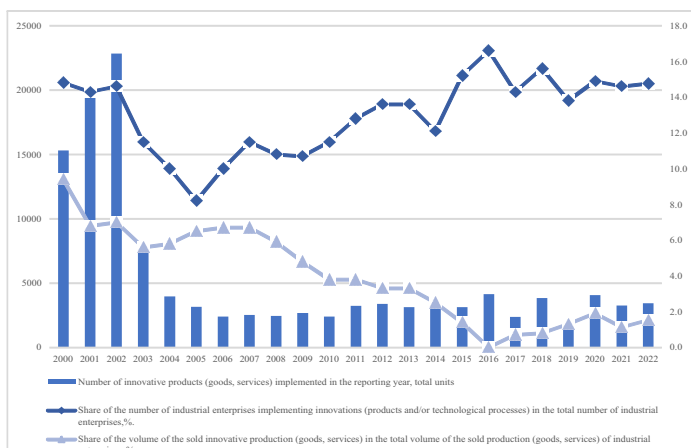
Figure 2. Overview of the funding sources for innovative projects in Ukraine and the total count of such projects



Source: This information was created by the authors by gathering economic statistics, as well as information related to science, technologies, and innovations, in the year 2023

Figure 3 illustrates the quantity of enterprises involved in inventive endeavors and actively contributing to the development of Ukraine's smart economy in the coming years.

Figure 3. Total number of businesses involved in innovation initiatives



Source: This information was created by the authors by gathering economic statistics, as well as information related to science, technologies, and innovations, in the year 2023

According to statistical information, it is clear that the advancement of the digital economy has experienced some obstacles during the time of martial law. Nevertheless, it is important to acknowledge that this hindrance has not resulted in a major detrimental effect. This is because the digital economy has proven to be a feasible alternative for numerous businesses in coping with challenges like population displacement, relocation, and remote work.

Furthermore, numerous studies have consistently demonstrated that while there is a general national progression, the development of each region has its own unique characteristics that must be considered when establishing management strategies. Consequently, although Ukraine's overall level of digitalization in the economy is satisfactory, it is crucial to ensure equal advancement of digital technologies across different regions.

When examining the preparedness of society for innovation and the expansion of the digital economy, it is crucial to take specific factors into account. (Agarwal, Kothari and Hiran, 2023) These include compatibility, which refers to matching technology with existing needs; relative advantage, which pertains to the superiority of a new technology in comparison to previous solutions for the same problems; observability, which involves obtaining clear and traceable results from implementing a new technology; testing, which allows for the simultaneous use of both new and existing methods to evaluate effectiveness and usefulness; and complexity, which influences the user's effort required to successfully adopt a new technology.

The significance of handling development procedures is increasing as Ukraine's economy endeavors to adjust its management systems in order to utilize the potential of digital technologies for progress and advancement. Lessons from more advanced countries demonstrate that effective development management can yield significant benefits during the process of economic digitalization. For instance, a recent study in the UK found that digitalization has led to a £1.8 billion reduction in annual government spending (Hryhorash et al., 2022). The impact of economic digitalization on national development dynamics can vary depending on various factors, presenting different outcomes.

In today's digital age, the social and service sectors are experiencing the most rapid effects of digitalisation. The level of knowledge and digital skills within a population is heavily influenced by the availability and reliability of information. This is particularly highlighted during times of martial law and the increasing necessity for remote work in various fields. Meanwhile, the regional education system plays a vital role in developing human capital that aligns with the needs of the local economy. As internet technologies continue to advance, the regional education system undergoes significant changes, prompting self-education and the acquisition of global knowledge through external sources of information. It is imperative for the country's leadership to closely monitor this process, as human knowledge serves as the foundation for a thriving digital economy. Forming human capital that aligns with the state's actual needs can greatly contribute to the socio-economic development of the nation.

The unique characteristics of the service sector greatly limit its scope. However, the digitalization of this sector has accelerated processes by providing greater access to information and speeding up its dissemination. Notably, the service sector is highly responsive to the digital economy, undergoing rapid changes and demonstrating quick results. Moreover, the functioning of business entities within the service sector is greatly influenced by changes in market demand rather than the availability of resources.

On the other hand, the manufacturing sector is slower to adapt to the digitalization of the economy due to the challenges associated with introducing new production technologies. The lack of government incentives further hampers the emergence of new industries based on digital technologies, as the initial stage is often marked by increased risks and costs, with uncertain profitability.

To summarize, the direct and indirect effects of digitalization on Ukraine's economy can be categorized into different areas, as outlined in Table 3.

Table 3. Systematizing the scope of digitalization's impact on economic growth

Direct impact	Indirect impact
Creation of new jobs	Increase the efficiency and speed of financial transactions
Human capital development	Additional investment in innovation development
Increase the efficiency of resource allocation	Increase the overall productivity of companies and the production process
Reduced production costs	Sharing knowledge and innovation around the world

Source: development of the authors

Based on the earlier mentioned points about how digitalization affects economic development, it can be concluded that digitalization generally has a positive impact on economic growth. However, it is important to be careful when introducing digital technologies in countries that are not prepared, lacking the necessary infrastructure, economic conditions, and attitudes of the population. In such cases, there is a possibility of impeding economic growth. Therefore, Ukraine should prioritize improving its human resources, encouraging financial development, and promoting domestic investment to make sure that digital technologies are used efficiently and effectively.

Conclusion

Digital transformation, often referred to as the current state of digital progress, is widely recognized. Studies have shown that the main drivers of this transformation are the process of digitization and the widespread availability of connectivity. These factors are accompanied by a growing network of advanced digital technologies and applications that are interconnected. Crucial components of this network include technologies like Internet of Things, big data analytics, artificial intelligence, blockchain, cloud computing, robotics, neural networks, virtual reality, and additive technologies. It is worth noting that Ukraine experienced significant growth in many of these

technologies during the pandemic, and the onset of a full-scale war presented further opportunities for advancement, despite the challenging circumstances.

Furthermore, it is crucial to emphasize that aside from the business environment, there are other significant factors that impact the acceptance of complete technological solutions. These include a state's scientific expertise, the existence of qualified professionals in information and communication technologies, the level of innovation within businesses, and the availability of financial resources for training staff and implementing technology. These discoveries reinforce the important role of science and the scientific community in the initial phases of digital technology advancement and distribution. In conclusion, it is important to highlight that digitalization has a positive impact on a country's advancement by allowing it to make use of its existing capabilities.

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