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Digital economy and information systems: Problems and challenges in globalisation

Abstract: The article examines the problems and challenges of the digital economy in the international space. This article is devoted to analysing the key challenges facing the digital economy in the context of globalisation. At the global level, the emphasis is on the problems states and organisations face. The authors emphasise cyber security problems, the digital divide between countries, regulatory barriers in data, monopolisation of the technology market, and labour automation. Environmental challenges are considered, particularly energy consumption growth and geopolitical competition between major powers for technological leadership. It is also important to determine the changes and transformations of the world economy regarding the conditions of globalisation. Special attention is paid to ethical aspects such as transparency of artificial intelligence algorithms, data privacy and bias in technology. The article proposes ways to solve these problems through international coordination, standardisation of legislation, development of digital infrastructure in developing countries, and harmonisation of approaches to regulation. The study focuses on identifying the main problems and challenges that will improve the effectiveness of creating the digital economy in the context of globalisation, to improve the understanding of digitalising and the forming strategies in a globalised world, to determine the main ones for ensuring the sustainable development of the digital economy.

Keywords: digital economy, globalisation, information globalisation, information technologies, digitalisation, cyber security, digital technologies, digital transformations, data.



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Цифрова економіка та інформаційні системи: проблеми, та виклики в умовах глобалізації

Анотація: У статті досліджується проблеми та виклики цифрової економіки в міжнародному просторі. Дана стаття присвячена аналізу ключових викликів, які постають перед цифровою

економікою в умовах глобалізації. На глобальному рівні здійснюється акцент на проблемах, які постають перед державами та організаціями. Автори акцентують увагу на проблемах кібербезпеки, цифрового розриву між країнами, регуляторних бар'єрах у сфері даних, монополізації ринку технологій та автоматизації праці. Розглядаються екологічні виклики, зокрема зростання енергоспоживання, та геополітична конкуренція між великими державами за технологічне лідерство. Також важливо визначити зміни та трансформацію світової економіки до умов глобалізації. Важливе місце при дослідженні виділено етичним аспектам, таким як прозорість алгоритмів штучного інтелекту, конфіденційність даних та упередження в технологіях. У статті пропонуються шляхи вирішення зазначених проблем через міжнародну координацію, стандартизацію законодавства, розвиток цифрової інфраструктури у країнах, що розвиваються, та гармонізацію підходів до регулювання. У дослідженні акцентовано увагу на визначення основних проблем та викликів, що дозволить покращити ефективність розвитку цифрової економіки в умовах глобалізації, покращити розуміння цифровізації та формуванню стратегій у глобалізованому світі, визначити основні для забезпечення сталого розвитку цифрової економіки.

Ключові слова: цифрова економіка, глобалізація, інформаційні технології, цифровізація, кібербезпека, цифрові технології, цифрові трансформації, дані.



Abbreviations:

AI is artificial intelligence,

ICT is information and communication technologies,

IoT is the Internet of Things.

Introduction

The digital economy is one of the most significant components of the globalised world, rapidly transforming traditional business operation models, job creation, and interaction between states. Globalisation offers new opportunities for transnational cooperation, innovation, and improved efficiency of economic processes. At the same time, digitalisation presents many challenges, such as cybersecurity, the digital divide, regulatory restrictions, and ethical dilemmas. In modern conditions, these challenges substantially impact the stability and sustainable development of the global economy.

The study object is the digital economy as a system of economic relations based on the use of digital, information, and communication technologies within its functioning in conditions of globalisation.

The study aims to analyse the problems and challenges of the digital economy in the context of globalisation and to develop strategic approaches to overcome them, considering international experience.

To achieve this aim, the following tasks need to be completed:

- examine the main characteristics and aspects of developing the digital economy in the global space;
- identify the key problems and challenges associated with developing the digital economy, including issues of cybersecurity, the digital divide, and regulation;

- assess the extent of globalisation’s impact on developing information technologies, their integration into the global economy, and the competitiveness of states;
- analyse international approaches to regulating the digital economy and the experience of addressing key challenges;
- develop recommendations for improving the conditions for growing the digital economy in a globalised world.

The study’s methodological framework on “Problems and Challenges of the Digital Economy in the Context of Globalisation” includes a wide range of approaches, methods, and tools that enable a comprehensive analysis of the phenomenon. The main methods used are as follows:

- analysis and synthesis – used to examine the key aspects of developing the digital economy and the interconnections of its elements in the global environment;
- systemic approach – enables the digital economy to be considered as a complex of interconnected technological, social, and economic processes;
- comparative analysis – applied to study the digital transformation experience in various countries and regions.

The digital economy and its development in the context of globalisation attract the attention of both domestic and international researchers.

A significant number of domestic academic studies have been dedicated to examining the identification of problems and challenges of the digital economy in the context of globalisation. In particular, V.M. Geets has investigated the impact of digital technologies on Ukraine’s economy (*Geets, 2022*). A.M. Kolot and O.O. Herasymenko, in their article “Social and Labour Development in the 21st Century”, address the global challenges of the digital economy in the labour sphere (*Kolot & Herasymenko, 2019*). K.M. Kraus, N.M. Kraus and O.V. Manzhura explore the nature of technological progress, digital technologies, and innovations (*Kraus et al., 2022*). A.O. Sloboda and N.Ye. Skorobohatova studied the impact of the digital economy on a state’s competitive advantages (*Sloboda & Skorobohatova, 2020*). O. Trokhymets and other scholars analysed the interconnections between the digital economy and classical economic sectors, focusing on the challenges arising from these relationships (*Trokhymets et al., 2024*). N.M. Kraus, O.P. Holoborodko, and K.M. Kraus explored and summarised key trends in the digital economy, defining its content (*Kraus et al., 2018*). O. Pankova, O. Kasperovych, and O. Ishchenko examined innovative platforms to advance conceptual and managerial support for digital transformation (*Pankova et al., 2020*).

Notable international scholars who have contributed to research on this topic include Manuel Castells, Klaus Schwab, Brian Arthur, and others.

This study aims to provide a comprehensive understanding of contemporary digitalisation challenges and facilitate the development of effective strategies to ensure economic growth.

The results of the study

Theoretical aspects of the digital economy in the context of globalisation

The theoretical foundation of the digital economy is a model based on the use of digital technologies, information resources, and infrastructure to create, store, process, and transmit

data. It encompasses all spheres of societal life where digital technologies are actively employed to enhance economic processes' efficiency, foster the creation of new business models, and drive innovation.

The digital economy has emerged due to the development of ICT and globalisation processes. Its theoretical aspects encompass several key areas:

The digital economy relies on using digital technologies to create, distribute, and consume goods and services. The primary components of this system include:

- digital platforms (e.g., Amazon, Google, Facebook), which are reshaping global markets;
- data as a new economic resource, where data collection, processing, and analysis have become critical processes in a world where data is often referred to as “the new oil”;
- e-commerce, which is transforming traditional business models.

Interdisciplinary approaches shape the digital economy's theoretical basis, including economic theory, computer science, sociology, etc. Digitalisation has redefined the traditional concept of globalisation. Its key features include:

- borderless market access, as digital technologies eliminate barriers between countries;
- integration of economies through technological solutions such as cloud computing, fintech, and blockchain;
- a new geography of labour, driven by the rise of remote work and outsourcing through platforms like Upwork and Fiverr.

A critical aspect of digital transformation is the integration of digital technologies, particularly the synergy between information and communication systems.

To understand the digital economy comprehensively, it is essential to identify its core theoretical aspects, which serve as a framework for analysing its dynamics. These include:

- network theories, such as the concept of a “network society,” where digital technologies foster new economic relationships;
- innovation cycle theory, which views digitalisation as a technological revolution reshaping market structures and creating new opportunities;
- institutional theories highlighting the role of governments and regulators in shaping digitalisation policies.

Data has become a pivotal resource underpinning innovation, managerial decision-making, and business development in the digital economy. The application of big data enables market analysis, trend forecasting, and product and service improvement.

Digitalisation has given rise to new forms of business, such as e-commerce, sharing economy platforms (e.g., Uber, Airbnb), remote services (EdTech, FinTech), and the creation of digital products and services. A dynamic interplay exists between these services, ICT, and digital solutions, driven by unpredictable environmental changes. Thanks to the internet and digital platforms, goods and services have become accessible regardless of the consumer's location, expanding markets and facilitating integration into the global economy.

In conclusion, the theoretical essence of the digital economy lies in defining the core characteristics of an economic model that leverages innovative digital technologies and big data. This is achieved through the adoption and application of digital technologies within the context of globalisation, enhancing market adaptability to digital transformation processes.

Main aspects of the problems and challenges of the digital economy in the context of globalisation

The digital economy, in the context of globalisation, faces many problems and challenges, which can negatively affect digital transformation and the formation of a new economic model.

As an integration phenomenon of the modern world, the digital economy poses new problems and challenges to society. These aspects are analysed from the viewpoint of the interaction of economic, technological, social and legal processes in the global environment.

It is advisable to group the problems and challenges of the digital economy into some categories, which will help to clearly identify certain aspects and highlight the main points of their impact on the development of the digital economy in the languages of globalisation.

Conceptual problems of the digital economy reveal the essence of forming the methodology for implementing programme measures of digitalisation (digital transformation). It is necessary to define the following conceptual problems:

1. The digital divide:
 - Its essence lies in the uneven access to digital technologies between developed and developing countries;
 - The reasons for their concept are to determine that there are infrastructure restrictions, financial insolvency of individual regions, insufficient digital literacy;
 - The bottom line challenge is to reduce the imbalance in access to the Internet and technology to ensure equal participation in the digital economy.
2. Automation and the labour market:
 - Bottom line: Process automation replaces manual labour, creating the threat of unemployment;
 - Challenge: Developing strategies for retraining personnel and creating new professions in digital industries.
3. Data protection and cybersecurity:
 - Bottom line: The growing amount of personal data and transactions requires the creation of reliable systems for their protection;
 - Challenge: Ensuring legal and technological regulation of cybercrime at the international level.

Along with conceptual ones, the digital economy faces economic challenges in the context of globalisation. These challenges relate to economic aspects that characterise the state's economy and reveal deviations from specific economic indicators that hinder the digital transformation of the economy.

These include the following economic challenges of digitalisation:

1. Monopolisation of markets
 - Bottom line: Concentration of market power in large technology companies such as Google, Amazon, and Facebook;
 - The challenge, in its essence, is to develop an antitrust policy in the global digital economy.
2. Financial risks

- The bottom line is that the use of digital currencies, such as cryptocurrencies, poses threats to the stability of traditional financial systems;
 - Challenge: Regulating digital assets and integrating them into traditional financial systems.
3. Tax transparency
- Bottom line: Global digital companies use low-tax jurisdictions;
 - Challenge: Harmonisation of international taxation rules for digital businesses.
- Technological challenges are also highlighted when analysing the digital economy in the context of globalisation.

1. Infrastructure Development:

- Bottom line: Insufficient development of digital networks in underdeveloped countries;
- Challenge: Investing in global digital infrastructure, including satellite internet.

2. integration of innovations

- Bottom line: Integration of AI, blockchain and the IoT into traditional sectors of the economy;
- Challenge: Ensuring the ethics, security, and accessibility of technology.

When analysing the digital economy in the context of globalisation, social aspects and ethical challenges are also highlighted:

1. Digital inequality

- Bottom line: inequality in access to digital resources between social groups and regions;
- Challenge: Creating an inclusive digital economy for all population categories.

2. Ethics of using AI

- Bottom line: Using algorithms to make decisions may violate ethical principles;
- Challenge: Developing ethical standards for digital technologies.

3. Education and digital skills

- The bottom line: the lack of digital competencies among the population;
- Challenge: Implementing educational programmes for developing digital literacy.

Based on these challenges, it is necessary to create a mechanism for overcoming them since forming a digital economy requires coherence and the proper development strategy. It is necessary to highlight the main effective theoretical ways to overcome challenges: an institutional approach; its essence is to ensure effective regulation of digital processes at the global level; an innovative economy, meaning development that emphasises the role of digital networks as the basis of the global economy.

Thus, the theoretical aspects of the problems and challenges of the digital economy in the context of globalisation emphasise the need for an integrated approach to overcome inequality, regulate technology and ensure sustainable development in the digital environment.

Strategic directions for addressing the problems and challenges of the digital economy in the context of globalisation

Developing the digital economy in the context of globalisation is a key priority for most countries because it provides economic growth, increases competitiveness and promotes integration into global markets. However, this process faces many challenges that require

strategic approaches to overcome them. In particular, the digital divide between countries and regions remains a serious problem that hinders full access to digital technologies for all population segments. Solving this problem requires significant investment in developing digital infrastructure, including the introduction of high-speed internet, particularly in remote and rural regions, which will provide more equal opportunities for participation in the digital economy.

Another important component is strengthening cybersecurity, as the spread of digital technologies is accompanied by an increase in the risks associated with data leaks, cyber-attacks, and crime in the virtual space. To do this, it is necessary to implement national and international cyber defence strategies, develop innovative technologies to ensure information security, and create specialised centres for monitoring and responding to cyber threats.

In addition, improving the regulatory framework in the digital economy is crucial. Globalisation requires harmonisation of legal norms at the international level to ensure the protection of personal data, regulation of cryptocurrencies, artificial intelligence, and co-consumption platforms. Harmonisation of legislation will create transparent and fair conditions for developing digital services and technologies.

Special attention should be paid to the education and training of specialists because the digital economy requires highly qualified personnel. To do this, it is necessary to integrate digital competencies into the education system, introduce professional development and retraining programs, and promote digital literacy among the population. Training human capital will contribute to developing the national economy and strengthening its position in the global market.

Another strategic direction is to encourage innovation in digital technologies. Investments in developing AI, the IoT, blockchain, and other latest solutions will strengthen countries' technological potential and create new opportunities for business and society. In this context, supporting start-ups, research, and innovation projects through grant programs, tax breaks, and venture funding is important.

Strengthening international cooperation is also an important element in overcoming the challenges of the digital economy. Coordinating efforts between countries will contribute to the fight against cybercrime, the development of joint innovative solutions, and the assurance of fair access to digital technologies for all.

Thus, strategic directions for developing the digital economy should aim to overcome existing problems and challenges, ensure the integration of countries into the global digital space, increase the level of digital literacy of the population, develop innovation, and strengthen security. A systematic approach will maximise the digital economy's potential and ensure sustainable development in a globalised world.

Discussion

The digital economy is one of the main driving forces of modern economic development, significantly changing the structure of the world economy, ways of doing business, and interactions between countries. However, its development is accompanied by many problems and challenges that are becoming more acute in globalisation. One of the key problems is uneven access to digital technologies. The digital divide observed between developed and developing

countries, such as urban and rural regions, creates significant barriers to full integration into the global digital economy.

The issue of cybersecurity is also becoming critical. The growing volume of digital data and its strategic importance makes information resources vulnerable to cybercriminals. Infrastructure attacks, personal data hacks, and financial fraud cause significant economic damage, undermine trust in digital platforms and hinder their spread. In this context, there is an acute problem of insufficient regulatory regulation, particularly at the international level, making it difficult to coordinate efforts to counter cyber threats effectively.

Promising areas for solving these problems require a systematic approach. Investing in developing digital infrastructure and providing access to high-speed internet in remote regions is necessary, such as creating programmes to improve the population's digital literacy. Harmonising legislation at the international level to regulate cybersecurity, personal data protection, and the use of artificial intelligence is important. Developing cooperation between the two countries, attracting investment in digital innovation, and supporting small and medium-sized businesses will increase integration into the global digital economy.

The digital economy is a powerful tool for transforming global society, but its development must be based on addressing existing challenges that will ensure fair and sustainable development in a globalised world.

Conclusion

In the context of globalisation, the digital economy is one of the main drivers of economic growth, innovative development, and society's transformation. At the same time, its development is accompanied by many problems and challenges that need to be resolved quickly. One of the most important is the digital divide, which restricts access to modern technologies for many regions and countries. This requires the active implementation of programs to expand the digital infrastructure, which will contribute to a more even distribution of opportunities in the digital space.

Ensuring cybersecurity is an important challenge, as risks of leakage, fraud, and attacks on key infrastructure facilities accompany the growth of digital data. Adequate protection requires international coordination, developing a legal framework and introducing innovative security technologies.

Another key aspect is the lack of qualified personnel. The development of the digital economy is impossible without human capital that can adapt to new technological challenges. This requires modernising the education system, supporting training programmes, and promoting digital literacy among the population.

The conditions of globalisation also place high demands on harmonising legislation regulating the digital economy. Insufficient legal frameworks make it challenging to regulate new areas such as cryptocurrencies, artificial intelligence, and data sharing, creating risks of using unregulated technology.

To address the relevant problems, strategic approaches that include investment in infrastructure, innovation development, promotion of international cooperation, and adaptation of legal mechanisms to the requirements of the digital economy are necessary.

Thus, for the sustainable development of the digital economy in the context of globalisation, overcoming existing challenges, ensuring equal access to digital technologies, strengthening security, promoting innovation and creating conditions for effective integration into the global digital space is important. This will allow us to fully realise the potential of the digital economy to grow well-being, increase competitiveness and form a modern global society.

Conflict of interest

The author declares that there is no conflict of interest.



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