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DOI: 10.32702/2306-6814.2023.20.57

CONTEMPORARY FEATURES AND CHALLENGES OF DIGITAL ECONOMY DEVELOPMENT IN UKRAINE

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СУЧАСНІ ОСОБЛИВОСТІ ТА ПРОБЛЕМИ РОЗВИТКУ ЦИФРОВОЇ ЕКОНОМІКИ В УКРАЇНІ

In the conditions of military operations, Ukraine continued the implementation of the Strategy for the Development of High-Tech Industries for Ukraine until 2025 and maintained the potential for the development of the information technology sector. Considering that digital transformation now means not only the integration of digital technologies into all areas of business but also ensuring its viability in wartime conditions, studying its features, and outlining the fundamental development issues becomes increasingly relevant. Therefore, the aim of the article is to provide a general analysis of the features and a comprehensive identification of the issues related to the development of the digital economy in Ukraine. The research results have demonstrated that the development of the digital economy in Ukraine has its own distinct characteristics, which are shaped by the available arsenal of tools for its advancement. Moreover, it has been proven that there are quite specific features in the development of the digital economy in Ukraine, which manifest themselves through high innovativeness, rapid growth of startup ecosystems, flexibility and adaptability, the use of information technologies as the foundation for various business models, and a focus on product and service diversity. These features serve as a competitive advantage for Ukraine in the digital world; however, they are not yet ubiquitous, as without joint efforts from the government, businesses, and citizens, they may be mitigated by the external factors affecting the development of the digital economy in Ukraine, which can vary in their impact strength. It is concluded that the challenges in the development

of the digital economy in Ukraine are currently shaped by external factors such as bureaucracy, a shortage of skilled personnel, cybersecurity, infrastructure and internet access, political and economic instability. Addressing these issues requires not only a comprehensive and scientifically grounded application of both general and specific tools and instruments for the development of the digital economy and individual types of digital business but also the activation of their development within platforms that can facilitate the collaboration of government, businesses, and citizens. The collaboration to address the issues in the development of the digital economy in Ukraine should encompass measures to improve legislation, initiatives to stimulate investment in education and talent development, the creation of support programs for startups and small businesses, as well as the advancement of cybersecurity and infrastructure.

В умовах військових дій Україна продовжила реалізацію Стратегії розвитку високотехнологічних індустрій для України до 2025 року та зберігала потенціал розвитку сфери інформаційних технологій. Враховуючи, що цифрова трансформація наразі означає не лише інтеграцію цифрових технологій у всі сфери бізнесу, але і збереження його життєздатності в умовах війни, вивчення її особливостей та окреслення базових проблем розвитку, стає все більш актуальним. Відтак метою статті є загальний аналіз особливостей та ідентифікація проблем розвитку цифрової економіки в Україні. За результатами дослідження доведено, що розвиток цифрової економіки в Україні має свої особливості, які формуються доступним арсеналом засобів або інструментів її розвитку. При цьому доведено, що існують досить специфічні особливості розвитку цифрової економіки в Україні, які проявляють себе через високу інноваційність, стрімкий розвиток стартап-екосистеми, гнучкість та адаптивність, використання інформаційних технологій як основи для різних бізнес-моделей, а також націленість на різноманітність продуктів і послуг. Ці особливості є конкурентною перевагою України в цифровому світі, але вони наразі не є повсюдними. Без спільних зусиль уряду, бізнесу та громадян може спостерігатися мінімізація впливу зовнішнього середовища на розвиток цифрової економіки в Україні, причому його фактори можуть мати різну силу. Зроблено висновок, що проблеми розвитку цифрової економіки в Україні наразі формуються коштом таких зовнішніх факторів, як бюрократія, кадровий дефіцит, кібербезпека, інфраструктура та доступ до Інтернету, а також політична та економічна нестабільність. Розв'язання цих проблем вимагає не лише комплексного та науково обгрунтованого застосування як загальних, так і специфічних засобів розвитку цифрової економіки та окремих видів цифрового бізнесу, але й активізацію їх просування у межах платформ, які здатні забезпечити спільність зусиль уряду, бізнесу та громадян. Спільність зусиль розв'язання проблем розвитку цифрової економіки в Україні має охоплювати заходи з поліпшення законодавства, заходи для стимулювання припливу інвестицій в освіту та підготовку кадрів, а також у створенні програм підтримки для стартапів і малих бізнесів. Крім того, ця спільність зусиль повинна спрямовуватися на розвиток кібербезпеки та інфраструктури.

Key words: information technology; digital business; economic transformation; means of production; digital data; network transactions.

Ключові слова: інформаційні технології; цифровий бізнес; трансформація економіки; засоби виробництва; цифрові дані, мережеві транзакції.

TARGET SETTING

An important step towards the development of the domestic digital economy was the approval of the Strategy for the Development of High-Tech Industries for Ukraine until 2025 on April 6, 2017. Furthermore, according to Price Waterhouse Coopers, even in the conditions of military conflict, Ukraine has continued to implement the outlined strategy and has maintained its potential for development in the information technology sector, which is facilitated by the availability of highly skilled labor in programming and other IT services [4]. Additionally, the country continues to actively develop infrastructure to support and finance startups, including incubators, accelerators, and

funds. Considering the outlined realities, key technologies for digital transformations (including both classical technologies 3.0 and Industry 4.0 [4]) continue to develop, acting as triggers that drive the development of the digital economy in Ukraine. By the digital economy, we mean an economy where the key factors and means of production are digital data, network transactions, and their utilization as a resource, allowing for the preservation of efficiency, adjustment of production processes, and the value of products and services based on external conditions. [4] Considering that digital transformation now entails not only the integration of digital technologies into all sectors of business but also the preservation of its viability in

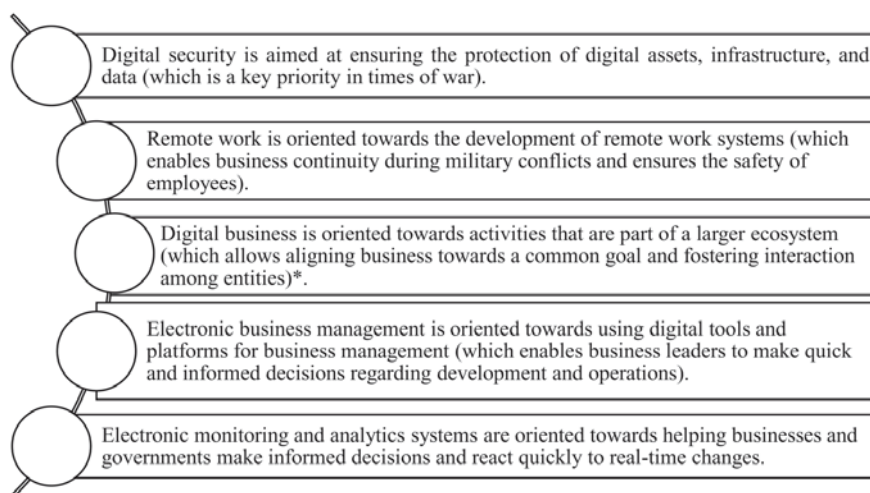


Figure 1. Common tools for the development of Ukraine's digital economy

Note

*A digital business entity is always oriented towards shared use of equipment, software, telecommunications, etc.

Source: formed based on [1; 5—6].

wartime conditions, studying its peculiarities and identifying the fundamental development challenges becomes increasingly relevant.

ANALYSIS OF RESEARCH AND PUBLICATIONS

Currently, a significant number of researchers, including Kiryeyev D.B., Spitsina A., Plukar L., Masligan O., Moroz T., Kasmin D., Nazarenko I., Kraus N., Goloborodko O., and Kraus K., are emphasizing the need for a systematic study of the features and challenges of digital economy development in Ukraine. According to the views of these researchers, this is important at the state level, as it can serve as the foundation for the development of local initiatives and comprehensive programs to assist Ukrainian companies in enhancing production efficiency. Researchers like Kulinich, T., Lisnievska, Yu., Zimbalevska, Yu., Trubnik, T., and Obikhod, S. also emphasize the importance of such research due to its significance for individual businesses. It can assist in the introduction of new products and services, as well as in risk management (the list of which has significantly expanded with the onset of Russia's full-scale invasion of Ukraine). A common characteristic of most existing studies is that while they highlight the need to analyze the features and challenges of digital economy development in Ukraine, they do not give significant attention to the specific issues mentioned. In our opinion, the main reason for this was that with the onset of Russia's full-scale invasion of Ukraine, there began an active transformation of its economy, the qualitative changes of which were not known. Currently, the qualitative transformation of the digital component of the economy is already known, making such research possible and relevant.

THE WORDING OF THE PURPOSES OF ARTICLE (PROBLEM)

The purpose of the article is to provide a general analysis of the features and a broad identification of the issues related to the development of the digital economy in Ukraine.

TARGET SETTING

Within the research, it is assumed as an axiom that flexibility and scalability are essential characteristics of business entities within digital economy innovation ecosystems. Adhering to the stated axiom allows us to consider the digital economy as a fundamental means of ensuring the resilience and development of a country in extraordinary circumstances, such as military conflicts. This is because the main aspects of the development of Ukraine's digital economy in times of war include:

1. Digital security.
2. Remote work.
3. Digital businesses as part of an ecosystem that operates within a chain (which may involve shared equipment, software, telecommunications, etc.).
4. Electronic business management, which is a participant in transactions (in a system involving consumers, businesses, and government).
5. Electronic monitoring and analytics systems.

Indeed, the specific characteristics of the formation and operation of the above-mentioned aspects of Ukraine's digital economy development rely on both general and specialized tools or instruments. So, the common tools for the development of Ukraine's digital economy and specific types of digital businesses are used to achieve specific goals or solve tasks and, together, serve as a single tool for ensuring the country's resilience and development in extraordinary circumstances (Figure 1).

The unity of the mentioned tools or instruments as shown in the figure allows consumers, the government, and business entities to:

1. Develop and implement modern methods and cybersecurity technologies to prevent cyberattacks and data theft.
2. Develop and implement technologies for remote team collaboration.
3. Sustain and grow businesses in challenging conditions, considering that the objects of transactions involve specific goods, services, or data.

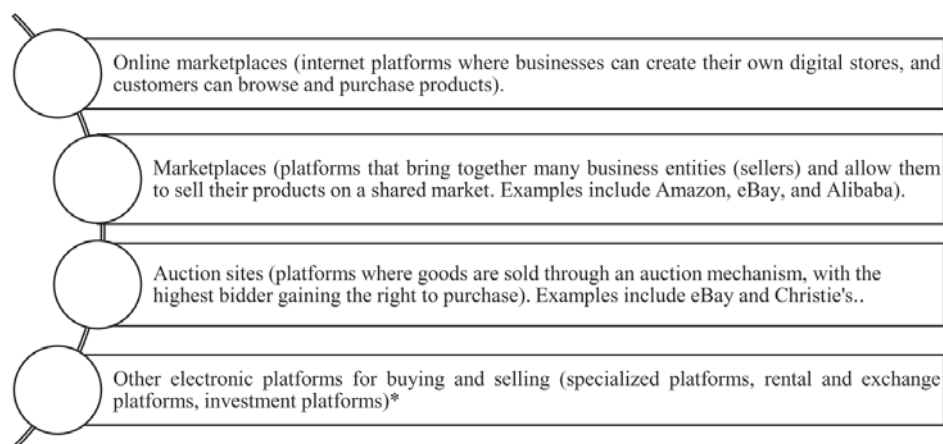


Figure 2. Specialized tools for E-commerce development in Ukraine

Note

*These are just a few examples of various types of electronic platforms for buying and selling, and the list can be much broader depending on the industry and consumer needs

Source: formed based on [1; 3; 6].

4. Make quick and well-founded decisions regarding operation and development in uncertain and changing market conditions.

5. React rapidly to real-time changes.

Furthermore, the focus on remote work formats can also become one of the key means to overcome the personnel shortage resulting from the war in Ukraine. It necessitates the exploration of new methods for recruiting top-notch professionals and building teams.

Specialized tools for the development of specific types of digital businesses in Ukraine are oriented towards using information technologies as the foundation for various business models, considering their specificity. Indeed, there are various types of digital businesses, including E-commerce, SaaS (Software as a Service), Internet media, Mobile applications, E-learning (e-learning), and FinTech (financial technology). The outlined types of digital businesses are predominant in Ukraine, and therefore, the examination of specialized tools is organized based on these categories. Regarding other types of digital business, such as AgriTech (agricultural technology), HealthTech (healthcare technology), or Digital Marketing, we did not distinguish them due to their relatively small market size in Ukraine [6]. Therefore, specialized tools related to them were also not considered, including the fact that they are partially represented within the outlined types of digital business mentioned earlier.

So, e-commerce involves generating revenue through the sale of goods and services over the Internet. Accordingly, this type of digital business is based on the use of digital tools such as online stores, marketplaces, auction websites, and other electronic platforms for buying and selling (Figure 2).

By the content of specialized tools and instruments in e-commerce in Ukraine, it is evident that it is an important component of the modern economy, providing consumers with a convenient way to purchase goods and services while offering businesses the opportunity to expand their market and attract new customers through the Internet. Perhaps this is why over the past 5 years, the Ukrainian e-commerce market has shown annual growth of 50% to

60%, consistently expanding regardless of ongoing economic fluctuations. Before Russia's full-scale invasion of Ukraine, the e-commerce market was valued at more than \$400—\$500 million. As of the end of 2023, the market's value stands at \$410 million. [4].

SaaS (Software as a Service) involves generating revenue by providing software to customers via the internet in the form of a subscription or rental. This form of digital business relies on utilizing digital tools and resources such as Customer Relationship Management (CRM) services, accounting, analytics, and many others. Customers have access to the software product through a web browser or dedicated applications, and they do not need to install or maintain the program on their own computers or servers. This business model has become very popular due to its flexibility, ease of implementation, and scalability, making it attractive to businesses of various sizes and industries. Before the full-scale invasion of Russia into Ukraine, the SaaS market's size was over \$200 million. As of the end of 2023, the market's size stands at \$230 million. [4].

Internet media involves generating revenue by creating, distributing, and monetizing content online. This type of digital business is based on using digital tools, such as news portals, blogs, podcasts, video hosting, and other media platforms (Figure 3).

Based on the content of specialized tools and resources for Internet media in Ukraine, it's evident that generating revenue and monetizing Internet media can be accomplished through various methods, including advertising (both banner and contextual), paid subscriptions, content sales, sponsorship agreements, affiliate programs, and many others.

In this business, the key task of specialized tools and resources for Internet media development is to attract an audience and create valuable and engaging content for consumers that can generate revenue from various sources. Before the full-scale invasion of Russia into Ukraine, the market size of Internet media was over \$550 million. As of the end of 2023, the market size has not been determined.

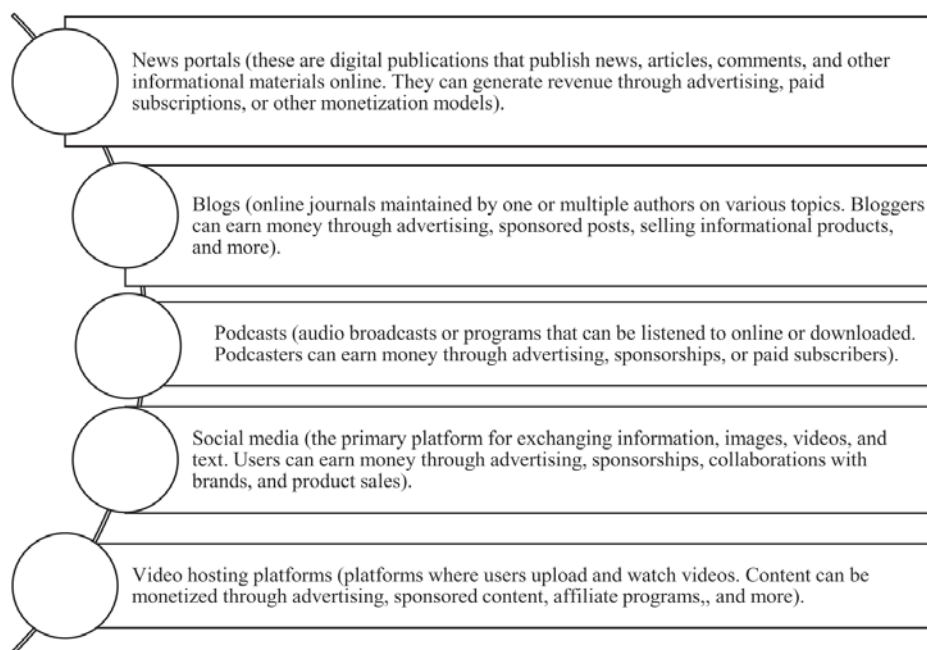


Figure 3. Specialized tools for the development of Internet media in Ukraine

Source: formed based on [2; 3; 5].

Business on mobile apps involves generating revenue by developing and distributing applications for mobile devices, such as smartphones and tablets. This field, based on the content of available specialized tools and resources, is divided into several subcategories, and the main ones include:

1. Subcategories of mobile app development (programs and associated apps for various purposes, including games, social networking apps, productivity apps, entertainment, education, and many others).

2. Subcategories of mobile game development (various games for entertainment and skill development

that players can download from app stores and, in some cases, make in-app purchases or view ads).

3. Subcategories for social networking (apps for communication, sharing photos and videos, creating content for social media, and many other tools that facilitate online interactions).

4. Subcategories of productivity and business apps (apps for organizing work tasks, calendars, notes, expense tracking, remote work, and others that help users be more productive and organized).

5. Subcategory of educational app development (apps for learning, teaching, exam preparation, and professional development in various fields).

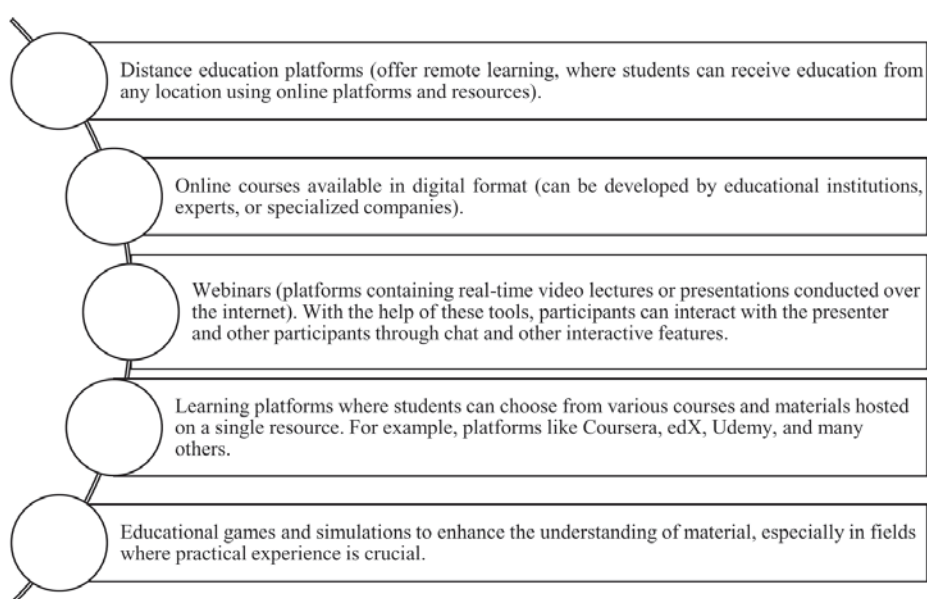


Figure 4. Specialized tools and resources for e-learning development in Ukraine

Source: formed based on [1;2; 5].

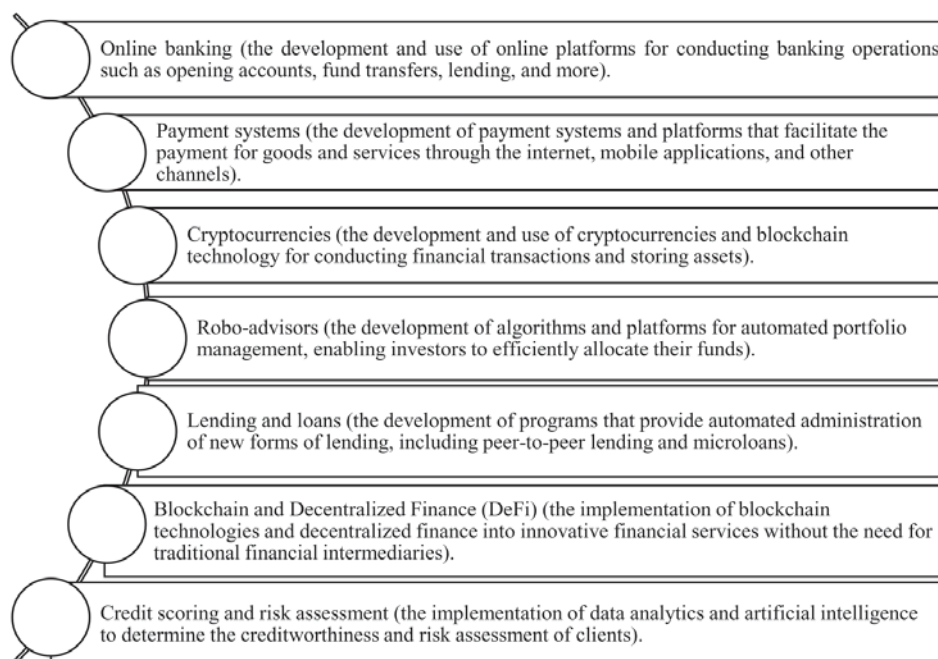


Figure. 5. Specialized tools and resources for fintech development in Ukraine

Source: formed based on [1; 2; 5—6].

Based on the content of the highlighted specialized tools and resources, it's evident that they create opportunities to generate revenue through various monetization models, including app sales, advertising, subscriptions, in-app purchases, and sponsorship agreements. In this business, the key task of specialized tools and resources for mobile app businesses is to create a competitive product that can quickly attract and retain users' attention in the market. Before the full-scale invasion of Russia into Ukraine, the market size of the mobile app business was over \$630 million. As of the end of 2023, the market size has remained unchanged [4].

E-learning involves generating revenue by delivering educational courses and materials over the internet. This type of digital business is based on using digital tools such as distance education platforms, online courses, webinar platforms and webinars (real-time video lectures or presentations conducted over the internet), learning management systems, educational games, and simulations (Figure 4).

Based on the content of specialized tools and resources for e-learning in Ukraine, it's evident that their primary task is to provide education that allows individuals to learn at their own pace and choose courses based on their interests. Before the full-scale invasion of Russia into Ukraine, the market size of e-learning was over \$4.3 million. As of the end of 2023, the market size has increased to \$10.2 million [4].

Fintech (financial technology) involves generating revenue by developing technologies to enhance financial services [6]. This type of digital business is based on using digital tools such as online banks, payment systems, cryptocurrencies, robo-advisors, and more (Figure 5). Based on the content of specialized tools and resources for e-learning in Ukraine, it's evident that their primary task is to simplify and promote a revolution in the financial

sector by transforming financial services into a format that is more accessible, fast, and convenient for users. Before the full-scale invasion of Russia into Ukraine, the market size of fintech was over \$977.90 million [4]. As of the end of 2023, the market size has not been determined [4].

According to the analysis of general and specialized tools for the development of the digital economy and specific types of digital businesses, the following characteristics of their development in Ukraine can be identified: innovation, the development of startup ecosystems in the directions of fintech, e-learning, mobile app business, internet media, E-commerce, SaaS (Software as a Service); flexibility in responding and adapting to market changes; the use of information technology as the foundation for various business models; a focus on product and service diversity [5—6]. However, these outlined characteristics are not absolute or universal at present, as they are constrained or even influenced by the external environment of the development of the digital economy in Ukraine, the factors of which may vary in their impact strength [5—6].

Specifically, the challenges in the development of the digital economy in Ukraine are currently shaped by external factors such as: complex administrative procedures and bureaucracy (which can hinder the establishment and growth of businesses, especially startups [2]); a shortage of skilled workforce (in the context of armed conflict, there is already a deficit of highly qualified IT specialists in certain specialized areas [2]); cybersecurity (due to the increasing number of cyberattacks and cybersecurity threats that can jeopardize data security and business infrastructure [3]); infrastructure and internet access issues (related to the consequences of the war, leading to deteriorating infrastructure and limited internet access in affected areas [6]); prolonged political and economic instability (creating uncertainty for digital businesses and investors [2]).

CONCLUSIONS FROM THIS STUDY AND PROSPECTS FOR FURTHER EXPLORATION IN THIS AREA

The research results have demonstrated that the development of the digital economy in Ukraine has its unique characteristics, shaped by the available arsenal of tools for its development. At the same time, it has been proven that:

1. There are quite specific characteristics of the development of the digital economy in Ukraine, manifested through high innovativeness, rapid growth of startup ecosystems, flexibility, adaptability, and the use of information technology as the foundation for various business models, aiming for a diversity of products and services. These characteristics are a competitive advantage for Ukraine in the digital world. However, they are not absolute or universal now because they are influenced by various external factors that have different levels of impact. The development of the digital economy in Ukraine requires concerted efforts from the government, businesses, and citizens to fully realize its potential.

2. The challenges to the development of the digital economy in Ukraine are currently shaped by external factors such as bureaucracy, an increasing skills shortage, cybersecurity, infrastructure, and internet access, as well as political and economic instability. Addressing these issues requires not only a comprehensive and scientifically grounded application of general and specific tools for the development of the digital economy and various types of digital business but also the activation of their development within platforms that can facilitate the collaboration of government, business, and citizens to find common solutions.

3. Community efforts to address the challenges of developing the digital economy in Ukraine should encompass measures to improve legislation, stimulate investment in education and skills development, create support programs for startups and small businesses, and enhance cybersecurity and infrastructure. Without resolving these issues, not only the further growth and development of the digital economy in Ukraine is impossible but also the development of innovative business.

According to the above, the prospects for further research lie in developing proposals for addressing the challenges of developing the digital economy in Ukraine. This may involve analyzing other countries that have successfully transitioned to a digital economy and studying their strategies and solutions.

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Стаття надійшла до редакції 12.10.2023 р.