

TRENDS AND FACTORS OF DIGITAL TRANSFORMATION OF BUSINESS: THE EXPERIENCE OF UKRAINE

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Abstract

The article examines the theoretical background of digital transformation and the differences and similarities with digitalization and digitization as related processes. The main concepts of the digital transformation of enterprises are systemized. Methodologies and indicators for evaluating the digital transformation of enterprises are investigated. The position of Ukraine in international “digital” rankings, as well as the strengths and weaknesses of Ukraine’s digital competitiveness, were studied. The main indicators of digital transformation of Ukrainian enterprises are analyzed. Factors affecting the acceleration of digital business transformation, such as the development of the ICT sector, the development of advanced infrastructure, the education system and the support of innovation and startups, have been thoroughly investigated. The main problems and directions of further development of the digital transformation of enterprises in Ukraine have been identified.

Keywords: digital transformation, business, ICT sector

1. INTRODUCTION

Digital technologies are an integral part of global progress and development. The share of the digital economy reaches 15.5% of global GDP and is growing rapidly (UNCTAD 2019). Enterprises of all sectors of the economy use modern digital technologies and data in their economic activities. Now the success and strategic development of an enterprise is measured not by assets or performance indicators, but by flexibility, the ability to change and adapt business to new conditions. Digital transformation helps enterprises to adapt to new challenges of the global and local business environment. The accelerated development of digital technologies requires increased attention to the processes of their implementation and use. Taking into account modern digital trends leads to overall business success, increased efficiency, customer orientation and long-term sustainable development. The study of digital business transformations shows that enterprises are actively implementing digital technologies, which helps to increase their economic efficiency, investment attractiveness, and competitiveness in the market. The implementation of digital technologies at enterprises is closely related to the improvement of their organizational structure and business processes, changes in strategies and operational management. At the same time, enterprises face new challenges on the way to business digitalization, such as high investments in digital technologies, lack of expertise and inadequate management of digital transformation at the enterprise level. A large number of executives manage companies based on their personal experience, vision, intuition and unstructured awareness of the dynamics and state of development of digital technologies. Therefore, a deep understanding of the trends in the development of digital technologies and the level of digital transformation of business and its measurement criteria is required.

The digital transformation of business is one of the strategic priorities of the EU Digital Decade policy programme 2030, which guides the digital transformation of Europe and contains specific goals and objectives formulated in the EU Digital Compass 2030. Accordingly, by 2030, more than 90% of small and medium-sized enterprises should achieve at least a basic level of digital intensity; 75% of enterprises should use cloud computing services, big data and artificial intelligence; the number of EU unicorns should double (Eurostat 2023). These key milestones are the basis for the strategies and concepts of the digital development of states in terms of developing mechanisms for supporting the digital transformation of enterprises and assessing its progress.

Digital business transformation consists in the complete restructuring of the company's development strategy, including the strategies of business units, structural divisions and functional areas, such as production, marketing, HR, logistics, finance, etc. Digital transformation involves the introduction of new digital technologies, which allows creating new or improving existing business models, increasing the efficiency of operations and improving the customer experience throughout the customer life cycle (Fitzgerald, Kruschwitz, Bonnet & Welch 2014; Westerman & Bonnet 2015; Solis, Lieb & Szymanski 2014). The main feature of digital transformation in enterprises, organizations, industries and spheres of the economy is the creation of new players, experiences, practices, values through the implementation of digital innovations that change, replace or supplement the business environment and the rules and principles of interaction between participants of socio-economic systems (Hinings, Gegenhuber & Greenwood 2018). Digital technologies contribute to fundamental changes and create new opportunities in business, public administration, as well as in the lives of people and society (Stolterman, Fors, Truex & Wastell 2004; Martin 2008). Through digital transformation, enterprises integrate digital technologies and business processes, join the digital business environment and adapt to the new conditions of the digital economy (Liu, Chen & Chou 2011; Bondar, Hsu, Pfouga & Stjepandić 2017).

The digital transformation of business is a priority for governments, because it contributes to the growth of the efficiency of all sectors of the economy. In the social sphere, digital transformation improves access to state, municipal, educational, medical and other important services and increases their quality, solves social problems, and helps save state and local budgets. In commercial sectors, digital transformation creates added value for consumers by improving service, quality of goods and services, and introducing innovation. Not surprisingly, digital transformation spending is estimated to reach \$2.15 trillion by 2023. Global spending on digital transformation is projected to reach \$3.9 trillion by 2027 (Statista 2023).

Businesses benefit from digital transformation through increased efficiency, optimization of business processes, cost reduction, quality production planning and business management, improved customer service, new opportunities for consumers, ahead of competitors due to the introduction of new technologies and improved service and product quality, leadership positions in its segment, forming a brand image. The digital transformation of business is an important strategic priority of the governments of countries, because enterprises benefit from intangible assets, networks, new business models that create a synergistic effect and added value in the digital environment.

In Ukraine, the digital transformation of business is a priority of the government, which is reflected in strategic government documents, in particular, the Concept of Development of the Digital Economy and Society of Ukraine for 2018-2020 (Digital Agenda of Ukraine) and other laws. The study of Ukraine's experience in the digital transformation of business is an interesting and challenging task, because now Ukraine is at a turning point in its development and formation of digital markets, integration into the global digital economy and digital space. The study of factors, trends and perspectives of the digital transformation of enterprises, the methodology of measuring its progress will contribute to the identification of problems and the development of strategies and policies aimed at supporting the digital transformation of business and accelerating the processes of forming the digital economy in Ukraine in the long term.

2. MATERIALS AND METHODS

2.1. Understanding digital transformation of business

Digital transformation of enterprise is fundamentally different from digitization and digitalization, because, unlike them, it is a strategic process that is the basis for operational management. Digitization involves converting analogue data into digital format. Digitization is the transformation of existing traditional offline processes into digital ones without changing their fundamental nature. Digital transformation involves the creation of new business processes, products, services, activities, business sectors, products and services, and markets.

The concept of digital business transformation requires clarifying the similarities and differences between digitization and digitalization and creating a hierarchy. It contributes to the development of digital business strategies, create plans and frameworks for the implementation of digital transformation projects, determine strategic priorities and investments plans in digital transformation processes. Table 1 contains the components of digitization, digitalization and digital transformation, their relevance for businesses.

	digitization	digitalization	digital transformation
Main components and features of the process	– sampling and quantization – signal manipulation – storage and transmission	– operational efficiency monitoring – business benefits – information transmission	– comprehensive strategy – compliance with the customer expectations – tech drivers use
Relevance for business	Useful for data-driven businesses looking to take advantage of digital technology. Digitization of data makes it more accessible and easier to analyze.	Relies on digitization through the systematic use of digital technologies to improve efficiency, planning and operational management, more effective management of inventory, finance and human resources, and cost reduction in the company.	Uses digital technologies to create new or fundamentally different business models based on digitization and digitalization.
Similarities	Common basis in using technology to improve productivity, performance and decision-making: – Tech-driven. Technological progress as the basis for organisational changes and business models improvement; – Performance-oriented. The end goal of each process is to improve productivity and efficiency; – Data-driven. Data engagement, as all processes use data to make decisions and take action.		
Differences	Differences mainly in scope, level of impact and ultimate goals: – Scope. Digitization focuses on data conversion; digitalization improves existing processes and operations with digital solutions; digital transformation completely changes the organization. – Impact level. Digitization is not systematic and changes process or operation at the task level; digitalization affects operational processes; digital transformation is a strategic shift. – Final goal. Digitization aims to improve data access and usability; digitization is aimed at increasing operation or business process efficiency; digital transformation aimed at complete changes in organization.		

Table 1. Conceptual similarities and differences between digitization, digitalization and digital transformation

Source: Compiled from Chantias, S, Hess, T 2016, *Understanding digital transformation strategy formation: insights from Europe's automotive industry*, Proceedings of the 20th Pacific Asia Conference on Information Systems.

Digitization, digitalization and digital transformation are data-driven, tech-based and aimed at increase in business performance. However, they differ in scope, impact level, and organizational goals. Digitization is a task-level change which focuses on data conversion. Digitalization improves operations processes with digital solutions, while digital transformation is leveraging tech for a total organizational rebuilding. Digitization makes data more accessible. Digitalization targets operational efficiency. Digital transformation aims at complete strategic changes in organization.

The key concepts of digital business transformation are consolidated in Table 2.

Concepts	Description
Optimization of processes	Digital tools optimize business processes and increase productivity, reduce costs and accelerate response time.
Innovation culture and change management	It motivates employees to propose new ideas and implement new technologies, improves organizational flexibility, interaction and internal relations. Change management is related to digital transformation processes.
Decision-making based on data	Data collection, analysis and interpretation helps to make informed decisions, identify current trends and business opportunities.
Customer focus	Understanding and meeting customer needs helps collect and analyze data about customer behavior, create personalized experiences, and increase engagement across multiple touch points.
Personalization and customization	Personalized and customized experiences to customers increases customer satisfaction and loyalty, as well as contributes to business competitiveness.
Employee empowerment and training	Digital tools and high digital skills of employees facilitate innovation and continuous learning, as well as the adoption of digital technologies.
Privacy and security	Cybersecurity and data privacy measures help to protect sensitive information and increase customer trust.
New business models	Companies are looking for new revenue streams and business models, diversifying businesses and increasing resilience to new challenges and market threats.
Market expansion	Digital tools help companies go global and reach a wide target audience.
Leadership and strategy	Leaders contribute to digital transformation, motivate and encourage people to embrace change.
Integration of technologies	Integrating modern high-tech digital technologies like machine learning, artificial intelligence, the Internet of Things, cloud computing, data analytics contributes to the optimization of operations, business processes, improves the decision-making process and provides valuable information.
Agility and flexibility	Businesses able to quickly adapt to changing market environment and customer behaviour.
Collaboration	Collaboration with partners, suppliers and even competitors in the digital space helps create new business models and improve value propositions.

Table 2. The key concepts of digital business transformation

Source: Compiled from Chaniyas, S, Hess, T 2016, *Understanding digital transformation strategy formation: insights from Europe's automotive industry*, Proceedings of the 20th Pacific Asia Conference on Information Systems.

Thus, digital business transformation is a comprehensive strategy that optimizes all operations and processes of an enterprise, changes business strategies and models, products and services, marketing, financial, product and other functional strategies, as well as creates new values for consumers through systematic implementation of digital technologies and improvement of customer experience. Digital transformation requires radical changes in human resources management, customer relations, marketing and service. Digital technologies increase the competitiveness of enterprises and their ability to adapt to the new business environment.

2.2. Methods and data sources

Research methods were general scientific and special methods of cognition. The comparative analysis was used to study the main drivers of digital transformation of business in Europe and Ukraine, indicators and methodologies for assessing the digital transformation of countries, identifying differences in the level of digital transformation according to the considered methodologies and indicators.

Statistical method was used to study the state and trends of digital transformation of business in Ukraine based on statistical data, quantitative study of factors affecting digital transformation of business in Ukraine.

Induction and deduction methods helped to substantiate and investigate the factors of digital transformation of Ukrainian enterprises in modern conditions, to carry out a critical analysis of the received information and to determine the main threats and prospects of the digital transformation of Ukrainian enterprises.

Abstract-logical method was used to systematize and generalize the factors of digital transformation of Ukrainian enterprises and formulate conclusions. Methods of generalization and abstraction helped to study strategic directions of accelerating the digital transformation of business in Ukraine in conditions of global threats.

The study was conducted on the basis of statistical data from Eurostat and the State Statistics Service of Ukraine, the Ministry of Digital Transformation of Ukraine, the Ministry of Finance of Ukraine, other consulting agencies and business associations (Digital Developers Committee, IT Ukraine Association, etc.). The comprehensive information base of the research, represented by various valid and reliable sources, made it possible to formulate conclusions regarding the trends of digital transformation of enterprises and substantiate further prospects. To determine the level of digital transformation of Ukraine and compare it with other countries, the methodology of calculating global indices was used, which include indicators of the digital transformation of enterprises (Digital Economy and Society Index (DESI), Digital Intensity Index (DII), Global Connectivity Index (GCI), Digital Intelligence Index (DII), Global Innovation Index (GII), WEF / WITSA Networked Readiness Index (NRI), World Digital Competitiveness Ranking (WDCR), UNCTAD B2C E-commerce Index, Digital Platform Economy Index (DPE Index), ICT Development Index (IDI).

The article is based on a comprehensive analysis of scientific literature and statistical data on the digital transformation of Ukrainian enterprises. The article uses scientific publications of world and European scientists on the topic of research, as well as normative legal acts of the European Commission and other supranational regulatory bodies of the EU, as well as the Ministries of Ukraine, which approved the EU initiatives, support programs, strategies in the field of digital transformation of the economy.

3. RESULTS

Digital transformation of business is inextricably linked to the concepts of “digital intensity” and “digital maturity” (Heinze, Griffiths, Fenton & Fletcher 2018), which determines the level of use of new digital technologies by enterprises in all areas. These terms form the methodological basis for measuring the progress of digital business transformation. Companies with a high level of digital maturity are more active in adopting and using digital technologies, have a high level of employee digital skills, access to technology and data, and ultimately have higher financial performance. According to research, 49% of

organizations with a high level of digital maturity had higher levels of net profit and revenue compared to industry average of 17 and 19%, respectively (Deloitte 2019). Digitally mature organizations are more resilient to threats, quickly adapt to market changes and take advantage of new market opportunities.

Measuring the level of digital intensity and digital maturity of an enterprise involves assessing the implementation and use of various digital technologies, access to infrastructure and data, the level of digital skills, e-commerce and other important factors.

The European Commission adopted the Digital Intensity Index (DII), which measures the use of 12 different digital technologies by businesses as a percentage of businesses that used the technologies during the reporting period. According to the latest data, in 2022, 70% of all EU companies reached a basic level of digital intensity. The share of SMEs with basic level of digital intensity was 69%, around 20 p.p. below the EU 2030 target, while large businesses had 98% (Eurostat 2023).

Comparing large companies and SMEs by digital intensity level, large businesses had a bigger share for very high (30%) and high digital intensity (54%) compared with only 4% of SMEs with a very high level and 27% with a high level of digital intensity. Most of the SMEs recorded low (38%) or very low (31%) digital intensity levels. The proportion of SMEs with a basic level of digital intensity ranged from 41% in Greece and 47% in Bulgaria to 89% in Denmark and 90% in Finland (Lone & Weltevreden 2023).

Large enterprises usually adopt digital technologies more rapidly and benefit from digital transformation projects in reducing costs, increasing sales, improving services, etc. This advantage is due to their sufficient financial and labor resources, as well as well-established and optimized management processes. In contrast, small businesses show lower digital intensity and face several challenges to digital transformation, including a lack of expertise, as well as insufficient financial resources to implement digital technologies.

The digital transformation of business plays a crucial role in strengthening the digital economy and depends on the digital intensity of enterprises, which involves the adoption and use of digital technologies. Digital intensity of enterprises depends on investments, the quality of digital infrastructure, domestic ICT sector, digital literacy and skills of the population.

Digital transformation takes place at the enterprise level and contributes to the growth of the digital economy by integrating digitized enterprises into the global digital environment and facilitating interaction with other stakeholders such as business partners, government and consumers. Digital transformation at the enterprise level requires skilled personnel and a reliable digital infrastructure. On the other hand, consumers need appropriate digital literacy, access to digital infrastructure and digital technologies to fully benefit from the digital economy. At the government level, advanced digital infrastructure, a high level of digital literacy of the population, and a strategic policy for the development of the digital economy and digitized enterprises are extremely important.

In international practice, a number of scientific approaches to the evaluation of the digital transformation of business and recommendations for evaluation components have been developed. For example, foreign experts suggest evaluating the components of models of digital maturity and digital transformation of an enterprise, containing indicators in the following categories:

- related to business architecture: performance indicators, customer experience, innovations, strategy, organization, collaboration, process digitalization, information technology, culture, expertise and transformation management (Urbach, Smolnik & Riempp 2009);
- organization, economy, digital environment and people (Deloitte 2023);
- value proposition, organization, customer, data, operations and transformation management (Gimpel, Hosseini, Huber, Probst, Röglinger & Faisst 2018);
- use of technologies, structural changes, financial indicators and value creation (Hess, Matt, Benlian & Wiesböck 2016);

- manufacturing process and technical aspects of digital transformation, as well as level of qualifications of employees (Lucas, Agarwal, Clemons, El Sawy & Weber 2013);
- development, production, logistics, services, marketing and sales (Schuh, Anderl, Dumitrescu, Krüger & ten Hompel 2020);
- ability to adapt business models and reorient them to create value, as well as ability to make organizational adjustments (Chanias & Hess 2016).

Ukrainian scientists are working on the development of methodologies for evaluating the digital transformation of enterprises. In particular:

- integral index of digital competitiveness based on indicators of readiness to use digital tools in business and indicators of digital intellectualization of enterprises related to personnel (Polous 2020);
- method of assessing the degree of digitization of the operational model of the marketing activity of a retail enterprise based on the indicators of the marketing complex (Proskurnina 2020);
- Enterprise Digitization index (IDI), which includes indicators of infrastructure, online spending and user activity (Voskoboieva & Romashchenko 2018).

International experience contains many methodologies, tools and indicators for measuring the digital transformation of enterprises, which involves the collection of statistical data and the formation of an information and analytical base (OECD 2020). Usually, in these methodologies, the digital transformation of enterprises is a component of a multi-component index of the development of the digital economy. Most international indices and methodologies do not separately evaluate the level of digital transformation of enterprises and do not allow to assess the trends, problems and future prospects. Key indicators of digital business transformation in the indices include access to infrastructure, Internet usage, e-commerce and some other basic indicators. However, important business indicators, for example, investments in the implementation of digital technologies, use of different digital tools, changes in business strategies, marketing strategies, information systems of resource management and planning are not taken into account in these well-known indexes.

In Europe, the level of digital transformation of enterprises is partially assessed by the Digital Economy and Society Index (DESI). This index contains the main indicators of the digital competitiveness of the EU member states, which correspond to the Digital Compass 2030. Business digital transformation is assessed through 3 sub-dimensions: digital intensity, digital technologies and e-commerce, each of which includes indicators. Thus, the DESI dashboard assesses the digital transformation of businesses according to the following indicators: SMEs with at least a basic level of digital intensity; electronic information sharing; social media; big data; cloud; artificial intelligence; e-Invoices; SMEs selling online; e-Commerce turnover; selling online cross-border (European Commission 2023b). All indicators are quantitative, so they provide objective performance indicators in terms of the achieved level of digital transformation of the business. The digital development of the economy and society depends on the evaluated areas, including the digital transformation of business (European Commission 2023a).

In Ukraine, the level of digital transformation of business according to the methodology of the European Commission (DESI) is currently not evaluated. However, in September 2023, the Cabinet of Ministers of Ukraine adopted a resolution approving the list of DESI indicators in Ukraine, as well as the procedure for data collection and exchange according to the EU methodology. With the help of this index, progress in digital transformation of enterprises in Ukraine will be monitored and their development will be compared with the digital economies of the EU. The inclusion in DESI will help realize the Ukraine's digital competitiveness potential, as well as contribute to integration into the EU's Digital Single Market.

Global indices that include separate indicators of the digital transformation of enterprises, have been compiled for Ukraine. Fig. 1 shows the position of Ukraine in some international rankings. These rankings highlight the overall level of development of digital technologies, the quality of digital infrastructure and other key indicators for evaluating the digital transformation of business in the context of digital transformation of economy.

Since each index evaluates a different number of countries, the following algorithm was implemented to compare the position of Ukraine in the index compared to other countries included in it. On a one-dimensional scale, a number indicates the position of Ukraine in the analyzed index, and the location of the position further or closer to the left border of the chart reflects the comparative position of the country in relation to the overall rating. That is, the closer Ukraine's position is to the left border of the chart, the better is the country's progress in the level of development of the digital economy, which is assessed by each index separately. Conversely, the further the country's position is to the right border of the chart, the worse the position, since the country occupies an outsider position in the index.

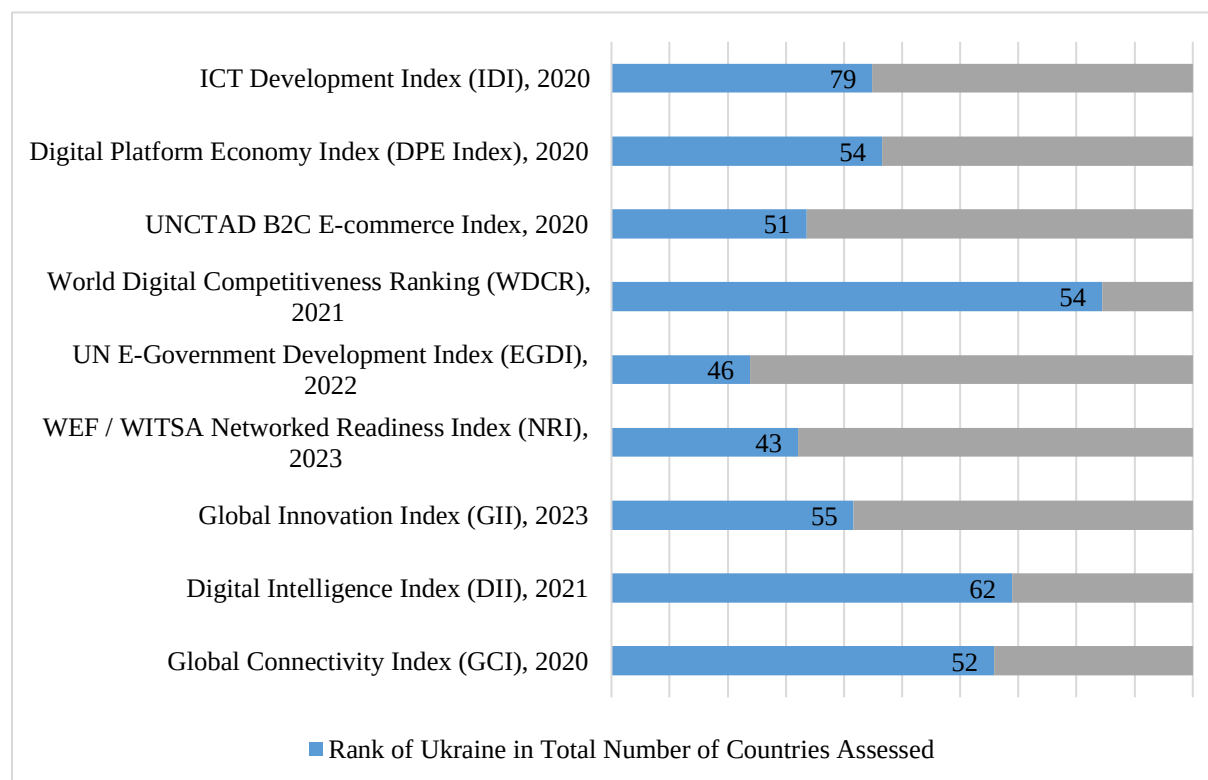


Fig. 1. Rank of Ukraine in global rankings by the date of the last assessment

Source: compiled by author.

The Ukraine's positions in international rankings are quite mediocre and do not contribute to the systematic and comprehensive realization of the potential of the digital economy and digital transformation of business. Meanwhile, the analysis of global indices showed that the positions of Ukraine are quite competitive in terms of:

- Global Innovation Index (GII), in which Ukraine ranks 55th out of 132 countries, that is, it is in the first half of the rating;
- Networked Readiness Index (NRI), in which Ukraine ranks 43rd out of 134 countries, which indicates a high level of development of digital and communication networks;
- E-Government Development Index (EGDI), in which Ukraine ranks 46th out of 193 countries, which makes it one of the leaders in the development of public digital services;
- B2C E-commerce Index, in which Ukraine ranks 51 out of 152 countries.

Therefore, the digital transformation of business is developing in Ukraine, which is evidenced by the high level of development of digital communication networks, the growth of e-commerce and the

increase in the availability of state digital services for business. This contributes to the increase in the level of digital transformation, facilitates the access of enterprises to the markets of goods and services, makes it possible to improve the customer experience and communications, as well as the overall digital competitiveness. At the same time, the progress of the implementation of digital technologies by enterprises is not evaluated.

Certain difficulties arise with assessing the level of implementation of digital technologies, such as the AI, IoT, cloud services, big data, and others. In the existing statistics in Ukraine, there are no relevant indicators that would comprehensively measure the use of such technologies by enterprises. Because of this, it is not possible to identify the gaps and identify the challenges faced by enterprises on the way to digital transformation.

In Ukraine, the State Statistics Service provides basic data that allow a fragmented assessment of progress in the digital transformation of business. Some indicators are available for analysis and interpretation, but for a short data period.

Through the joint efforts of Ukrainian enterprises and the Ukrainian authorities, in particular, the Ministry of Digital Transformation of Ukraine, the Ministry for Communities, Territories and Infrastructure Development of Ukraine and other ministries and departments that regulate the digital economy and adoption of digital technologies, support of projects and startups, Ukraine has made significant achievements in this area.

State Statistics Service aggregates some indicators of the digital business transformation in Ukraine (Table 3).

Indicators	Years		
	2019	2020	2021
enterprises with access to fixed broadband Internet	86.4	86.6	85.1
enterprises engaged in electronic trade	4.8	4.9	5.0
e-commerce turnover in the total turnover	4.5	5.0	5.3
enterprises selling goods through a website or web application	-	-	3.9
enterprises selling goods through marketplaces	-	-	2.5
enterprises that used social media	29.7	30.1	29.1
enterprises that have website	35.6	35.2	35.3
enterprises that have a chat service for communicating with customers	-	-	9.1
enterprises purchasing cloud computing services	10.3	10.2	9.8
enterprises conducting big data analysis	12.5	11.9	12.7
enterprises that provided training in ICT	3.7	3.8	4.5
enterprises that have hired specialists in ICT	22.3	21.6	21.7

Table 3. Main indicators of digital business transformation in Ukraine, percentage in the total number of enterprises

Source: Compiled from State Statistics Service of Ukraine 2024.

Therefore, in Ukraine, certain indicators indicate a low level of digital transformation, despite the high level of telecommunication networks and the penetration of the Internet and digital devices. Businesses involved in digital commerce and social media account for a significant percentage. A third of enterprises have their own website and use social networks for business promotion and communications. Compared to EU data, a total of 77.7% of European enterprises have a website. In general, enterprises in the EU are quite well adapted to doing business on the Internet (Eurostat 2023).

About a tenth of Ukrainian enterprises use cloud computing services and big data. A fifth of enterprises employ qualified IT specialists, as the practice of hiring outsourcing IT companies is very common.

The key factors of the digital transformation of business in Ukraine are powerful educational institutions, a competitive ICT sector and human capital, as well as a highly developed infrastructure and support system for the development of ICT and startups in Ukraine at the government and business levels (Fig. 2)

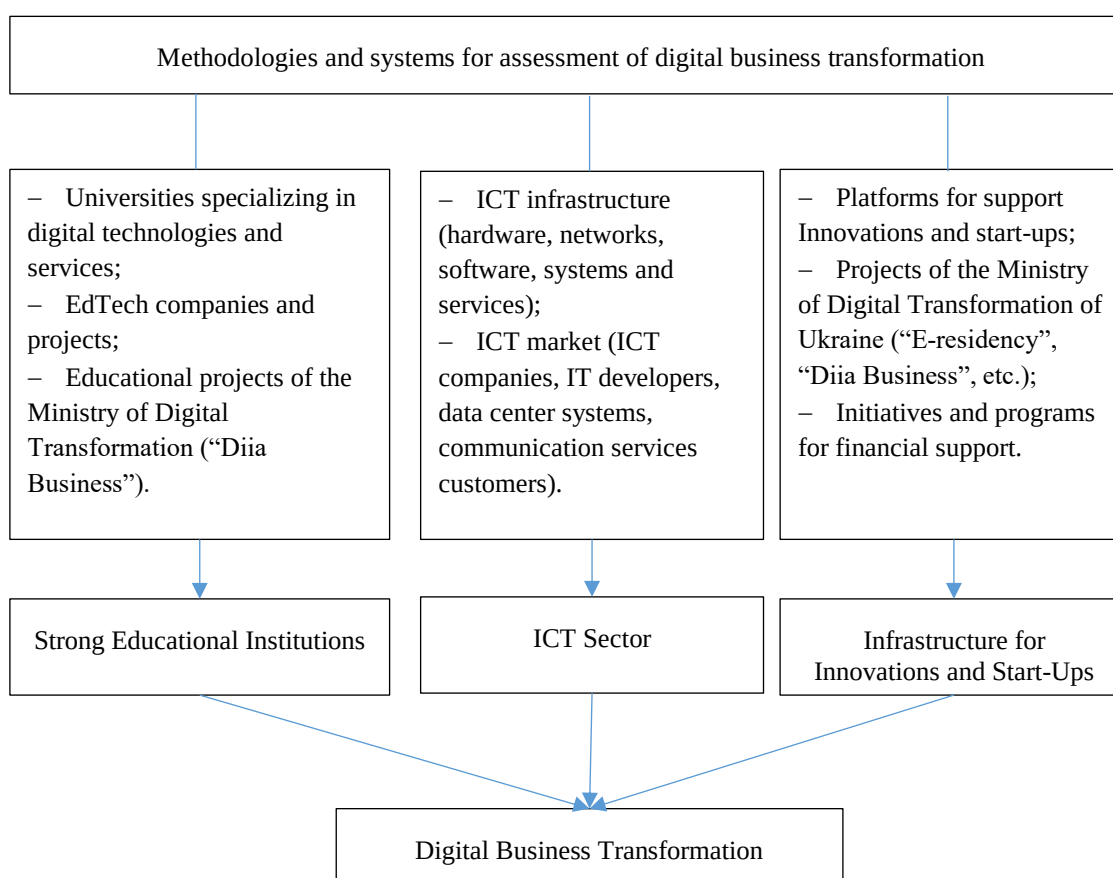


Fig. 2. Key contributors to digital transformation of business in Ukraine

Source: compiled by author.

An important factor in facilitating the digital business transformation is the infrastructure to support entrepreneurship, innovation and startups, which includes various initiatives, state financial programs aimed at business development and the implementation of digital technologies, staff training, improving digital skills, mastering new skills, expanding cooperation, facilitating the access of entrepreneurs to digital public services, etc. In Ukraine, the infrastructure that supports the digital transformation of small and medium-sized businesses, as well as the development of ICT and startups, is rapidly developing.

For example, the Ministry of Digital Transformation of Ukraine has launched the “Diia Business” project. Its purpose is comprehensive support for entrepreneurs, consulting, facilitating access to foreign markets, establishing business connections, training, legislation news, etc. (ITU 2021). The “E-residency” project aims to support entrepreneurs doing business in Ukraine from abroad, and provides access to public services, financial and bank account management, tax administration, etc. (ITU 2021). In order to solve administrative issues, consulting and educational services, starting from 2021, entrepreneurs have access to the National Diia Centres Web Platform for Centres of Administrative Services (CASPs), launched by the Ministry of Digital Transformation with the participation of the United Nations Development Programme (UNDP) in Ukraine (ITU 2021).

In the IT sector, the support of which is a strategic priority of the state, the “Diia City” project has been developed. It is a platform for supporting IT entrepreneurs, employment of IT specialists, legal protection, search for international investors and partners. The goal of the project is also to create the largest IT hub in Central and Eastern Europe. The IT industry is expected to create more than 450,000 new jobs and generate \$16.5 billion by 2025 (ITU 2021). “Diia City” is available for both Ukrainian and foreign enterprises, and provides participants with numerous benefits, including: training, development, testing and distribution of software, digital marketing, research and development, cyber security and robotics, taxation issues and intellectual property protection, venture investment, etc. (ITU 2021).

360 Tech Ecosystem Overview is an online platform for business information about the IT ecosystem: IT companies, investors, universities, startup accelerators, technohubs, etc. It is available for entrepreneurs at “Diia Business”.

Ukrainian Startup Fund (USF) promotes Ukrainian startups abroad and expands international cooperation. Thanks to the project, startups and IT companies were able to attract \$8.7 million in funding, more than 287 participants attended 30 of the global largest technical events, and more than 180 partners were involved in USF projects.

Eastern Partnership (EaP) Startup Ecosystem is a platform for ICT innovation that facilitates the search for investors and partners, the dissemination of ideas and collaboration. This is an international project initiated by the European Commission and EU4Digital Initiative, the Ministry of Digital Transformation of Ukraine, Startup Moldova, Ukrainian Startup Fund, Ukrainian Tech Ecosystem project. The EaP startup ecosystem has united more than 12,000 enterprises and startups in the Eastern Partnership countries.

As of January 2024, there are about 2600 startups in Ukraine. Until 2018, there were no unicorn startups in Ukraine. Currently, at least 6 companies have a valuation of one billion dollars (IT Ukraine Association 2024). This trend indicates the development of the startup ecosystem and its potential prospects.

In Ukraine the digital business transformation requires a strong and competitive domestic IT market and internal demand for IT products and digital technologies from enterprises. The IT industry is one of the key sectors in the Ukrainian economy. Currently, Ukrainian IT sector is export-oriented: 80-90% of IT services are provided to foreign customers. IT service exports reached \$6.7 billion in 2023, or 4.0% in GDP. IT services make up 41.5% of the total volume of service exports and 13.2% of the total exports in 2023 (Fig. 3). At the same time, for 2023, the export of IT services decreased by 8.4% compared to 2022. Despite the decline in revenue, the IT industry increased its tax payments by 11.5% in 2023 (IT Ukraine Association 2024).

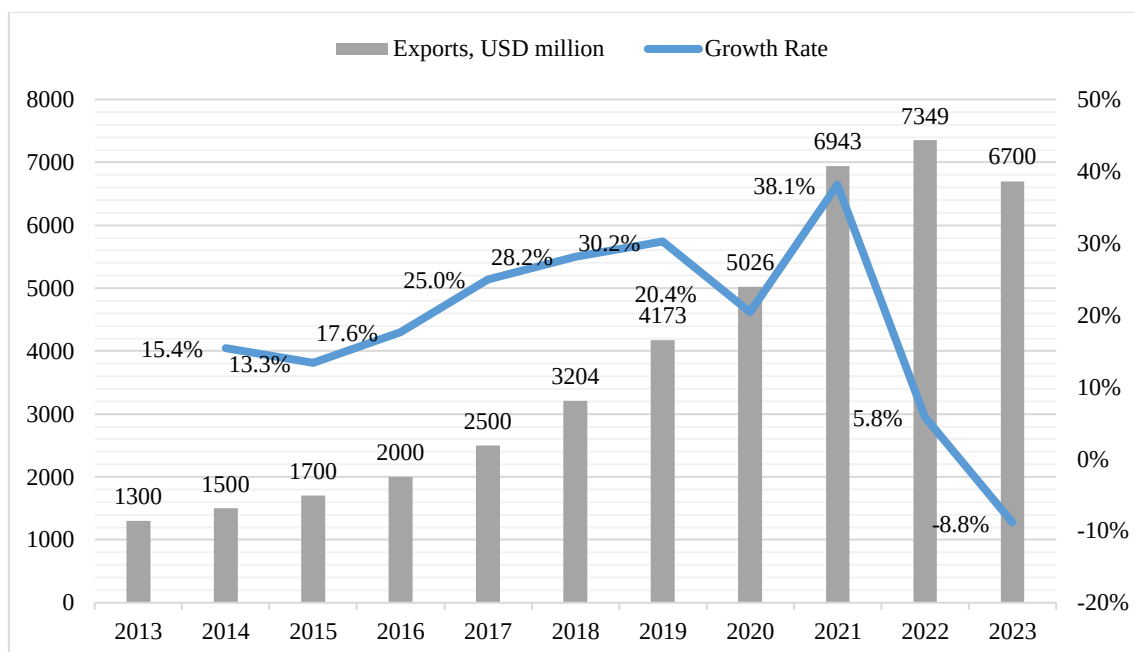


Fig. 3. IT sector exports in Ukraine in 2013-2023

Source: compiled from IT Ukraine Association 2024.

The approximate number of legal entities providing IT services in 2023 was about 8,100. About 2150 IT companies operate in the country. Ukraine has a powerful human potential and IT companies have enough qualified labor force. The number of IT specialists working in Ukraine in 2023 increased by approximately 2.7% to 346,200 people. Over the five years from 2018 to 2023, the growth in the number of IT specialists in Ukraine amounted to 78.4% (IT Ukraine Association 2024).

The landscape of Ukrainian IT education is highly competitive due to the growing demand for IT specialists. In 2023, Ukrainian universities graduated 31,500 IT specialists. Universities provide only 50% of the total number of required specialists. EdTech companies have trained about 620,000 graduates in recent years. IT companies have their own universities which are valuable and practically oriented (IT Ukraine Association 2024).

The main threats to the further growth of the digital transformation of business are the negative impact of the socio-economic crisis on the economy and the demographic situation in general. The decline of the consumer market and the decrease in the purchasing power of Ukrainians due to the Russian invasion, which has been going on for the third year, has a negative impact on Ukrainian business. Due to declining incomes and migration, low consumer demand and reduced market potential, businesses face falling sales, instability, reduced financial flows and insufficient funding for digital transformation projects. Migration, poverty and depopulation will continue to have a negative economic and social impact on the processes of digital transformation of enterprises in Ukraine even after the end of the war (Kliuchnyk 2020). At the same time, businesses are finding opportunities to sustain business and create potential for growth during the post-war recovery. This will be facilitated by business support programs, including state financial programs, programs to support digital transformation projects, grants for digital transformation projects from the Government and donors.

4. DISCUSSION

Digital transformation of business in Ukraine faces a number of problems and obstacles. First of all, it is a low demand for digital products of Ukrainian development due to the low solvency of enterprises, the complexity and high cost of the transition from imported software to Ukrainian. The development

of the institutional and legal environment, the implementation of advanced international practices for the protection of intellectual property and cyber security, and the gradual recovery of domestic demand contribute to the growth of the domestic development market. According to the latest data, in 2022, the digital development market of Ukraine amounted to UAH 1,180.3 million. In 2023 the market volume reached about UAH 1,465.4 million, growth is 19.50%. About 59% of the market belongs to the development of web projects, 23% – to the development of mobile apps and 18 % – technical support (Digital Developers Committee 2023). The growth of the potential of the domestic market makes it possible to scale Ukrainian-developed digital products.

Another big problem is the low level of digital transformation of SMEs and their involvement in the digital economy. To improve the situation, it is necessary to create mechanisms to stimulate the digital transition, training and professional development, and improving the digital skills of entrepreneurs. The development of the innovation, ICT and startup support system in Ukraine will help solve this problem. This will help accelerate the digital transformation of Ukrainian enterprises and realize their growth potential. Small and medium-sized enterprises often face obstacles on the way to digital transformation, in particular, due to a lack of funding, insufficient awareness of organizational, legislative and financial measures to support digital transformation projects of enterprises. Therefore, strategies, policies, frameworks and best business practices should focus on SMEs as important actors in the development of the economy and the IT sector, the development of innovation and the provision of ICT services.

Priority strategic measures to accelerate the digital transformation of business and implement its state support in Ukraine should be aimed at creating opportunities for the growth of the IT sector, increasing the domestic consumption of digital products, supporting the Ukrainian industries of software development, IT consulting, IT services, innovations and startups.

It is necessary to involve SMEs in digital transformation projects, to stimulate them to implement digital transformation projects with financial, informational and organizational support measures. SMEs need informational and advisory support when seeking funding for digital innovation. Currently, various initiatives have been launched in Ukraine to solve this problem, such as the “Diia City” project, platforms for supporting innovations and startups, etc. However, the main problem remains the lack of financing. Because of this, an additional functional online database with a list of financial sources available to entrepreneurs from different countries and different organizations is needed. This database should be available on online platforms. This will help SMEs choose funding sources that meet the needs and specifics of implementing digital transformation projects. It is necessary to advise Ukrainian enterprises on attracting financing on foreign platforms, searching for investors and creditors outside the banking system.

In Ukraine, there are no special funds for financing digital transformation projects that operate on a permanent basis. Bank loans for such purposes are not granted. Therefore, the financing of the digital transformation of business needs to be expanded. It is necessary to expand the existing instruments and sources of financing, in particular, at the expense of grants, funds of donor organizations, foundations, etc. Funding lines for financing digital transformation projects should include separate business areas, for example, internal processes; supply chain management; product/service innovations; customer relations; business models; cybersecurity; digital skills and competences. This will help to clearly predict the socio-economic effect of digital transformation projects and create flexible and adaptive financial, informational and organizational support tools. It is necessary to organize joint management and co-financing of digital transformation together with EU enterprises in related sectors, in particular, through existing ICT and startup support platforms, such as the Ukrainian Startup Fund and others.

To accelerate the digital transformation of business in Ukraine, the government needs to stimulate the increase in the number of qualified workforces in the ICT sector through the development of education, the creation of innovative scientific and educational hubs and projects. Further simplification of administrative barriers and difficulties in electronic business governance is necessary, which will improve the business processes of SMEs and increase their confidence in the digital environment. It is necessary to implement measures of state support and to expand the access of SMEs to best experience, expertise and knowledge, to improve measures of state financial support of digital technology implementation projects. It is necessary to improve and develop the interaction of the Ukrainian

ecosystem of innovations, ICT and startups with similar international and European ecosystems of ICT innovations and networks of financial support for digital transformation and innovative development.

The main limitations of the study of the digital transformation of enterprises in Ukraine include the lack of an information and analytical base of indicators that measure the use of digital technologies by enterprises, similar to the Digital Intensity Index. In Ukrainian statistics, there are separate indicators of digital transformation, which were analyzed in this paper, but the methodology of their collection, processing and interpretation differs from world practice. In addition, in Ukraine, various institutions collect data on the digital transformation of business, for example, the State Statistics Service, the Ministry of Finance, the Ministry of Digital Transformation, as well as non-governmental non-profit organizations and associations and consulting agencies. This makes it difficult to comprehensively and systematically assess the progress of digital business transformation.

Various methodological approaches are comprehensive, contribute to the development of a strategic plan for the company's digital transformation and a system for assessing progress. However, these methodologies are inconsistent with each other, which complicates the practical implementation of each of them by Ukrainian enterprises.

In Ukraine, the process of collecting data on the digital transformation of enterprises is not systematized. Because of this, it is difficult to compare the level of digital transformation of enterprises with other countries and among themselves, to identify weaknesses and problems that need to be solved. However, measuring the digital transformation of enterprises as a factor of economic growth will help to form an information and analytical base for evaluating the impact of digitalized enterprises on indicators of socio-economic development of the country.

Research and development in the field of digital business transformation assessment is inconsistent among themselves, does not take into account some important internal aspects of digital transformation, for example, marketing, logistics and other related to business model and human resources factors of digital transformation. In practice, it is difficult to assess the digital transformation of small and medium-sized businesses, because certain factors characteristic of large enterprises are important and unavailable to SMEs, for example, the availability of personnel with sufficient digital skills, the use of digital marketing, etc. Therefore, it is necessary to adapt the existing methods and approaches to the evaluation of the digital transformation of business to Ukrainian specifics, in particular, SMEs, and take into account marketing, technical, and human criteria in the evaluation methodology.

5. CONCLUSIONS

Digital transformation is a complex and systematic implementation of digital technologies for rebuilding the business strategy and activities of the enterprise, increase customer loyalty and competitiveness in the target market. The digital transformation of business is an important driver of economic growth in Ukraine and a government priority. Enterprises are actively implementing digital technologies, as it helps them to increase economic efficiency, optimize costs, improve the quality of customer service, improve the management of business processes and use market opportunities to increase competitiveness. Digital transformation is the highest link in the hierarchy of digitization and digitalization processes, unlike which, it involves a complete and fundamental change of the existing business model of the enterprise. Digital business transformation is based on the conceptual features of process optimization, data-driven decision-making, customer orientation, personalization and customization, staff development and motivation, new business models, privacy and security, leadership, collaboration, flexibility, technology integration and market expansion.

Trends and the level of digital transformation of enterprises are assessed by various indicators, some of which are included in international indexes. The position of Ukraine in international rankings is quite mediocre, but in recent years, significant progress has been observed in the growth of innovativeness of the economy, improvement of the readiness of networks, a high level of e-government and e-commerce. This contributes to the increase in the level of digital transformation, facilitates the access of enterprises to the markets of goods and services, makes it possible to improve the customer experience and

communications, as well as the overall digital competitiveness. At the same time, the progress of the implementation of digital technologies by enterprises is not evaluated due to the lack of comprehensive methodologies adapted to Ukrainian business.

Evaluation of the digital transformation of enterprises is characterized by inconsistency of methodologies and systems of indicators. A number of global indices include separate indicators that measure the digital transformation of enterprises. Ukraine's position in these indexes is not high, which indicates a low level of digital transformation of certain aspects of the Ukrainian economy compared to other countries. However, Ukraine has quite high positions in the Global Innovation Index, Networked Readiness Index, E-Government Development Index, B2C E-commerce Index.

In Ukraine, some basic data allow a fragmentary assessment of progress in the digital transformation of business. Certain indicators indicate a low level of digital transformation, despite the high level of telecommunication networks and the penetration of the Internet and digital devices. Businesses involved in digital commerce and social media account for a significant percentage. A third of enterprises have their own website and use social networks for business promotion and communications. About a tenth of Ukrainian enterprises use cloud computing services and big data. A fifth of enterprises employ qualified IT specialists, as the practice of hiring outsourcing IT companies is very common. Overall, the digital transformation of business in Ukraine is average.

The key factors of the digital transformation of business in Ukraine are educational institutions, a competitive ICT sector and human capital, as well as a highly developed infrastructure and support system for the development of ICT and startups.

The main recommendations for accelerating business transformation in Ukraine are: improving financing mechanisms for SMEs, strengthening the institutional and legal framework, promoting the development of digital skills, promoting international cooperation, improving data collection and analysis.

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