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DIGITAL DETERMINANTS OF NATIONAL ECONOMY RESILIENCE

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Abstract. The *objective* of this research is to ascertain the pivotal factors that exert influence on the resilience of the national economy, employing Ukraine as a case study. The *subject* of the study is, therefore, the resilience of the national economy. *Methodology.* In order to outline the theoretical foundations of the study, the methods of theoretical generalisation, historical method and systematisation method were used. The study of the level of digitisation and its impact on economic resilience was based on comparative analysis, systematic and experimental methods. In addition, statistical, index and indicative analysis, as well as graphical and tabular methods were used. *Value / Originality.* In order to assess economic resilience in the context of digitalisation, a Methodology for Assessing Digital Resilience of the National Economy was developed. The overarching objective of this methodology is to evaluate the digital resilience of the economy in the face of both external and internal pressures. Utilising this methodology, an Integral Index of Digital Resilience for Ukraine was subsequently calculated. *Results.* The calculations showed that Ukraine has a moderate level of digital resilience. The proposed methodology identified vulnerabilities in the household sector, such as significant disparities in digital literacy among the population, the availability of quality ICT technologies, and the development of legislation on the protection of personal data on digital platforms. In the business sector, the assessment found a strong relationship between the adoption of digital technologies and increased resilience to economic shocks, particularly in the use of ICT technologies and the readiness for further digital development. The assessment of the government sector showed it to be the most resilient, given the existing digital transformations and e-services.

Keywords: resilience of the digital economy, shocks, digitalisation, digital transformation.

JEL Classification: D83, F60, L2, M15, O33

1. Introduction

The crisis challenges of the past decade have shown that national economies remain fragile and vulnerable to both external and internal factors. It has become clear that the previously rapid pace of globalisation is slowing down, while the priority is shifting towards strengthening the resilience of individual economies and protecting national interests. At the same time, it is becoming clear that economies need more agile and adaptive digital tools to reduce their vulnerability to potential future economic shocks and to speed up recovery from existing shocks.

While macro-economic forecasting is widespread, it is clear that crisis events and their impact on the economy are often difficult to fully predict. Therefore, in the response phase to the impact of shocks, the priority is how fast and effective the response is. Compared to other, more traditional tools, digital tools are faster and can process larger amounts of information. By analysing the flow of digital data, changes in internal and external conditions can be quickly identified, enabling effective responses to crises. In addition, digital tools are often more accurate, making it possible to create models to predict the consequences of different crisis scenarios and develop strategies to mitigate their impact.

Digital tools can therefore play a key role at each stage of ensuring economic resilience. However, there is currently no clearly defined system of factors influencing the impact of digital technologies on

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economic resilience, nor are there indicators for assessing such an impact, which underlines the need for this research.

The aim of this research is to identify the key factors influencing the resilience of national economies to digital factors, using Ukraine as a case study.

The research was conducted using a combination of general scientific and specialised methods. Firstly, the theoretical foundations of digitalisation were defined using the method of theoretical generalisation, the historical method, and the systematisation method. Secondly, the level of digitalisation in Ukraine's economy was determined using comparative analysis and the system method. Thirdly, the experimental method was applied to assess the impact of digitalisation on economic resilience and to establish cause-and-effect relationships. The study utilised a range of analytical methods, including statistical, index and indicative approaches, in addition to graphical and tabular analysis.

The concept of the digital economy in its classical understanding is outlined in the works of D. Tapscott and N. Negroponte, who were among the first to define its basic elements (Negroponte, 1995; Tapscott, 1997).

Further interpretations of the digital economy have defined it as one that "includes goods or services whose development, production, sale or delivery is critically dependent on digital technologies" (Kling, Lamb, 2000).

The US Bureau of Economic Analysis identifies the main components of the digital economy (Barefoot et al., 2018). Digitisation is defined as the interpretation and management of the world through processes that rely almost entirely on digital data (Clarke, 2019). As posited by A. Hrytsenko (2018), the process of digitalisation of the economy entails the implementation of digital technologies into social production. The development of the digital economy concept and its processes is influenced by a number of significant factors, including the emergence of social networks, the Internet of Things (IoT), cybersecurity, big data and analytics, artificial intelligence (mostly machine learning), blockchain, and others (Tang, 2021).

The utilisation of digital technologies by the business sector has been demonstrated to enhance the resilience of the economic system as a whole. This can be attributed to: the transformation of business models and the creation of new products (which affects the overall diversification of the economy and, therefore, its ability to adapt to changes) (Tanasiichuk et al., 2024); the business sector's entry into global markets and diversification of income sources (which increases the economy's competitiveness and thus its ability to recover) (Osetskyi et al., 2023); cost reduction through digitalisation (which affects the absorptive capacity of the economic system) (Shestack et al., 2023); and strengthening of digital security (Biliavskyi et al., 2024).

Studies identifying the positive impact of digitalisation on economic resilience have also been analysed. Digitalization affects firms' productivity through expansion into new markets (Caputo et al., 2020), improved communication between the business sector and households (Bican, Brem, 2020), product diversification, and the ability to adapt to changing business environments (Legner, 2017). According to researchers (Heinz et al., 2021; Michel-Villarreal, 2021), automation and the use of digital technologies increase organisational resilience.

2. Digitalisation as a Factor of Economic Resilience

Unlike digitisation, which focuses on the process of converting analogue data into digital form and covers a smaller economic area, the process of digitisation covers almost the entire economic system. Gradually, as digital technologies develop, digitisation becomes accessible in all sectors of the economy. The primary goal of digitisation is the automation of various economic processes, especially through the use of digital technologies.

As a result of the growing number of new digital technologies, it is possible to identify a distinct process – digital transformation (Figure 1). In contrast to previous definitions (digitisation and digitalisation), digital transformation is considered at the micro-economic level, i.e., the transformation of a business model or organisational structure taking into account digital technologies. At the macro-level, the process of digital transformation is currently progressing at a more gradual pace, due to the fact that it encompasses a broader area for expansion and requires the combined efforts of each country, both in practical and regulatory terms. Currently, there are several barriers preventing a faster uptake of digital transformation (Hurdles preventing, 2023): cyberthreats, environmental sustainability, social and government objectives, lack of skills to implement technologies, economic uncertainty and the implementation of regulatory instruments.

Digital transformation can thus be defined as the process of integrating digital technologies into a company's operations. The overarching objective of digital transformation is to effect change to the organisational model of the company's functioning, its individual organisational structure elements, and its cultural values.

The digital economy is therefore a model of the economic system that is based on digital technologies and uses them to transform traditional business models and create new market opportunities.

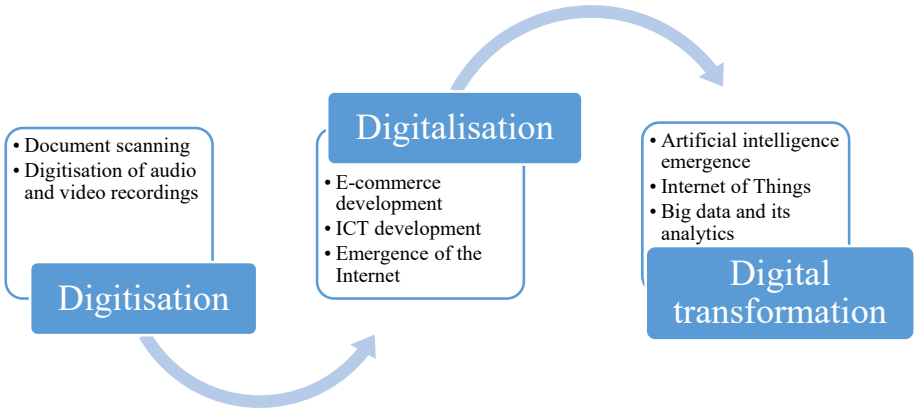

Figure 1. Evolution of the concepts of "digitisation", "digitalisation" and "digital transformation" depending on the development of digital technologies

Source: generated by the authors

In this model, digital data is the primary resource and information and communication technologies (ICT) provide new ways of producing, distributing, exchanging and consuming goods and services. Digitalisation is currently the leading process in the digital economy.

Despite the fact that the digital economy constitutes a novel paradigm, it is nevertheless the case that its functionality cannot be regarded as wholly distinct from that of the traditional economic model. The digital economy, akin to the traditional one, is predicated on commodity-money relations; nevertheless, it is characterised by the transition of these relations into the digital domain. The procurement and disposition of goods and services transpires online (e-commerce), transactional and banking operations are digital (fintech), and the entity in question can be a digital product (software or media content, etc.). The digital economy is also characterised by classic economic features such as competition, state regulation, and resource scarcity. Consequently, it can be posited that the digital economy is a transformational model built on the traditional economy. The distinguishing feature of this transformation is not merely the augmentation of the tertiary sector (services sector) or the emergence and expansion of a new one (the digital economy), but rather the radical transformation of all three existing sectors (Lyashenko, Vyshnevskyi, 2018).

The digital economy is comprised of several key components, including e-commerce/e-business (the trade of goods or services via the Internet) and digital infrastructure (equipment, software, telecommunications) that facilitate the operation of this particular economic model (E-commerce and Internet use, 2015). Thus, digitalisation as a process inherent in the digital economy can be characterised by the following key elements (which constitute its institutional environment): 1) the basis for the existence and spread of digitalisation is a developed digital infrastructure; 2) the agents of digitalisation are households, the state, and businesses. At the same time, digitalisation is aimed at automating economic processes, and thus its object is the economy.

Digitalisation, defined as the automation of economic processes, is a primary factor in economic resilience. Thanks to automation, continuity, and easy integration of digital technologies, the economy is better able to absorb shocks, adapt to new conditions, and recover from crises. Digitalisation and its key elements effectively form a mechanism for influencing resilience, as they increase the efficiency, flexibility, and innovation of economic processes due to their systemic nature.

The mechanism of the impact of digitalisation on economic resilience is a set of processes, tools and technologies that enable the use of digital technologies in the economic system to increase its ability to withstand shocks. Its elements include digital infrastructure, digitalisation agents, digital tools, innovation and automation. In this context, economic resilience is defined as the ability of the national economy to withstand, adapt to, and recover from external and internal shocks, disruptions, or adverse conditions, while maintaining stability and supporting the long-term growth of its own parameters (Sorokina, Lebedeva, 2024).

The primary objective of digitalisation is automation, which is to be regarded as the principal process in this mechanism. At the micro-level, automation manifests itself in digital transformation, where the business sector changes its model through the implementation of digital technologies (e.g., digital platforms, robotics, artificial intelligence, etc.) so that most processes do not depend on the physical labour/effort of employees. According to the researchers (Heinz H. et al., 2021; Michel-Villarreal R., 2021), such a transformation increases organisational resilience (the ability of a company to respond promptly to shocks, adapt and ultimately benefit from them).

At the macro-level, it is evident that automation does not reach such scales. However, the automation of certain economic processes is a topic that can be discussed. In the context of its impact on resilience, automation exerts two effects. Firstly, it reduces dependency on the human factor, significantly speeding up routine processes. Secondly, it decreases the risks of errors. One of the components of economic resilience is infrastructure, and researchers (Fingleton et al., 2012; Martin, Sunley, 2015) identify communication technologies and technological networks (elements of digital infrastructure) as crucial because they enable flexibility during economic downturns. The role of digital infrastructure is to ensure the accessibility of digital goods/services to all economic agents.

The impact of digitalisation on economic resilience is ensured by its agents through the fulfilment of their functions. Accordingly, the agents of digitalisation include households, firms and government, as they play key roles in the economic system and directly influence the use of digital technologies.

The household sector is made up of consumers, whose demand stimulates the development and emergence of new technologies (for example, modern digital platforms emerged as a result of consumer demand during COVID-19). Economics traditionally focuses on the consumption of goods and services, savings, and the provision of economic resources by households. However, in the digital economy, it is argued that the development of human capital and digital skills plays a more significant role, enabling an increase in overall resilience over time. The ability to use digital technologies increases labour productivity; in addition, people with developed digital skills are more likely to engage in innovative activities, and the possession of such skills leads to better adaptability to change.

The business sector has been identified as one of the most active agents of digitalisation, given that its functions account for the largest share in the practical implementation of digital processes. The functions of the business sector can be categorised as follows: the direct creation of digital products (or the creation of products/provision of services involving digital technologies), e-commerce, and investment in more advanced IT infrastructure within the enterprise. The overarching objective of businesses is to enhance competitiveness and operational efficiency through the digital transformation of their activities.

The government is a pivotal agent of digitalisation, given that its functions are not confined to the utilisation and implementation of digital technologies, but also extend to the realms of regulation and legislation. The use of digital technologies in public administration includes the following aspects: digitalization of general elements of governance, provision of digital services to citizens, digital citizen engagement, innovative strategies, and digital skills (Pakhnenko, Kuan, 2023). Drawing upon the long-established functions of economic agents in the field of economics, it is possible to propose "digital" functions for the three sectors of the economy (see Table 1).

Indeed, the functions in question are mutually interdependent, and collectively they engender a cohesive system. To illustrate this point, the acquisition of digital skills, a hallmark of the household sector, exerts a substantial influence on their utilisation within the business sector, thereby giving rise to

Table 1
"Digital" functions for the sectors of economy

Economy sector	Functions of economic agents in the traditional economy	Functions of economic agents in the digital economy	Resilience property
Households	Consumption of goods and services	Creating trends for e-commerce. Digital communications. Access to information and services.	Adaptation, absorption
	Saving and investing	Use of digital financial instruments.	Recovery
	Participation in the labor market	Supply of digital skills and abilities in the resource market.	Adaptation
Business	Production of goods and services	Creation of digital products/services. E -commerce.	Adaptation, recovery
	Investments in development	Investment in the company's IT infrastructure.	Absorption
	Innovative activity	Digital transformation of business models/organisational structure.	Adaptation
Government	Regulation of economic activity	Enshrine the procedure and specifics of digitalisation development at the legislative level.	Adaptation
	Provision of public goods and services	Electronic government (e-government).	Adaptation, absorption
	Support of macro-economic stability	Development of digital infrastructure and its cybersecurity. Support for innovation.	Recovery

Source: developed by the authors

the development of digital products and services. Concurrently, the government, through its regulatory and legislative functions, oversees the usage of digital technologies in other sectors. Ensuring the comprehensive provision of these functions and even distribution of digitalisation across all sectors is therefore crucial.

Despite the generally positive impact of digitalisation on economic resilience, there are also digital risks. These risks can be categorised into four distinct groups: economic, social, environmental, and infrastructural (see Figure 2).

Digital risks in the economic sphere are closely linked to the labour market, in particular the issue of 'displacement' of jobs due to the introduction of new technologies and the automation of familiar processes. It is possible that the pace of adoption of digital technologies will outpace the creation of new jobs for those who lose their jobs as a result of these transformative changes.

Social digital risks include the digital divide as one of the manifestations of the negative impact of digitalisation on resilience. The digital divide refers to the disparity in access to and use of digital technologies between different groups of people or regions. Given the rapid development of automation and digital transformation in the economy, the digital divide has negative consequences for the economic system as a whole, as it reduces economic opportunities for economic actors, lowers labour productivity and increases educational inequality.

Despite optimising the use of resources and reducing greenhouse gas emissions, digitalisation also has a negative impact on the environment. The most common problem today is e-waste, which is more characteristic of developed countries. The causes of excessive e-waste include the rapid cycle of technology replacement and improper disposal. Although developed countries understand the problem, only 10% of electronic waste is currently recycled, with the remaining 90% sent to developing countries (Abalansa et al., 2021). This, in turn, leads to unequal exposure to chemical elements and consequently to social inequality.

In the infrastructural sphere, digital risks encompass the issue of cybersecurity and the challenge of safeguarding digital infrastructure against cyberattacks. As mentioned earlier, a well-built digital infrastructure is the foundation for the effective spread of digitalisation, but there is also a downside: the increasing number of connected devices and systems makes the economy more vulnerable to cybercrime and cyberattacks. As a result, the economic system can suffer financial losses, disruptions to critical infrastructure and the theft of personal data from households.

3. Ukraine's Digital Resilience Assessment

In order to assess economic resilience in the context of digitalisation, it is necessary to consider the role of digital indicators in ensuring the economy's more adaptive response to shocks. To this end, a methodology for assessing digital resilience has been developed. The primary objective of the methodology is to assess economic resilience under external or internal influences. As part of this methodology, the assessment tool is an integral index composed of selected indicators divided across three sectors (see Table 2).

The methodology is largely based on the mechanism of the impact of digitalisation on economic resilience, as discussed above. As economic actors are, in practice, able to use and disseminate digital technologies, the household, business and government sectors were chosen as the basis for the potential assessment. Within each sector, a number of indicators relevant to the specified functions of economic actors were selected. Shkuropadska D. et al. (2021) were the primary source of inspiration for the methodology for calculating the Integral Index of Digital Resilience of a country. The selection of digitalisation indicators

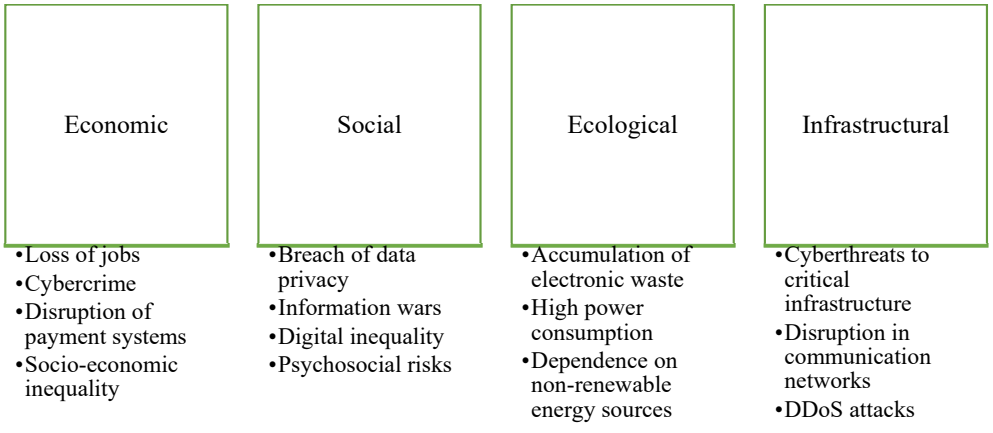

Figure 2. Classification of digital risks
Source: developed by the authors

Table 2
Indicators of the digital transformation and sustainability assessment methodology

Household sector	
Indicator	Threshold value
Digital Skills Gap Index	≥ 6
Global Connectivity Index, %	≥ 70
Network Readiness Index: People, %	≥ 44
Average monthly salary of employees working in the ICT sector, thousand EUR	≥ 2.2
Human Capital Index	≥ 0.40
Data protection laws	≥ 2.5
IT Talent Competitiveness Index	≥ 22
Information Access Index	≥ 6
Mobile Internet Stability Index	≥ 0.13
Broadband Internet connection speed, Mbps	≥ 100
Business sector	
Indicator	Threshold value
IT Competitiveness Index for Central and Eastern Europe (CEE) in 2023 by economic impact component	≥ 9.5
Growth rate of software markets, %	≥ 10
Share of the number of enterprises that apply ICT security measures in their information and communication systems in the total number of enterprises, %	≥ 90
Global Innovation index	≥ 30
Export of ICT services, billion USD	≥ 6.5
Network Readiness Index: Technology	≥ 40
Share of the employed population in the ICT sector in the total employed population, %	≥ 4
Share of the number of enterprises using artificial intelligence technologies in the total number of enterprises, %	≥ 6
Index of readiness for advanced technologies	≥ 0.6
IT business environment competitiveness index	≥ 13
Government sector	
Indicator	Threshold value
Readiness for AI tools	≥ 0.25
Network Readiness Index: Governance	≥ 55
E- participation index	≥ 0.4
Online Service index	≥ 0.5
Cybersecurity index	≥ 60
GovTech Maturity index	≥ 0.6
Transformative capability score	≥ 40

Source: developed by the authors

enables an evaluation of the extent of digital technology penetration into the economic system. For each indicator, a threshold value has been determined (see Table 2). The value of the indicator is deemed to be resilient if it meets the threshold, with a normalized value of 1. Otherwise, it is considered non-resilient, with a normalized value of 0 (see Table 4). This component of the methodology is key in determining the resilience of economic entities to potential shocks.

The calculations showed that Ukraine has an average level of digital adaptation and resilience, with an overall score of 63%. According to the developed rating scale (Table 3), this means that the country is currently in the stage of active implementation of digital technologies, but there is room for improvement. There is potential to withstand some shocks, but there is also a need to implement measures that can strengthen potential resilience.

Currently, the household sector has the lowest score, with the resilience of digital implementations in this sector reaching only 50%. The following indicators were found to be vulnerable: the Digital Skills Gap Index, the level of development of data protection legislation, the IT Talent Competitiveness Index, the stability of mobile internet connections and internet speed.

The Digital Skills Gap Index provides an assessment of a country's readiness for the future development of digitalisation. The assessment includes the number of educational institutions in the country that provide digital skills training to the population, digital responsiveness, government support for digital skills development, and more. According to the most recent data, Ukraine's score on this index is 4.8, whereas the threshold value is 6. The discrepancy between the current value and the threshold value is minimal, but there is scope for enhancement. The data protection laws evaluate the potential protection of personal data

Table 3
Scale for assessing the level of digital transformation and resilience of a country

Resilience level	Resilience scale	Value
Critical level	0-20%	Economic agents have difficulty adapting to digital change. Digital tools and technologies are used minimally, if at all. High vulnerability to shocks, low ability to maintain resilience.
Low	21-40%	Implementation of digital technologies at the initial stage. Partial adaptation to digital changes, but still significant shortcomings. Resilience to shocks is possible, but risks are still high.
Average	41-65%	The adoption of digital technologies is active, but there is room for improvement. The ability to adapt to digital change is at an average level. Ability to withstand some challenges, but there is a need to further strengthen resilience.
Sufficient	66-85%	Implementation and use of digital technologies at a sufficient level. High level of adaptation to change. Significant resilience to shocks, ability to be sustainable and efficient.
High	86-100%	Maximum integration of digital technologies into economic activities. Excellent ability to adapt to change. High resilience to potential challenges.

Source: developed by the authors

in the event of cyberthreats. Regrettably, this indicator necessitates improvement, as its current value is 2, whereas the threshold is 2.5.

The IT Talent Competitiveness Index is a supplementary index to the Digital Skills Gap Index, with a focus on the evaluation of digital skills and competencies among workers in the ICT sector. In this instance, the disparity from the threshold value is negligible, with a mere 0.3 points separating the two: in 2023, the index value stood at 21.7, while the threshold value is set at 22. The investigation identified vulnerabilities in select indicators of digital infrastructure resilience, notably the speed of fixed broadband and mobile internet connections. While mobile internet speed is close to the threshold, broadband speed needs more improvement (80.20 Mbps compared to the expected 100 Mbps). However, the low internet speed is largely offset by positive results in the assessment of universal connectivity. This indicator assesses the number of internet users, the share of households with internet access at home and active mobile broadband users. According to this indicator, the Ukrainian population actively uses the Internet and generally has free access to the network. Positive results and dynamics are also observed in the indicator of average monthly salaries of employees working in the ICT sector: while the threshold value is 2.2 thousand EUR, Ukrainian specialists receive on average 3.2 thousand EUR (based on 2024 data). The business sector shows better results, with its resilience estimated at 60%, indicating a slightly better adaptation to and development of digital technologies within the sector. The following areas were identified as vulnerable: the share of the population employed in the ICT sector and the overall competitiveness of the IT business environment.

One of the hallmark features of an enterprise's automation level is the utilisation of AI tools. The baseline value for this indicator was established at 6% (based on the experience of EU countries), yet the contemporary Ukrainian business environment exhibits slightly lower indicators. In 2023, a mere 5.4% of enterprises employed AI tools to automate their processes. The value of the indicator of the share of enterprises implementing ICT security measures is also below the threshold. In 2023, the proportion of enterprises implementing security measures was recorded at 73.2%, falling short of the EU average of 90%. Furthermore, the proportion of the employed population engaged in the ICT sector remains modest, accounting for a mere 1.9% of the total employed population. Moreover, the IT Business Environment Competitiveness Index requires enhancement, with Ukraine currently achieving a score of 8.8.

The government sector has been found to demonstrate the highest level of resilience, with an overall score of 86%. The sole vulnerability identified pertains to the level of online services provision, as gauged by the Online Services Index. Despite the prevalence of electronic government services in Ukraine, the current score for this indicator falls short of the established threshold. 0.4 points compared to the expected 0.5.

As demonstrated by the assessment results, there is still room for improvement, but Ukraine also has strengths. Specifically, favourable indicators encompass the advancement of digital infrastructure, the aptitude for novel digital technologies, the accessibility of IT professionals and the remuneration of ICT specialists (along with the competitiveness of the IT sector in general), and the integration of digital solutions within the government sector.

4. Conclusions

Digitalisation is the process of implementing digital technologies in all areas of economic and social activity in order to increase the efficiency, innovation and competitiveness of the economic system. The main elements of digitalisation are digital infrastructure,

Table 4
Results of the Calculation of Integral Index of Digital Resilience for Ukraine

Households sector						
№	Indicator	Threshold value	2022	Normalised value	2023	Normalised value
1	Digital Skills Gap Index	≥ 6	4.8*	0	4.8*	0
2	Global Connectivity Index, %	≥ 70%	74,60***	1	74,60	1
3	Network Readiness Index: People, %	≥ 44	54.43	1	57.07	1
4	Average monthly salary of employees working in the ICT sector, thousand EUR	≥ 2.2	3.3	1	3.4	1
5	Human Capital Index	≥ 0.40	0.51*	1	0.51*	1
6	Data protection laws	≥ 2.5	2	0	2	0
7	IT Talent Competitiveness Index	≥ 22	21.7***	0	21.7	0
8	Information Access Index	≥ 6	8	1	8**	1
9	Mobile Internet Stability Index	≥ 0.13	0.10	0	0.08	0
10	Broadband Internet connection speed, Mbps	≥ 100	51.70	0	75.14	0
Sector result			50%			
Business sector						
№	Indicator	Threshold value	2022	Normalised value	2023	Normalised value
1	IT Competitiveness Index for Central and Eastern Europe (CEE) in 2023 by economic impact component	≥ 9.5	10.9***	1	10.9	1
2	Growth rate of software markets, %	≥ 10	15.3	1	15.3	1
3	Share of the number of enterprises that apply ICT security measures in their information and communication systems in the total number of enterprises, %	≥ 90	73.2***	0	73.2	0
4	Global Innovation index	≥ 30	31.0	1	32.8	1
5	Export of ICT services, billion USD	≥ 6.5	7.52	1	6.9	1
6	Network Readiness Index: Technology	≥ 40	50.5	1	47.8	1
7	Share of the employed population in the ICT sector in the total employed population, %	≥ 4	1.9*	0	1.9*	0
8	Share of the number of enterprises using artificial intelligence technologies in the total number of enterprises, %	≥ 6	5.4	0	5.4**	0
9	Index of readiness for advanced technologies	≥ 0.6	0.6	1	-	1
10	IT business environment competitiveness index	≥ 13	8.8***	0	8.8	0
Sector result			**60%**			
Government						
№	Indicator	Threshold value	2022	Normalised value	2023	Normalised value
1	Readiness for AI tools	≥ 0.25	0.29	1	0.31	1
2	Network Readiness Index: Governance	≥ 55	60.81	1	60	1
3	E- participation index	≥ 0.4	0.6	1	0.6**	1
4	Online Service index	≥ 0.5	0.3	0	0.4	0
5	Cybersecurity index	≥ 60	65	1	65	1
6	GovTech Maturity index	≥ 0.6	0.8	1	0.8**	1
7	Transformative capability score	≥ 40	43	1	42	1
Sector result			**86%**			
Total result			63%			

* data for 2021;

** data for 2022;

*** data for 2023.

digitalisation agents, digital technologies and the economic system as the direct object of impact.

The set of tools and technologies used to integrate digitalisation processes into the economy to enhance its ability to absorb and recover from shocks forms the mechanism of digitalisation's impact on resilience. The core process of this mechanism is automation, supported by digital infrastructure. The impact of digitalisation on resilience occurs mainly through the functions performed by digitalisation agents, and these functions form a single, coherent system. The practical impact of digitalisation manifests itself through the integration of digital technologies into economic activities – methods and tools that create digital products, transform business models and reshape interactions between sectors. Digitalisation can have both positive and negative effects on the resilience of the economy, but government regulation can significantly mitigate the negative effects.

The results obtained show that the methodology for assessing digital transformation and resilience comprehensively covers the functions and potential capabilities of each sector, in particular by including components related to the analysis of digital development and the determination of potential resilience based on established thresholds. The proposed approach has facilitated the identification of vulnerable areas in the Ukrainian household sector, including significant disparities in digital skills among the population, the availability of quality ICT technologies, and the development of data protection legislation on digital platforms. The vulnerabilities in these areas indicate an uneven spread of digital transformation in the household sector and the need to support the digitalisation process with more specific legislative and regulatory measures. In Ukraine's business sector, the assessment found a strong link between the adoption of digital technologies and increased resilience to economic shocks, particularly in the use of ICT technologies and readiness for further digital development. Concurrently, an evaluation of Ukraine's government sector revealed that it currently exhibits the highest degree of resilience, particularly in the context of prevailing digital transformations. There is a discernible positive trend in the implementation of electronic services and the integration of digital technologies within public administration.

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