BENEFITS AND RISKS OF DIGITAL BUSINESS TRANSFORMATION: THE EXAMPLE OF EASTERN EUROPE COUNTRIES

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ABSTRACT

The purpose of this research was to conceptually substantiate an effective business digitalization strategy in Eastern Europe (EE), taking into account the identification of destructive and complementary factors of digital transformation (DT). The survey, completed by top managers of companies from different sectors of the EE countries' economy, helped form a system of indicators for assessing the level of DT by country. The systematization of the DT factors made it possible to differentiate them by the nature of influence, advantages, and threats of the DH (digital humanities) for the EE countries. The results indicated a low and medium level of DT in the countries studied because of the lack of a digitalization strategy. A matrix of business digitalization management strategies has been formed for Eastern European countries, considering the efficiency level, digitalization threats, and the priority in their management. It will help mitigate the threats of DT and reduce the digital divide with countries with a high level of DT.

Keywords: digital transformation, business, Eastern Europe, digital technology, strategy, digital economy.

INTRODUCTION

The consequences of the pandemic have become drivers of the intensity of the transition to DT in business around the world. According to

the latest Gartner estimates, in 2020, about 91% of the companies in the world used information technology, and 87% of CEOs surveyed consider DT as a priority for their strategic business development (Goasduff, 2020).

The countries of Eastern Europe are also active participants in the DT of business, having already felt the consequences of effective data management: ensuring social inclusion and economic growth, and the creation of new jobs. In current conditions, most countries of Eastern Europe are characterized by one of the highest levels of development in software development, the IT sector, and the introduction of digital technologies. According to McKinsey & Company, digital technologies in Central and Eastern Europe (CEE) can lead to an increase in GDP to €200 billion (Atlantic Council, 2020).

Most countries of the region, in particular: Russia, Poland, Ukraine, Hungary, Belarus, and Romania, have identified DT as a critical imperative to reach sustainable and innovative development (International Institute for Management Development, 2022). The Eastern European region is characterized by an impressive reserve of highly qualified technical personnel and a high level of technological expertise in implementing digital projects of any scale and complexity (N-iX, 2021). But in comparison with developed countries, DT in the region lags far behind. Two countries are the leaders in the DT of business today: China and the United States, which are characterized by the world's highest rates of introduction of high-speed 5G internet, more than 50% of the number by the presence of hyper-scale data centers, and about 90% of the capitalization of the most prominent digital platforms in the world (UNCTAD, 2021). These countries in the global dimension receive the most incredible benefits from digitalization in terms of financial, market, and technological opportunities control over large data sets.

This kind of success is not for everyone. The possibilities of countries for DT vary significantly, depending on the country's financial potential, readiness to introduce information technologies, the level of human capital, market conditions, government support, etc. But against the background of various economic opportunities, as the importance of data as a financial resource in the global space increases, the digital gap between developed and developing countries also increases. Creating the added value of data or digital intelligence ensures the competitiveness of the business and its sustainability development. It has no value without turning data into digital intelligence, so countries that cannot provide processing soon can only serve as raw data providers for global digital platforms. At the same time, such countries lose the benefits of DT and will also force to buy digital intelligence to support their development.

From previous studies within the change management theory framework, we know that any changes are challenging to implement since this requires certain conditions, time, and readiness for change (Schwer & Hitz, 2018). More than 70% of large companies fail to implement various changes in their activities (Shapran & Britchenko, 2021). And if we are talking about DT, then such changes are characterized by a high cost of implementation, require specialized skills of the company's employees, and the organization's readiness to such changes (Lysiuk & Britchenko 2020; Bezpartochnyi, Britchenko & Bezpartochna, 2021; Pirtskhalaishvili, Paresashvili & Kulinich, 2021). Scientists have proven in the practice of numerous companies that, along with the difficulty of introducing any change, the business usually takes a long time to respond to their adaptation (Megits, Neskorodieva & Schuster, 2020; Lysiuk & Britchenko, 2021; Vasiljeva et al., 2020). At the same time, DT requires a quick response because the organization risks losing its place in the market in the shortest possible time and becoming uncompetitive. Therefore, against the background of all the benefits for the business development and economy, DT also carries certain risks which are too tricky to predict and estimate. Our scientific priority was to study the comprehensive experience of DT in EE, as a region with emerging economies that have embarked on the path of active development of the digital economy, but which face many obstacles.

LITERATURE REVIEW

DT is one of the vaguest terms in the scientific literature today. Based on the topics considered, can argue that this concept covers many aspects of business: digital infrastructure, the creation of value by transforming physical business operations into digital, generating and

processing large amounts of information, changing relationships with demand, and dual interaction with customers at all levels of business-divisions (Schwer & Hitz, 2018; Nguyen & Tuyen, 2021). At the same time, research today more and more considers the effects of DT either in a specific type of business or at the level of one business operation (Schwer & Hitz, 2018).

DT in the scientific, economic literature is associated with such concepts as digitization and digitalization. Since scientists use these concepts in various aspects of the study of the digital economy, there has been some confusion in formulating the content of these concepts. At the end of the 20th century and in the 21st century, to solve any problems, a person began to use gadgets, digital networks, various cloud data storage everywhere, which simplified their life, making it richer and more functional. This process is called digitization, which refers to converting analog technologies and physical objects into digital ones (Schwer & Hitz, 2018).

The digitization process develops quite rapidly, contributing to faster-unlimited access to a large amount of diverse information. It has necessitated the introduction of digital technologies in various areas of life and production, allowing already digitized information and automating business processes. This process is digitalization. (Nguyen & Tuyen, 2021).

DT is based on fundamental changes in approaches to management, corporate culture, external communications, that are related to the introduction of information processes at all levels of business (Ghosh et al., 2021).

At the heart of DT are organizational changes, which correlate to the concept of "development." Many organizational change theories are presented in the scientific literature, giving a specific idea of how an organization (business) works and how it has been transforming. Organizational changes represent the formation of a new organizational structure, intending to adapt to changes in the external environment. Therefore, one can argue that DT is a tool to increase a business or organization's economic and social efficiency. To the majority extent, this applies to information and communication, media, professional services, financial and insurance, trade, and advanced manufacturing (Gandhi, Khanna & Ramaswamy, 2016). But it is also relevant for slowly digitizing industries,

such as healthcare, construction, and agriculture (Gandhi, Khanna & Ramaswamy, 2016).

Most scientific studies hypothetically or empirically have proven the positive impact of the DT on business, sustainable development, and labor productivity, improving the quality of goods and services, reducing time and material resources spent on production, and providing services (Deloitte, 2020, Nguyen & Tuyen, 2021; Ghosh et al., 2021). However, the positive impact of digitalization on business performance is not so noticeable. According to McKinsey's research, less than one third of organizational changes increase business efficiency. At the same time, concerning information transformations, their effectiveness is even lower, especially when maintaining the sustainability of the positive effect (McKinsey, 2018).

An inverse relationship has been proven between digitalization and labor productivity in OECD countries. The productivity decrease is explained by the fact using digital technologies requires appropriate infrastructure, technical, managerial skills, financial capabilities, and power cybersecurity management policies at the micro and macro levels, etc. (OECD, 2022).

Some countries of Eastern Europe (Hungary, Poland, Slovakia, Czech Republic) are members of the OECD. Other countries of Eastern Europe (Belarus, Bulgaria, Moldova, Russia, Romania, Ukraine) are characterized by a lower level of DT. That suggests even less efficient use of digital technologies in these countries than in OECD countries (Fletcher School, 2022; E-Governance Academy, 2022).

DT management is a complex system task that cannot be solved using universal management methods. Understanding the essence of changes allows finding an appropriate way to manage their implementation, considering its main advantages and disadvantages. We have focused on business and management to highlight the importance of DT for emerging economies.

METHODOLOGY
Evaluation of the effectiveness and threats of DT in business

International organizations and rating agencies have developed many business digitalization indicators. But their use is limited because they have a short period of data publication and do not cover all countries of Eastern Europe

(Fletcher School, 2022; E-Governance Academy, 2022). Of the threats associated with DT, there is data on cyber threats, which does not reflect all the threats of DT (E-Governance Academy, 2022). The lack of necessary statistical information necessitated using the questionnaire method.

Top managers of companies from Eastern Europe (Belarus, Bulgaria, Hungary, Moldova, Poland, Russia, Romania, Slovakia, Ukraine, Czech Republic) took part in the survey, With one representative from each company. These companies represented different industries with different assets, of income, headcount, and profitability or unprofitability. However, top managers of IT companies were not involved in the survey since they have a higher digitalization level.

1125 respondents from Belarus, 920 from Bulgaria, 1133 from Hungary, 1163 from Moldova, 1327 from Poland, 1503 from Russia, 1205 from Romania, 983 from Slovakia, 1621 from Ukraine, 1295 from the Czech Republic took part in the survey.

The survey was conducted during September-November 2021 remotely. The questionnaire consisted of questions related to the effectiveness and threats of DT, and was compiled using Deloitte, 2020; Nguyen & Tuyen, 2021; Ghosh et al., 2021 (Google Forms, 2022). We used a 20-point scale for evaluation. In terms of performance DT indicators, a higher score meant that for the company DT brings a more significant positive effect for business. It was not the potential opportunity to improve business efficiency through DT that was assessed, but

fundamental changes in companies. In terms of digital threats, a higher score on questions meant a higher likelihood of significant losses for the company.

The questionnaire contained a control question to assess the DT development: "Do you agree that using digital technologies is developed in your country?". This question allowed us to evaluate the degree of consistency in respondents' assessments for each country. This question used a statistical indicator analog Digital Development Level (E-Governance Academy, 2022). The median was calculated separately for each country under study based on respondents' estimates on this issue. Ranges of possible scores for the questionnaire question - [0; 20], the content of Digital Development Level estimates is [0; one hundred]. Grade values were standardized (Anysz, Zbiciak & Ibadov, 2016). The standardized values deviation of the median according to the assessments for the questionnaire question from the standardized value of the Digital Development Level for all countries hasn't exceeded 3% (E-Governance Academy, 2022).

Despite the assessment results' representativeness, some assessments turned out to be inconsistent. These scores have been excluded. The number of respondents whose estimates we used for further analysis was given in Table. 1. The number of respondents for each country is sufficient to provide a level of significance p=0.05 (Taherdoost, 2017).

Table 1: Number of survey respondents by Eastern European countries

COUNTRY	NUMBER, PERS.	COUNTRY	NUMBER, PERS.	COUNTRY	NUMBER, PERS.
BELARUS	1048	Poland	1315	Slovakia	983
BULGARIA	905	Russia	1477	Ukraine	1592
HUNGARY	1118	Romania	1193	Czech	1295
MOLDOVA	1051				

Source: Authors' finding

Levels of effectiveness and threats of business DT

Using the fuzzy set method, we determined the DT effectiveness/threats levels based on the

respondents' scores on the questionnaire. To determine the levels of private and integral indicators, we used a trapezoidal membership function. With the help of the cluster analysis method, we defined zones of 100% confidence for

a certain level. Cluster analysis was carried out in the Statistica 12 program using the following ways: hierarchical clustering to determine the number of clusters - levels of effectiveness/threats of DT; k-medial to assess the range of indicators values corresponding to the adequacy levels of the clustering results.

The sample for clustering was formed from the answers of respondents for all countries and each question separately. We supplemented this sample with the observation of the minimum ("0" points) and maximum ("20" points) possible indicators values which made it possible to take into account all possible levels of indicators. The current ranges of indicator values by clusters were formed based on them, then adjusted according to the 3-sigma rule, including the efficiency and threats of digitalization. Estimates of respondents not included in the indicated ranges created intermediate levels. We calculated the integrated efficiency/threats of DH (1) (Krawczak & Szkatuła, 2020).

$$IEG(ITG) = \sum 0 \times \mu_L + 0.5 \times \mu_M + 1 \times \mu_H$$

$$\mu_L = \begin{cases} 1, & 0 \leq G \leq G1 \\ \dfrac{G2 - G}{G2 - G1}, & G1 < G < G2 \\ 0, & G2 \leq G \leq 20 \end{cases}$$

$$\mu_M = \begin{cases} 0, & 0 \leq G \leq G1, G4 \leq G \leq 20 \\ \dfrac{G - G1}{G2 - G1}, & G1 < G < G2 \\ \dfrac{G4 - G}{G4 - G3}, & G3 < G < G4 \\ 1, & G2 \leq G \leq G3 \end{cases}$$

$$\mu_H = \begin{cases} 0, & 0 \leq G \leq G3 \\ \dfrac{G - G3}{G4 - G3}, & G3 < G < G4 \\ 1, & G4 \leq G \leq 20 \end{cases}$$

Where *IEG(ITG)* – an integrated indicator of DT efficiency and DT threats;

μ_L – the probability of classifying the indicator of DT efficiency/threats as a low level, μ_M – to the average, μ_H – to high;

G – the score for a questionnaire question reflecting the DT effectiveness/threats;

[0; *G1*] – the range of indicator values G, which, according to the results of clustering, corresponds to a low level, [*G2*; *G3*] – to the average, [*G4*; 20] - to high.

The resulting adequacy of clustering has been confirmed by: the excess of the intergroup dispersion over the intragroup one for all indicators; empirical values of the F-criterion (14.02-50.66) which exceed the critical value (2.99) at a significance of 0.05 (Cunningham, Weathington & Pittenger, 2013).

Business Digitization Management Strategy Matrix

We substantiated the choice of indicators to create business DH management strategies as follows:

1. substantiation of the feasibility of business DT by assessing the integral levels of its DT effectiveness / DH threats (Nguyen & Tuyen, 2021).

2. determining the prioritization of DT threats in managing them (Deloitte, 2020; Ghosh et al., 2021) using the graph method. The graph's vertices showed digitalization threats. The edges of the graph were causal relationships between threats, which have been determined using the Granger test based on the respondents' scores using the Granger and Dickey-Fuller test in the EViews 10 program. The probability of time series with no stationarity did not exceed 0.05 at the 0 integration level.

Using the graph method and MICMAC analysis, an "influence-dependence" diagram was built between digitalization threats. We calculated the threat impact score as the number of threats it affects. We calculated the threat dependency index as the number of threats that provoke it.

The range of maximum values of the indicators (which corresponds to the number of DT threats) was divided into two equal intervals, and an "influence-dependence" matrix was formed, including four quadrants - groups of threats:

"independent threats" - basic, affecting most other threats and independent of others;

"dependent threats" - resulting indicators of other threats. They depend on most threats but don't affect other threats;

"autonomous threats " - independent of others and do not affect others;

"linking threats" that occupy intermediate positions in the threat graph. They are a consequence of the influence of most threats and the cause of the manifestation of others. (Romano, Ferreira & Caeiro, 2021).

RESULTS

Based on the survey results, we determined that all respondents indicate the possibility of improving business efficiency through digital technologies. All scores exceeded "0" points but were far from the maximum level. The arithmetic mean estimates for the overall effectiveness of DH were "4.36"-"10.97" points for countries (Table 2) with a potential value of "20" points. The integral indicator values of the efficiency of DH are 0.22-0.55 with a likely "1".

Table 2: DT effectiveness Indicators in Business of Eastern Europe, 2021

COUNTRY	AS	IEG	COMP, %			COUNTRY	AS	IEG	COMP, %		
			L	M	H				L	M	H
BELARUS	5.07	0.25	75.8%	23.2%	1.0%	Russia	9.44	0.47	13.2%	84.8%	2.0%
BULGARIA	8.98	0.45	20.1%	76.9%	3.0%	Romania	8.43	0.42	25.6%	72.3%	2.1%
HUNGARY	9.84	0.49	9.5%	87.0%	3.5%	Slovakia	10.21	0.51	5.1%	89.7%	5.2%
MOLDOVA	4.36	0.22	84.4%	14.9%	0.7%	Ukraine	5.39	0.27	68.7%	30.2%	1.1%
POLAND	10.12	0.50	4.2%	92.0%	3.8%	Czech	10.97	0.55	1.6%	92.8%	5.6%

AS - arithmetic mean score for DT efficiency indicators, points; IEG - integrated indicator of DT efficiency; Comp - % of companies by efficiency level; L - the low level of DT efficiency; M – the average level of DH efficiency; H – the high level of DH efficiency.

Source: Authors' finding

The following levels of DT efficiency were determined: low with the values of the integral indicator [0; 0.31], medium [0.40; 0.61], high [0.73; 1].

The use of digital technologies characterizes companies with a low level of efficiency:

- simplification of internal and external communications (the advantage for companies has been estimated at an average of "15.8" points);
- quick access to information ("12.1" points);
- remote cooperation with clients ("10.2" points);
- optimization of the company's logistics costs ("10.1" points);
- speeding up the search for goods/materials in the warehouse, optimizing the route when moving ("9.9" points);
- reduction of time for delivery of goods/services ("9.8" points);
- obtaining information about customers' goods (services) by tracking the frequency of visiting the site, viewing goods, orders, etc. ("9.3" points).

The companies with a low level of efficiency are characterized by a communicative and logistical orientation using digital technologies, that is, to simplify communications and optimize logistics processes within the company and with counterparties.

The companies with an average level of DT efficiency are characterized by the following areas for using digital technologies:

- increasing brand awareness through using Internet marketing ("15.1" points); improving the product quality/services) ("13.6" points);
- optimization of the company's production processes ("12.8" points);
- automation of accounting, financial, and other reporting ("11.1" points);
- processing of large data sets ("10.7" points);
- monitoring the employees' performance

("9.2" points).

The average level of efficiency using digital technologies in companies is ensured by optimizing communication, logistics processes, internal business processes, production processes, using Internet marketing, automating accounting and reporting, and working with big data.

A high-efficiency level is ensured by introducing artificial intelligence, robotics, full automation of companies, and ensuring smooth functioning. The advantages of DT which characterize the companies with a high level of efficiency:

- the ability to manage the company, work in the company, being located anywhere in the world ("13.8" points);
- the possibility of uninterrupted functioning of the business in conditions of forced social isolation ("12.9" points);
- expanding customer access to the company's products by creating "virtual fitting rooms," demonstrating goods and services through local and global networks (11.5 points);
- saving time for solving problems by automating problem-solving algorithms ("10.9" points);
- simplification of personnel adaptation leads to innovations by automating some of the

tasks ("10.5" points);
- reduction of errors due to the human factor ("10.4" points);
- providing personalized interaction with customers through artificial intelligence ("8.3" points); and
- reducing the digital divide with the best companies in the world (country, region, industry) ("8.1" points).

Using the methods of cluster analysis and fuzzy sets, we determined the values range of the integral indicator of DT threats according to its levels: 1) low [0; 0.26], average [0.43; 0.63], high [0.79; 1].

The low level of threats is inherent in companies whose personnel are interested in introducing digital technologies and have experience in their use. When more expensive and reliable technologies have been used, the threat of errors in the technologies' operation has been minimized; companies have a dedicated data protection system; and the threat of unauthorized interference in the process of production, information, and management systems is minimized. There is an operational system for responding to cyber-attacks. The low level of threats is typical mainly for companies from the Czech Republic, Poland, and Slovakia (Table 3).

Table 3: DT threat level of business in Eastern Europe, 2021

COUNTRY	AS	ITG	COMP, %			COUNTRY	AS	ITG	COMP, %		
			L	M	H				L	M	H
BELARUS	17.35	0.87	1.4%	5.9%	92.7%	Russia	10.71	0.54	3.0%	93.2%	3.8%
BULGARIA	10.19	0.51	8.5%	87.5%	4.0%	Romania	10.71	0.54	10.6%	83.3%	6.1%
HUNGARY	12.01	0.60	5.4%	71.6%	23.1%	Slovakia	4.88	0.22	82.5%	15.7%	1.8%
MOLDOVA	17.87	0.89	0.6%	1.2%	98.2%	Ukraine	12.94	0.50	14.6%	82.0%	3.5%
POLAND	4.10	0.18	81.0%	16.8%	2.2%	Czech	3.06	0.13	98.5%	0.9%	0.5%

AS - arithmetic mean of the DT threat indicators, points; ITG - Integral indicator of DT threats; Comp - % of companies by threat level; L - low level of DT threats; M - the average level of DT threats; H - high level of DT threats.

Source: Authors' finding

The average level of threats is typical for companies in Bulgaria, Hungary, Russia, Romania, Ukraine. The companies with a medium level of threats need to develop DT. But they don't have enough experience and competencies necessary to maximize the benefits of digitalization. These companies lack a cybersecurity management strategy and are characterized by threats:

1) loss of information as a result of infection of the corporate network with malware (average of "13.7" points);
2) disclosure of personal data and confidential information ("13.5" points);
3) information leakage ("13.1" points);
4) intrusion of malefactors through information systems ("11.8" points);
5) intruders interference in the technological process ("10.6" points).

Companies with a high level of DT threats are borne by insecurity from cyber-attacks, the inability to use all the DT benefits, and errors in the operation of digital technologies. For all questions of the questionnaire that characterize the DT threats, the average ratings of respondents were not lower than "14.8" points. A high level of digitalization threats is inherent mainly in Belarus and Moldova.

We established causal relationships between DT threats (the probability of their independence not exceeding 0.04) (Rajbhandari & Zhang, 2021) (Tab. 4).

Table 4: Cause-and-effect relation between business DT threats in Eastern European countries

Relation	Prob	Relation	Prob	Relation	Prob
Pers → Leak	0.01	Exp → Qual	0.00	Strat → Tech	0.00
Leak → Pers	0.00	Strat → Pers	0.00	Strat → Inf	0.00
Fake → Stop	0.02	Strat → Leak	0.00	Strat → Dis	0.01
Fake → Rob	0.03	Strat → Infec	0.01	Disint → Qual	0.00
Exp → Pers	0.00	Strat → Mon	0.00	Stop → Rob	0.04
Exp → Leak	0.00	Strat → Qual	0.02	Dis → Qual	0.00
Exp → Infec	0.03	Strat → Exp	0.02	Dis → Disint	0.04
Exp → Mon	0.01	Strat → Disint	0.01		

Prob - probability not statistically significant relationship;

DT Threats: Pers - disclosure of personal data and confidential information; Leak - leakage of data, unauthorized collection of data; Infec - loss of data as a result of infection of the corporate network with malware; Fake - Creation of a simulated reality; Mon - loss of money because of transfer to fake companies; Qual - decrease in the quality and efficiency of employees work; Exp - reduction in the company efficiency due to lack of experience in DT, unskilled personnel; Strat - digitalization will not bring business benefits because of lack of a DT strategy, business adaptation to new technologies; Disint - will not bring business benefits because of disinterest of management and staff; Tech - Failure of the company's operation as a result of intruders' interference in the technological process; Inf - Causing harm to the company as a result of the intervention of intruders through information systems; Stop - Stopping the functioning of the company because of temporary malfunctions of technologies, failures, errors of the system, not related to the interference in their functioning; For - Dependence on foreign digital technology providers; Dis - Tension in the team as a result of the dismissal of workers because of automatization; Rob - Making bad decisions by robots without human intervention.

Source: Authors' finding

Based on the established cause-and-effect relations, we built the Reachability Matrix between business DT threats (Table 5). Score "1" means a chain of cause-and-effect relationships between the i-th indicator, reflected in the rows of the table, and the j-th, reflected in the columns. A score of "0" - relations do not exist.
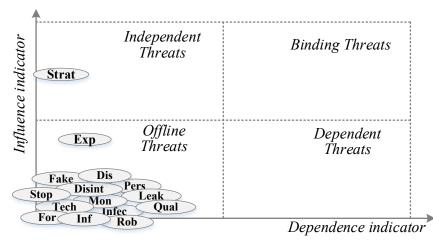
Table 5: Reachability Matrix between business DT threats in Eastern Europe

Threats	Pers	Leak	Infec	Fake	Mon	Qual	Exp	Strat	Disint	Tech	Inf	Stop	For	Dis	Rob	I
Pers	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Leak	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Infec	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Fake	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	3
Mon	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Qual	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Exp	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	6
Strat	1	1	1	0	1	1	1	1	1	1	1	0	0	1	0	11
Disint	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
Tech	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Inf	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Stop	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
For	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Dis	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	3
Rob	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
D	4	4	3	1	3	5	2	1	3	2	2	2	1	2	3	-

I - influence indicator; D - dependence indicator.

Source: Authors' finding

We built an " influence-dependence " matrix using influence indicators and the relations between digitalization threats. (Fig. 1).
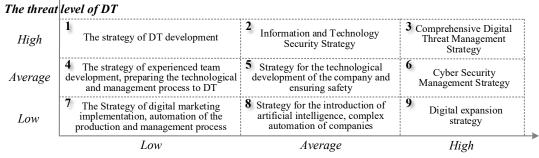

Figure 1: Influance-Dependency Matrix of DT Threats in the business of Eastern Europe

Source: Authors' finding

Among the studied threats, one independent threat was identified as the lack of a strategy for business adaptation to new technologies. Other threats are defined as "standalone." These threats from the directions for ensuring effective 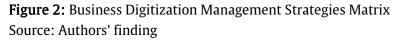business DT should be considered when developing a strategy. Binding and dependent ones have not been identified. This means that all supposed threats must be considered when developing a business DT management strategy.

Business digitalization management strategies have been determined based on the integral

indicator of DT efficiency/ threats, adjusted according to business priorities (Fig. 2).

The threat level of DT

	Low	Average	High
High	**1** The strategy of DT development	**2** Information and Technology Security Strategy	**3** Comprehensive Digital Threat Management Strategy
Average	**4** The strategy of experienced team development, preparing the technological and management process to DT	**5** Strategy for the technological development of the company and ensuring safety	**6** Cyber Security Management Strategy
Low	**7** The Strategy of digital marketing implementation, automation of the production and management process	**8** Strategy for the introduction of artificial intelligence, complex automation of companies	**9** Digital expansion strategy

Level of efficiency of DT

Figure 2: Business Digitization Management Strategies Matrix
Source: Authors' finding

The first cell corresponds to companies with low digitalization efficiency and high threats. That raises doubts about the need for DT at these companies. But, as the survey results showed, the expansion of digitalization, the creation of appropriate infrastructure, and the digital competencies development of production and management personnel can help increase efficiency in business in Eastern Europe. In addition, DT is a modern trend of economic growth. The number of companies using digital technologies is increasing. To provide the opportunity to cooperate with them (implementation of money transfers, information exchange, etc.), it is necessary to have the required technologies and own them. With this in mind, for companies in the first cell, a goal of DT strategy is to develop digital competencies. In these companies, digital technologies are used at a basic level, and the staff does not have the experience and necessary competencies. They are not interested in DT.

The main problem for companies in the second and third cells is reducing digitalization risk by ensuring security. Depending on the second cell, there is a high-efficiency level, focusing on improving the technological process, accounting, and reliability, and working with big data. Therefore, for these companies, ensuring the safety of the technical process and information security is reasonable. The use of digital technologies for companies in the third cell must be more comprehensive.

The fourth cell contains the companies with low efficiency and a medium level of DT threats. For these companies, the problem of staff incompetence is less relevant than for companies

in the first cell. Despite this, there is a shortage of experienced employees, and digital technologies are practically not used to automate production and management. These companies are suitable for forming a professional team and preparing digitalization technology and management.

For companies in the fifth cell, based on the average level of digitalization efficiency and the intermediate level of threats, a strategy for technological development and ensuring its security is recommended.

Companies in the sixth cell are characterized by a high level of digitalization efficiency and the introduction of AI. The threats for these companies are the loss of information due to corporate network infection with malware the disclosure of personal data. To minimize these threats, a cybersecurity management strategy has been chosen.

A low level of DT threats characterizes cells seven through nine, so strategies aim to increase the use of digital technologies.

DISCUSSION AND CONCLUSION

A combination of quantitative and qualitative assessment methods helped comprehensively assess the DT benefits/threats for developing economies. It thoroughly allows us to take into account the features of DT in contrast to the previously proposed approaches (Nguyen & Tuyen, 2021; Schwer & Hitz, 2018). When evaluating the benefits, they operate mainly with indicators of GDP per capita or labor productivity, which does not allow taking into account the qualitative nature of changes in the business. When assessing threats to DT, using an

expert method made it possible to evaluate cybersecurity threats (Nguyen and Tuyen 2021) and the threats of not receiving the potential effect of technological failures too. Using quantitative evaluation methods, we substantiate the obtained results empirically. That has given an advantage (in comparison to using the analysis and the deductive methods (Ghosh et al. (2021), Schwer and Hitz (2018)) to reveal the current patterns of DT development in Eastern Europe reliably. This allowed us to form an empirical basis for the scientific substantiation of effective DH strategies for these countries for reducing the digital divide with developed economies and countries that are world leaders in DT in the future.

We concluded that the countries of Eastern Europe have a low and medium level of DT efficiency. Technologies are used for better effect in the Czech Republic, Slovakia, Poland - in countries with the most advanced digitalization of the economy. These countries have a highly developed DT experience in digital competencies, allowing more efficient use of available technologies. Another reason for a more efficient DT of business in these countries is higher economic development, which ensures a higher volume of investments in digital adoption.

Belarus, Moldova, and Ukraine are the least economically developed and are characterized by a low level of business DT. The country-average value of the integral indicator of DT efficiency in business is 3.7-4.6 times lower than the maximum possible value. 68.7-84.4% of the surveyed companies showed low DT efficiency in business: 14.9-30.2% – average, 0.7-1.1% – high

DT in Eastern European countries positively impacts business performance since the values of the integral indicator of business digitalization efficiency for all companies exceed "0". That confirms the findings of Deloitte (2020), Nguyen & Tuyen (2021), Ghosh et al. (2021), and refutes OECD (2022). But this efficiency for Eastern European countries is at a low and medium level. The potential for improving business efficiency is 55% (for the Czech Republic) and no more than 27% in countries with a low level (Belarus, Moldova, Ukraine).

We have found that DT threats in Eastern European countries are predominantly related to cyber security, underutilization of the benefits of DT, and errors in the operation of digital technologies.

"Independent Threats" are a priority for Eastern European countries, since the lack of a business DT strategy leads to inefficient work of personnel, low qualifications, lack of experienced employees, lack of interest in the business DT, the tension in the team, and high risks of cyber-attacks due to an incorrectly formed security system or its absence. Due to a poorly chosen strategy or its absence, failures in the operation of technologies are possible, for example, when purchasing technologies from unverified manufacturers or lacking the necessary functionality. Therefore, one can argue that developing an effective DT strategy is a top priority for Eastern European counties.

The development of a DT strategy and its implementation, proposed in the framework of the study, differentiated from the level of DT threats/effectiveness, will allow substantiating not only an effective plan using digital technology, but also the measures necessary to minimize employees' resistance to innovation and improve their skills, justification of possible sources of investment in the introduction of digital technologies in business, and the potential effects of DT. In general, a DT effective strategy will allow companies in Eastern Europe to develop towards narrowing the digital divide with more advanced countries.

The findings have significant practical value. But because they were obtained based on a survey of a limited sample of respondents, their implementation is limited to business functioning only in Eastern Europe.

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