

UDK 33(082) (0.034.2)

Volume 1, No. 1, 2023

COLLECTION OF PAPERS NEW ECONOMY

*INNOVATIVE SOLUTIONS FOR MANAGING
THE ECONOMY IN AN INTERNATIONAL CRISIS
SCENARIO*



GEORGE EMIL PALADE
UNIVERSITY OF MEDICINE,
PHARMACY, SCIENCE, AND
TECHNOLOGY OF TARGU MURES



INTERNATIONAL SCIENTIFIC CONFERENCE
**NEW 2023
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*Innovative Solutions for Managing the Economy in an
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UDK 33(082) (0.034.2)

ISSN 2831-1736



Bijeljina
September 2023.

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PUBLISHED BY

“Oikos Institute - Research Center” Bijeljina

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PRINTED BY

Mojić, d.o.o Bijeljina

PRINTING

300 copies

CIP - Каталогизacija u publikaciji
Народна и универзитетска библиотека
Републике Српске, Бања Лука

33(082)(0.034.2)
005(082)(0.034.2)

TRADITIONAL scientific conference on the subject "Innovative solutions for managing the economy in an international crisis scenario" (11 ; 2023)

Collection of papers [Електронски извор] : New economy / XI Traditional scientific conference on the subject "Innovative solutions for managing the economy in an international crisis scenario", 2023 ; [Editor in Chief Stelios Bekiros]. - Onlajn izd. - El. zbornik. - Bijeljina : Oikos Institute – Research center, 2023. - (Collection of papers New economy : online, ISSN 2831-1736)

Sistemski zahtjevi: Nisu navedeni. - Način pristupa (URL): <https://conference.oikosinstitut.org/>. - El. publikacija u PDF formatu opsega 255 str. - Nasl. sa naslovnog ekrana. - Opis izvora dana 5.9.2023. - Bibliografija uz radove.

ISBN 978-99976-748-6-9

COBISS.RS-ID 139006209

COLLECTION OF PAPERS NEW ECONOMY

Vol. 1, No. 1, 2023

ISSN 2831-1728 (Print)

ISSN 2831-1736 (Online)

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UKRAINIAN ENTERPRISES' EQUITY CAPITAL FINANCIAL MONITORING AND ANALYSIS OF ITS IMPACT ON PROFITABILITY INDICATORS

Nina Kushnir ¹, Nataliia Kovshun ², Tetiana Adamchuk ³, Yurii Tymeichuk ⁴, Diana Tsaruk ⁵

Received 13.01.2023.

| Send to review 23.01.2023.

| Accepted 12.05.2023.

Original Article



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JEL Classification:

C35, G31, G32, O16, M21

Doi: 10.61432/CPNE0101001k

UDK: 658.14/.17(477):339.727.22

ABSTRACT

One of the prerequisites for the enterprise's successful operation is the effective capital structure and assets construction. The financial stability of Ukrainian enterprises was significantly affected during the pandemic and during the period of martial law. Financing of economic sectors in Ukraine is currently rather limited, since it is especially relevant for enterprises of various scales to maintain an optimal equity structure to ensure a sufficient financial independence level. Therefore, the article presents the research results into the financial monitoring aspects of the enterprises' equity capital, which serves as a tool for monitoring the capital formation, use and preservation, as well as its impact on the enterprises' financial outcomes. Based on the statistical data for 2015-2022, the dynamics and structure analysis of Ukrainian enterprises' equity capital, as well as its efficiency indicators was carried out. It was found that there is a non-deterministic relationship between the equity capital value and the enterprises profitability indicator, and therefore a correlation-regression analysis was conducted to reveal the reliability of the relationship between these parameters. The calculated correlation coefficient indicates the existence of a significant relationship between equity and the profitability indicator of enterprise activities. Thus, the created regression model of the equity capital influence on the resulting profitability indicator shows the nature in characteristics change and can be used to analyze the enterprises' profitability increasing factors. The study found that in the conditions of martial law, it should be strategically important for enterprises to find profitability increased reserves through capital management.

Keywords: *financial monitoring, equity capital, enterprise's financial result, enterprise's profitability, correlation-regression analysis.*

1. INTRODUCTION

In the conditions of today's challenges, business entities in Ukraine must adapt to the realities that were affected by the pandemic at first, and later by the military-political situation. Under the influence of these negative factors, a large number of enterprises were forced to suspend their activities, relocate, or even liquidate. This means that during the last period practically no new enterprises were created in Ukraine, however, due to state support and lending programs, enterprises are trying to maintain their activities by attracting investments and loan funds (Ahmić, & Isović, 2023).

During the last year, the equity capital of large, medium and small enterprises significantly decreased by 50% in total compared to 2021. Moreover, in 2022 the average profitability of enterprises reached a negative value, and compared to 2020, when the pandemic began, it decreased by almost 6%.

The problems of maintaining profitability remain quite relevant. Therefore, it is an important issue to monitor the impact of optimizing the enterprises' equity capital size and structure on the financial results of their activities and to identify reserves for increasing profitability through the effective use of the company's own financial resources.

In this regard, the purpose of the article is to study the enterprise's equity capital financial monitoring system, and to identify the nature of equity capital influence on the enterprise's profitability.

2. RELATED WORKS

The main research in the field of enterprises' equity management was carried out by such Ukrainian economists as [Buhai \(2016\)](#), [Dekhtiar \(2015\)](#), [Chebanova \(2018\)](#), [Yepifanova \(2015\)](#), who fragmentarily paid attention to the equity capital structure, the factors influencing equity capital for the purpose of increasing the enterprise's financial stability.

[Utkina \(2022\)](#) considered the urgent issue of financial monitoring information support. The problems in the context of making changes to the current legislative framework in connection with the martial law on the territory of Ukraine were considered.

In many scientific works of Ukrainian economists, the economic and legal essence of equity capital concept and its evolution in world and Ukrainian science are highlighted. The article by [Buhai \(2016\)](#) presents theoretical aspects of equity capital as a financial system component, the main problematic issues of practical nature of equity capital certain necessary measures and ways of solving them.

[Kruhlova and Kozub \(2022\)](#) pay considerable attention to the study of factors affecting the Ukrainian enterprises profitability. The authors use the financial leverage ratio, solvency ratio and the enterprises size ratio as economic factors of profitability level changes. The research states that non-economic factors affecting profitability include the effectiveness of management activities, the principles of social business responsibility implementing into the enterprise activity.

[Kovalchuk \(2016\)](#) studies the profitability dynamics of enterprises in different regions of Ukraine under the macroeconomic factors influence. However, this work does not concern the current conditions of the martial law in Ukraine.

The [State Statistics Service of Ukraine \(2023\)](#) annually conducts an activities analysis of different scale Ukrainian enterprises, in particular their assets, equity, loan funds and profitability in terms of activity types. Therefore, the issue of equity capital financial analysis, its dynamics and structure is sufficiently studied, but the problems of creating the financial monitoring system and mechanism at the enterprise, optimizing equity capital and the effectiveness of its use in order to identify its impact on profitability remain unsolved and require further consideration. This study will allow to expand the existing works in the field of research the equity capital use efficiency as an important factor affecting the Ukrainian enterprises profitability indicator.

3. METHODOLOGY AND DATA

The article uses comparison methods, the coefficients method, the method of analytical tables, graphic methods for the schematic representation of the equity capital financial monitoring system and mechanisms, as well as for the representation of the enterprises' equity capital, profitability structure and dynamics.

For researching of the company's own capital use effectiveness, the loan and equity capital ratio, the financial dependence ratio and the equity capital share in the balance amount of the company were used. Loan and equity capital ratio (debt to capital ratio) is calculated by dividing the total debt of the enterprise by its own financial resources. The normative value of this indicator should not exceed 1. Financial dependence ratio (assets to equity ratio) is calculated by dividing the amount of the enterprise assets by its equity (the normative ratio level is within 1.67-2.5). The share of equity capital in the balance sheet of enterprises structure is the result of dividing equity capital by the balance amount and is expressed as a percentage (the normative value is within 40-60%) ([Volkova et al., 2016](#)).

Profitability indicators are represented by the percentage of operational activity profitability and profitability of all activity of enterprises, which were determined according to the average level of enterprises profitability of various types of economic activity (code NACE) .

The method of correlation-regression analysis is carried out in order to identify the influence of the size of the enterprises' own financial resources (X) on their profitability level (Y).

The average values of the factors of the equity capital amount (x) and the enterprises profitability (y) were determined according to data for 2012-2022.

The main closeness and direction indicator of the model factors relationship is the correlation coefficient (r):

$$r = \frac{\sum[(X-x)(Y-y)]}{\sqrt{\sum(X-x)^2 \sum(Y-y)^2}} \quad (1)$$

The correlation coefficient value in the range of 0.66-0.99 indicates a significant and direct connection between the factors.

Correlation coefficient validity criterion (t_r) is calculated based on the standard correlation error (S_r):

$$t_r = \frac{r}{S_r} \quad (2)$$

Correlation coefficient error (S_r) takes into account the number of periods ($n=11$) during which the data for the study were obtained:

$$S_r = \sqrt{\frac{1-r^2}{n-2}} \quad (3)$$

The number of degrees of freedom (v_r) is applied to determine the validity of the relationship between the equity capital amount parameter (X) and the enterprises profitability level (Y) for the period of 2012-2022:

$$v_r = n - 2 \quad (4)$$

Correlation coefficient validity criterion should exceed the corresponding theoretical values of the significance level (Student's test) for v_r at the significance levels of 5% and 1%.

The relationship between considered parameters is expressed through the regression equation, which has the following form:

$$Y = y + R_{yx} (X-x) \quad (5)$$

Using the regression coefficient (R_{yx}), it is possible to determine the level of change in all enterprises' activities profitability when the equity capital amount changes by UAH 1 billion.

$$R_{yx} = \frac{\sum[(X-x)(Y-y)]}{\sum(X-x)^2} \quad (6)$$

The two-factor model is presented graphically in the form of the profitability indicator and the equity capital amount linear dependence and is constructed on the basis of empirical and calculated data ([Ulanichuk 2020](#)).

4.EQUITY CAPITAL FINANCIAL MONITORING SYSTEM

Equity capital is the main part of the balance sheet liabilities, and it is at the enterprise's disposal after deducting the amount of all obligations. Equity capital is financed by funds contributed by the owners or founders and supplemented by the company's own financial resources (Liubar et al., 2019). The equity capital augmentation is possible at the expense of obtaining a positive enterprise's activity financial result. In turn, the predominance of equity capital in the balance structure contributes to the enterprise's financial stability, increases its competitiveness and attractiveness for investments, the reliability of long-term financial investments and ensures the possibility of profit obtaining without significant insolvency risks. However, in order to company's financial resources

effectively use, one should not just increase the company's own resources, but optimize the capital structure, also using the borrowed funds potential.

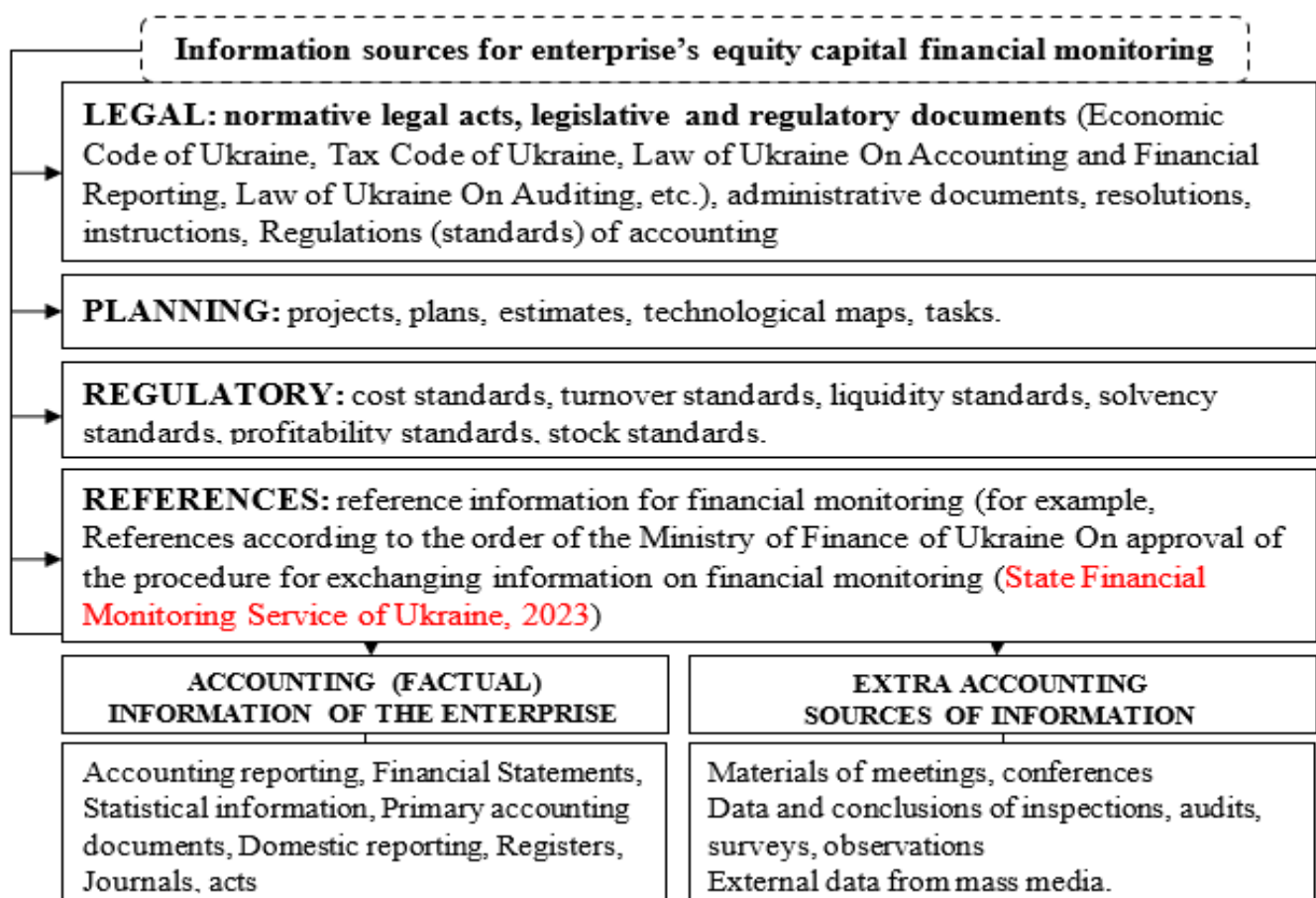
The National Bank of Ukraine and the State Financial Monitoring Service (2023) define the enterprise's equity capital as an important object for monitoring. Since a small amount of the company's equity or share capital is an indicator of an unsatisfactory financial condition it may serve as a sign of the counterparty unreliability, cooperation with which may have negative consequences. Therefore, the capital structure and interrelation checks are often carried out because business entities must transparently disclose the beneficiaries and the ownership structure (Tadić, 2016).

Financial monitoring tools are used in order to track the factors of formation, use and preservation enterprise's own capital. The financial monitoring system significantly adjusts the equity analysis methodology and implements means to identify factors of negative deviations in its structure, determines the impact of equity capital components on the financial result (Babich et al., 2022).

The legal, directive, reference, regulatory sources of information, as well as accounting and non-accounting data should be used in the process of enterprise's own capital financial monitoring (Fig. 1). Legal, regulatory and reference information support of financial monitoring serves as a methodical basis for its implementation. Planned sources of information can be the target project indicators, planned amount of revenues and expenses of the company, planned estimates, which are used for monitoring purposes as a reference point for calculating deviations of actual and planned indicators (Utkina, 2022).

The analysis of data on changes in equity capital is carried out with the use of the Equity Report, which contains information on the balance of equity capital at the beginning and end of the year, the income amount and capital use, as well as its structural elements. Financial monitoring entities should pay considerable attention to the comparison of the equity capital receipt and use coefficients in order to monitor whether the enterprise is increasing its capital (Kudina et al., 2017).

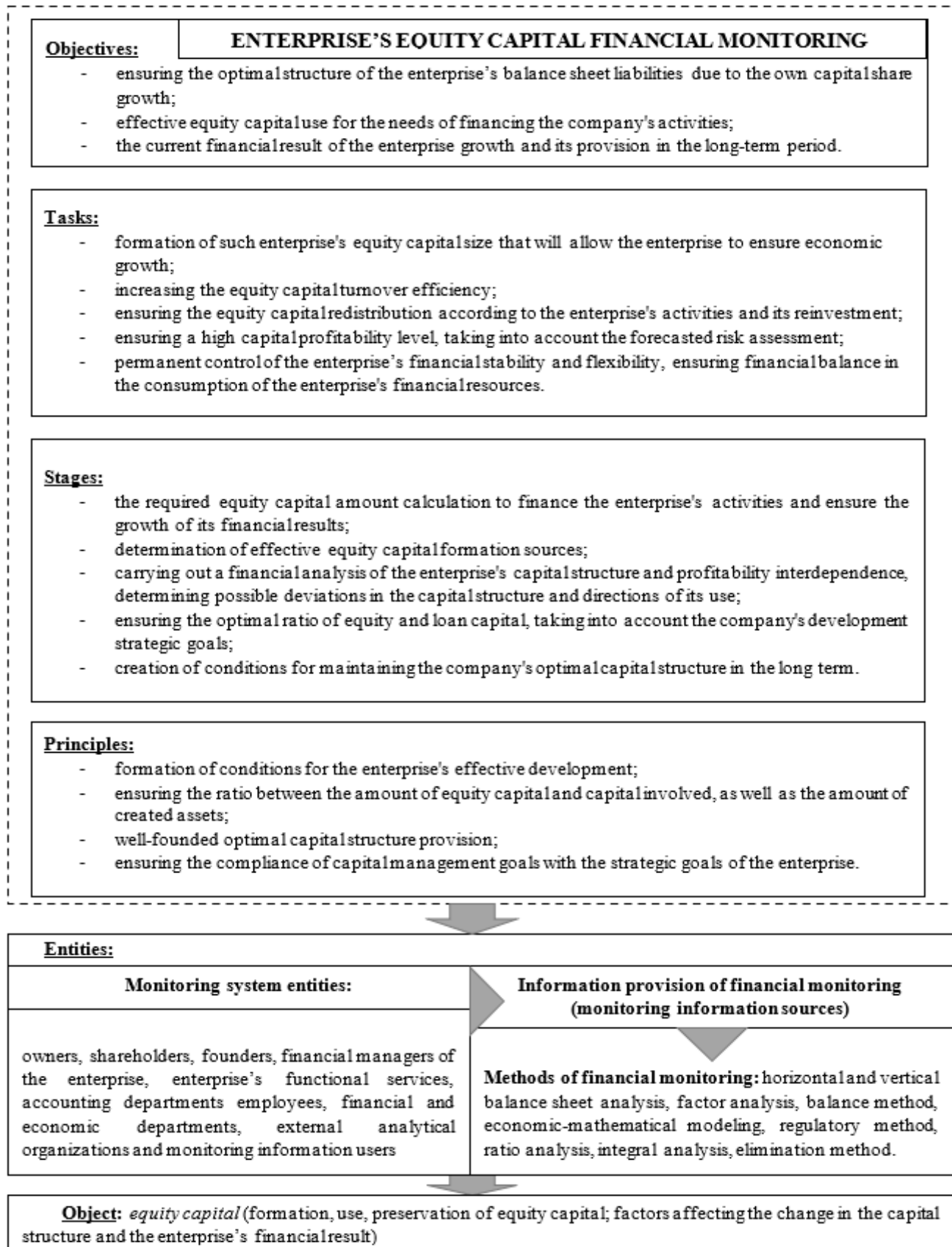
Figure 1. Information support for financial monitoring of the enterprise's equity capital



Source: created by the authors

The quality of monitoring conclusions depends on the information completeness; therefore it is worth investigating not only the main sources of factual information reflected in financial statistical reporting, but also analyzing in detail the data of internal economic reporting, primary accounting documents, registers, acts, registers that complement the analysis (Utkina, 2022). Information support for financial monitoring is part of the enterprise's equity capital monitoring system (Fig. 2).

Figure 2. The enterprise's equity capital financial monitoring system



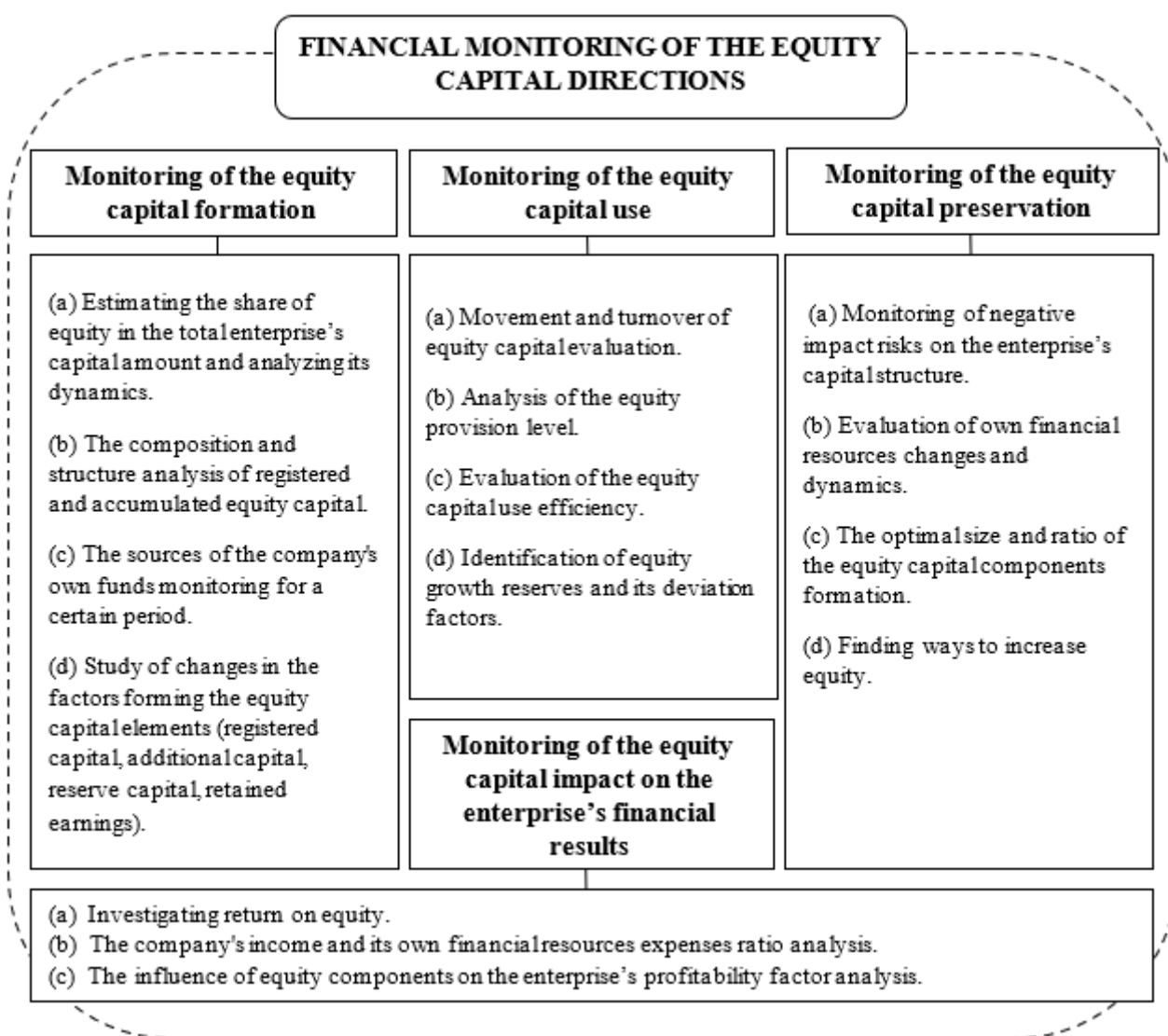
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The combination of goals, tasks, stages, principles, the presence of entities, and objects interaction in a single system allows to implement the financial monitoring directions and ensure its effective organization. The system elements cooperation ensures the formation of the correspondence between the available own resources and their strategic investment, the mechanism formation for diagnosing the risks of a crisis situation development and potential bankruptcy (Dekhthiar, 2015).

The equity capital financial monitoring system also includes directions for its implementation (Fig. 3). Depending on the goals and tasks that the monitoring entities set, the following areas of equity capital financial monitoring can be distinguished:

- monitoring of the equity capital formation;
- monitoring of the equity capital use;
- monitoring of the equity capital preservation;
- monitoring of the equity capital impact on the enterprise's financial results.

Figure 3. Financial monitoring of the enterprise's equity capital directions



Source: created by the authors

The capital structure directly affects the financial stability of the enterprise. Monitoring entities conduct an analysis of sources that increase equity capital, analysis of its changing factors, evaluate the available equity capital structure (in terms of registered and accumulated) during investigating the equity capital formation (Babich et al., 2022). Also in this direction, the monitoring entities observe the dynamics of the share of equity capital in the total amount of liabilities and its correlation with the borrowed funds (Table 1).

The efficiency of equity capital use is related to its dynamics and turnover at the enterprise, as well as the own financial resources and income from the sale of products ratio growth. A system of financial ratios which includes financial independence ratio (percentage of equity capital in the enterprise's total capital), financial risk ratio (the capital raised to equity capital ratio), the financial dependence ratio (shows how much loan funds the company has attracted for UAH 1 of equity) is applied to analyze the equity capital use involving methods of comparative analysis (Yepifanova, 2015).

The evaluation of the preservation equity capital possibilities is an important financial monitoring direction. Therefore, based on the analysis of changes occurring in the liabilities of the balance sheet structure, the monitoring entities perform a risks analysis that negatively affect the capital structure and determine the optimal equity capital amount and its ratio with loan resources (Kruhlova et al., 2022).

5. RESULTS

The study of the influence degree of the structure and equity capital size on the enterprises' financial results and their profitability is carried out in the context of reserves for the enterprise' profit growth analysis due to changes in the equity capital elements, including an increase in retained earnings. In addition, in this monitoring direction, an integral profitability analysis is used to assess the level of funds invested in equity capital profitability (Chebanova, 2018).

Analytical data in Figure 4 reflect the dynamics and structure of equity capital at the Ukrainian enterprises during 2015-2021 and effectiveness of its use indicators (Table 1). During the researched period, the equity amount was constantly increasing and from the end of 2015 to the end of 2021 it increased by 80%. A significant increase took place in 2021 compared to the previous 2020 year by UAH 773.5 billion, that is by 23.2%. At the same time, during 2015-2021, the growth of enterprises' loan capital (by 72%) and the balance sheet amount (by 74%) is also monitored.

Table 1. The efficiency of equity capital use indicators of Ukrainian enterprises, 2015-2022

Indicators	Period								Deviation (2022 I-III qtr./2021)	
	2015	2016	2017	2018	2019	2020	2021	2022 I-III qtr.	Abs.	Growth rate, %
Loans and equity capital ratio	2.53	3.09	3.05	3.02	2.72	2.80	2.42	2.60	0.2	6.9
Assets to equity ratio (financial dependence ratio)	3.5	4.1	4.1	4.0	3.7	3.8	3.4	3.6	0.2	5.5
The equity capital share in the assets, %	39.6	32.4	32.8	33.2	36.8	35.7	41.3	27.9	-13.4	-32.5

Source: authors' calculations based on the data of the State Statistics Service of Ukraine

However, during the first three quarters of 2022, total equity is down 48% compared to 2021. At the same time, the total balance amount also decreased by 40%, which is due to the enterprises' activities termination in the occupied territories.

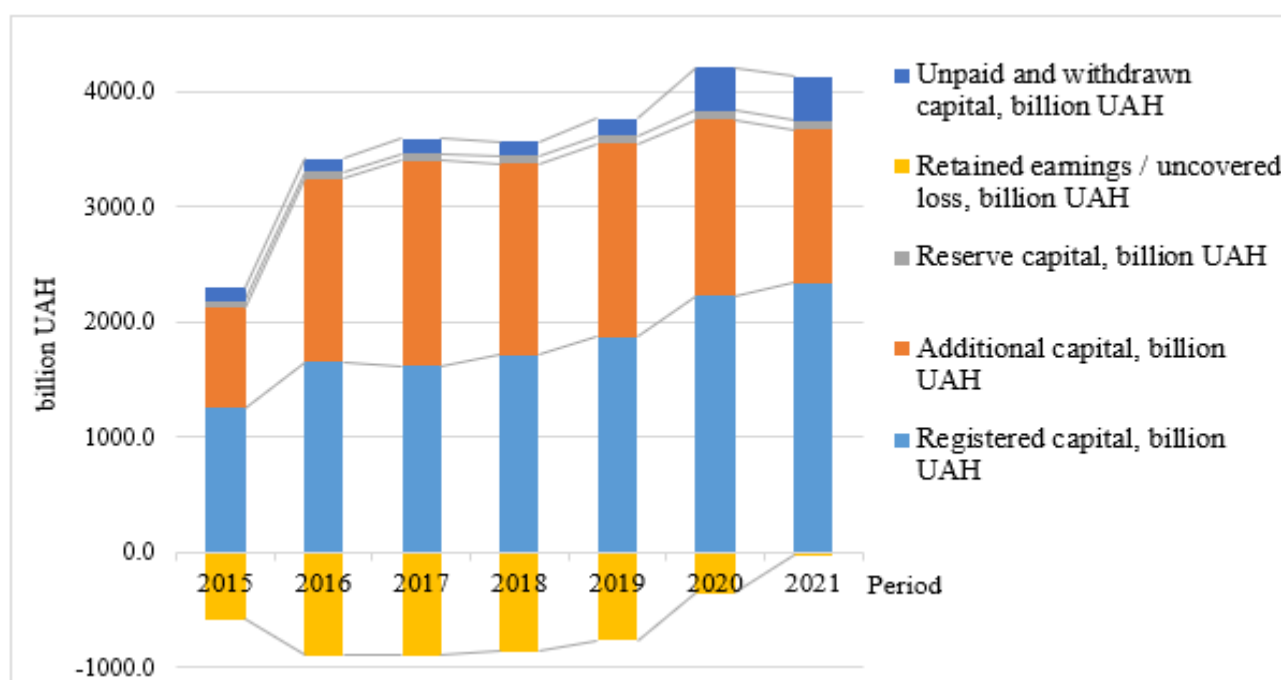
Analyzing the enterprises' loans and own funds ratio, it should be noted that during the 2015-2021 period, the ratio ranged from 2.42 (in 2021) to 3.09 (in 2016). Since the normative value of this ratio is ≤ 1 , its actual values indicate a significant attraction of loan capital by domestic enterprises in comparison with accumulated own resources, and therefore liabilities prevail in the balance sheet structure (Yepifanova, 2015).

The equity capital share in the balance sheet liabilities, which is characterized by the financial autonomy coefficient, had an upward trend during 2015-2021, and in 2022, compared to 2021, it decreased by 32%. The optimal value of this coefficient is 0.5, and therefore, during the analyzed period, the enterprises' dependence level on external loans is quite significant. However, the lowest share of equity in the balance structure was in 2022.

The structure of equity capital of enterprises includes registered capital, additional capital, reserve capital, retained earnings (or uncovered loss), unpaid and withdrawn capital (Fig. 4) (Dekhtiar, 2015).

During 2015-2021, the Ukrainian enterprises equity capital structure was dominated by registered capital (Fig. 4), which includes authorized and other registered capital, share capital and contributions to registered authorized capital. Ukrainian enterprises' registered capital was UAH 2340.4 billion in 2021, which is by UAH 110.3 billion more than in the previous 2020 year and by 86% more compared to 2015 (corresponding data for 2022 has not been published due to the postponement of the publication due to martial law) (State Financial Monitoring Service of Ukraine, 2023).

Figure 4. Business entities equity capital structure and dynamics in Ukraine, 2015-2021



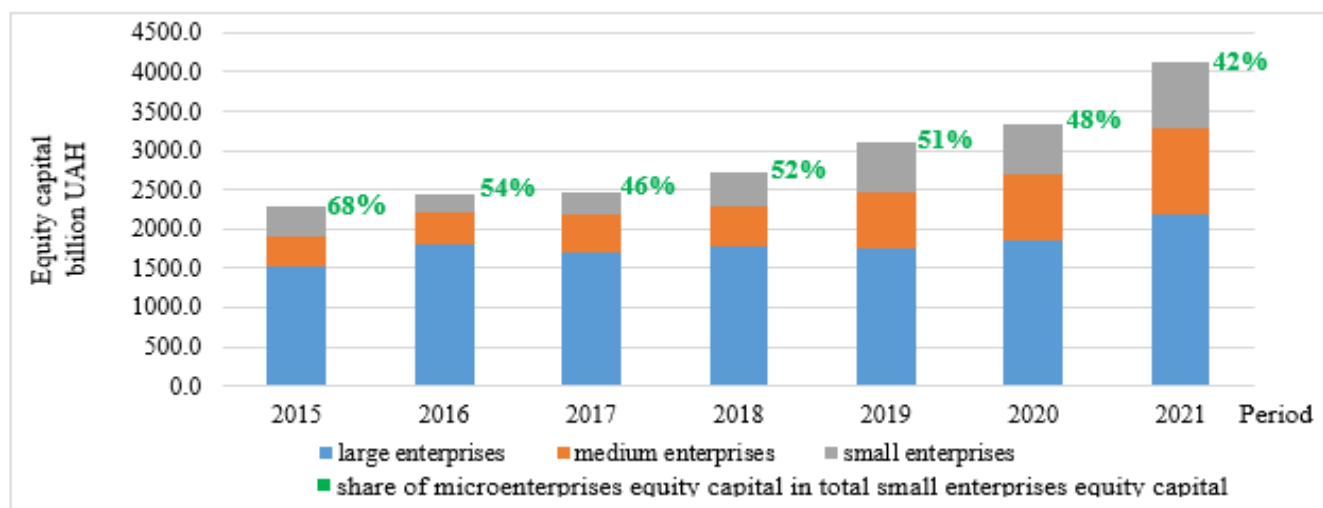
Source: developed by the authors based on the data of the State Statistics Service of Ukraine

Additional capital was contributed in excess of the authorized capital amount and includes the amounts of non-current assets revaluation, the financial assets value received free of charge. It also constitutes a significant enterprises' equity capital share and did not have a clear growth trend, but in 2021 it amounted to UAH 1329.7 billion, which is 53.5% more compared to 2015. Reserve, unpaid and withdrawn capital are insignificant enterprises' equity capital share and show unstable dynamics during the analyzed period.

The part of the income that remains at the enterprise disposal from the economic activity conduction is included in the equity capital composition in the form of retained earnings. However, during 2015-2021 domestic enterprises generally received an uncovered loss, which absolute value was the largest in 2016 when amounted UAH 893.8 billion, as shown in the graph (Fig. 4). Since 2017, the uncovered loss had a downward trend and in 2021 had the smallest value (UAH 20.5 billion), that is it decreased by 17 times compared to 2020.

The study includes data on the equity capital of large, medium and small enterprises in Ukraine (Fig. 5). In 2021, the share of equity capital in the balance sheet structure prevailed in large enterprises and amounted to 41%. In medium and small enterprises, it was 23% and 22%, respectively. That is why large enterprises are more resistant to macroeconomic factors than small and medium-sized business entities. As can be seen in Figure 5, the equity capital of large enterprises during 2015-2021 grew at insignificant rates in contrast to the equity capital of small enterprises, which more than doubled during this period (State Statistics Service of Ukraine, 2023).

Figure 5. Equity capital of large, medium and small enterprises in Ukraine, 2015-2021

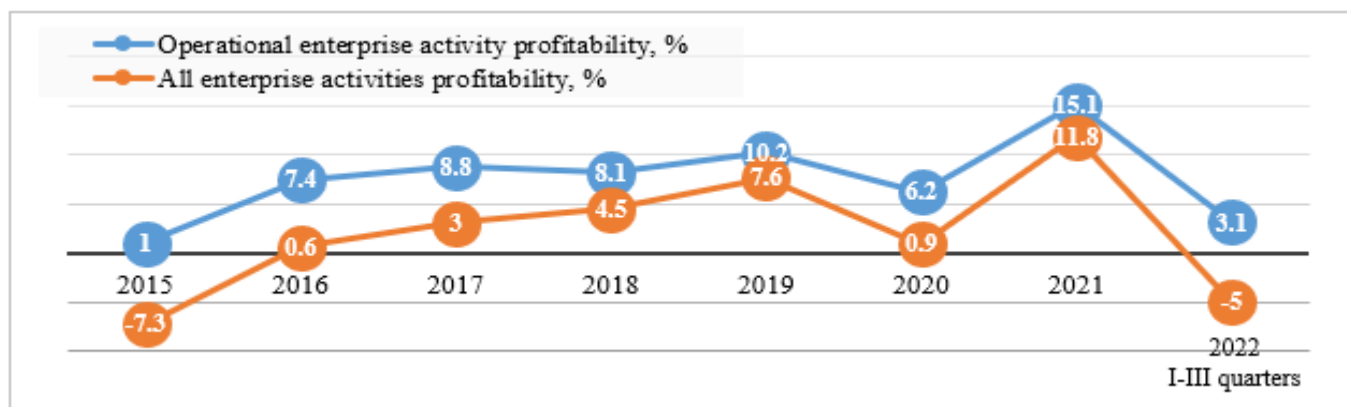


Source: developed by the authors based on the data of the State Statistics Service of Ukraine

The connection between the enterprise's equity capital and its financial result is that if the enterprises have a loan capital predominance, the insolvency threat appears in the enterprises. It requires additional expenses of the enterprise for the credit facilities use, which also affects the assets liquidity and prevents the enterprise from obtaining the following loans in the future (Kruhlova et al., 2022). If the company has retained earnings, its own capital structure improves, which is also reflected in the increase in the enterprise's financial results. Since profitability ratios are the key financial condition indicators of enterprises, they are highly dependent on the equity capital size, as well as on its structure, i.e., the retained earnings or uncovered losses reflection (Novichenko, 2021).

The Ukrainian enterprises' profitability indicators, the dynamics of which for the 2015-2022 period are shown in Figure 6, indicate that these ratios were the lowest in 2015. The unprofitability of all enterprise activities in 2015 was -7.3%, although the profitability of operating activities was at the level of 1%.

Figure 6. Business entities profitability dynamics in Ukraine, 2015-2022



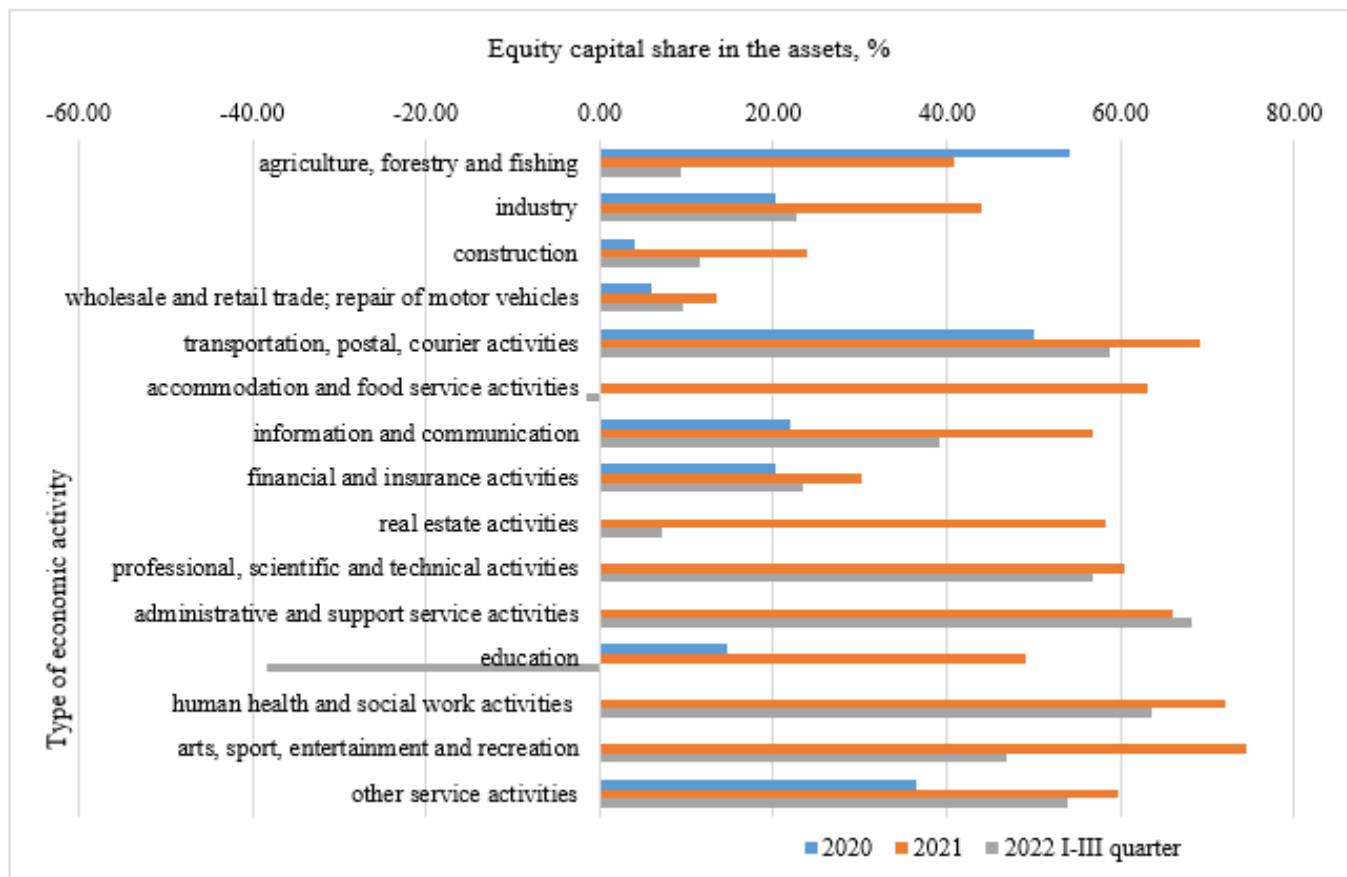
Source: developed by the authors based on the data of the State Statistics Service of Ukraine

During 2016-2019, all enterprises' activities profitability increased by 12.7 times. At the same time, there was an increase in equity capital and a decrease in the undistributed loss of enterprises. However, in 2020, compared to 2019, there is a sharp decrease in all enterprise activities and operational activities profitability by 6.7% and 4% accordingly, which is due to the pandemic impact and the suspension of a large part of economic entities. In 2021, there was an increase in all activities and operational activities profitability, the value of which was 11.8% and 15.1% accordingly. The equity capital value of enterprises also increased significantly in 2021, compared to 2020, and the undistributed loss value was the lowest for the analyzed period (Kovalchuk, 2016).

In 2022, the financial results of Ukrainian enterprises suffered significant losses. The average profitability of all activities of large, medium and small enterprises during the first three quarters of 2022 compared to 2021 decreased by 16.8%, and the profitability of operational activities decreased by almost 5 times (KorFor Analytical Group, 2023).

Evaluating the official statistical information on enterprises of various activity types for the I-III quarters of 2022 (Fig. 7), it should be noted that compared to 2021, the share of equity capital in the assets of agricultural, industrial enterprises, construction enterprises, enterprises engaged in operations with real estate, accommodation and food service activities enterprises decreased significantly. During the period of I-III quarters of 2022, only the share of equity capital in the balance of enterprises in the field of administrative and support service activities increased by 2.2%.

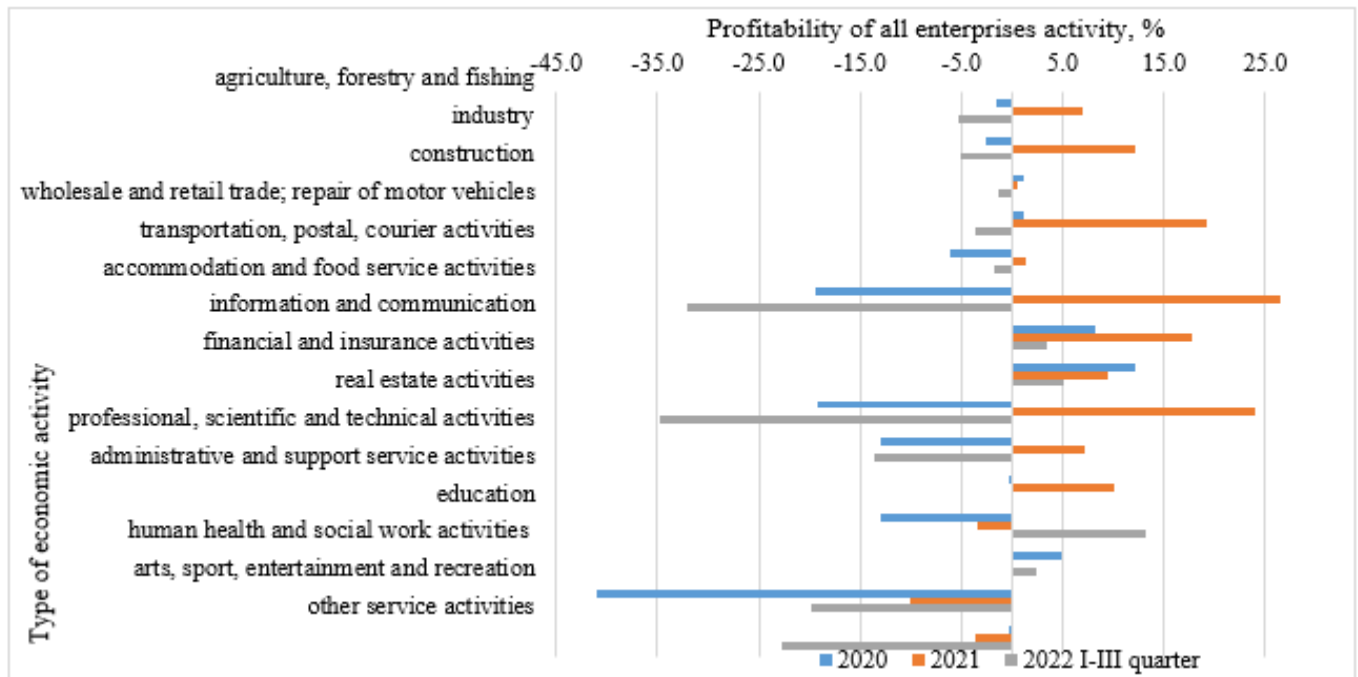
Figure 7. The equity capital share in the assets of enterprises by economic activity type, 2020-2022



Source: developed by the authors based on the data of the State Statistics Service of Ukraine

A significant decrease in the share of the company's own capital affected the profitability of those types of activities that were most sensitive to the martial law conditions or were located in the occupied territories. The dynamics of the profitability of Ukrainian enterprises by type of activity during 2020-2022 is shown in Figure 8. The most clearly decrease in profitability of enterprises in the field of accommodation and food service activities and real estate activities by 58.5% and 58.6%, respectively, can be observed on the diagram.

Figure 8. Profitability of enterprises by economic activity types, 2020-2022



Source: developed by the authors based on the data of the State Statistics Service of Ukraine

Since there is a non-deterministic relationship between equity capital and profitability indicators of large, medium and small enterprises, we will use correlation-regression analysis to identify the relationship density between these parameters and to build a regression economic-mathematical model of the capital factor value influence on the resulting characteristic. Table 2 shows estimated data for calculating correlation interdependence and the equity capital amount (X) impact on all enterprises activities profitability in Ukraine (Y) during 2012-2022.

Table 2. Calculation of the correlation between the equity capital amount and the Ukrainian enterprises' profitability, 2012-2022

Period	Equity capital, billion UAH X	Activities profitability, % Y	X-x	Y-y	(X-x)(Y-y)	(X-x)²	(Y-y)²
2012	1904.94	1	-673.41	0.28	-188.56	453485.24	0.08
2013	1950.37	-0.70	-627.98	-1.42	891.73	394356.91	2.02
2014	1480.66	-14.20	-1097.70	-14.92	16377.61	1204935.04	222.61
2015	2288.74	-7.30	-289.61	-8.02	2322.69	83875.07	64.32
2016	2445.80	0.60	-132.55	-0.12	15.91	17569.40	0.01
2017	2458.53	3.00	-119.83	2.28	-273.20	14358.21	5.20
2018	2708.58	4.50	130.22	3.78	492.25	16958.18	14.29
2019	3092.77	7.60	514.41	6.88	3539.16	264620.19	47.33
2020	3339.81	0.90	761.45	0.18	137.06	579810.32	0.03
2021	4113.34	11.80	1534.99	11.08	17007.64	2356180.09	122.77
2022	2226.8	-5.00	-319.57	-5.20	1661.76	102124.25	27.04
n = 11	x = 2546,40	y = 0.20	Σ = 0	Σ = 0	Σ(X-x)(Y-y)= = 42150.22	Σ(Y-y) ² = = 5498485.32	Σ(X-x) ² = = 508.40

Source: developed by the authors based on the data of the State Statistics Service of Ukraine

According to the calculations results carried out in Table 2, we determine:

1. Correlation coefficient:

$$r = \frac{42150.22}{\sqrt{5498485.32 \cdot 508.40}} = 0.8 \quad (7)$$

2. The correlation coefficient error:

$$S_r = \sqrt{\frac{1-0.8^2}{11-2}} = \sqrt{\frac{1-0.64}{9}} = 0.20 \quad (8)$$

3. Correlation coefficient validity criterion:

$$t_r = \frac{0.80}{0.20} = 4.00 \quad (9)$$

To determine the validity of the relationship between the equity capital amount parameter (X) and the enterprises profitability level (Y) for the considered period, we determine the number of degrees of freedom:

$$v_r = 11 - 2 = 9 \quad (10)$$

The corresponding theoretical values of the significance level (Student's test) for $v_r = 9$ are $t_{0.99} = 2.26$ and $t_{0.95} = 3.25$ (Ulanchuk, 2020).

Thus, since the correlation coefficient between factorial and functional features is in the range of 0.66-0.99 and is 0.8, the relationship between the change in the parameters is considered direct and strong. Taking into account the correlation coefficient validity criterion, which is 3.66, and comparing its value with the theoretical values, it can be concluded that since the calculated value is greater than the theoretical value at the significance levels of 5% and 1% (2.26 and 3.25 accordingly), then the relationship between own financial resources of economic entities amount and their profitability is reliable at both probability levels.

Having investigated that for the 2012-2022 period, the equity amount owned by domestic enterprises had a significant impact on their profitability level, and characterizing the relationship between these variables as strong and reliable, it is also worth conducting a regression analysis to assess the possibility of predicting the changes in the enterprises' profitability in perspective.

Using the calculated data in Table 2, we will define the regression coefficient (R_{yx}), which allows showing the value of the change in all enterprises' activities profitability when the equity capital amount changes by UAH 1 billion.

$$R_{yx} = \frac{42150.22}{5498485.32} = 0.0077 \quad (11)$$

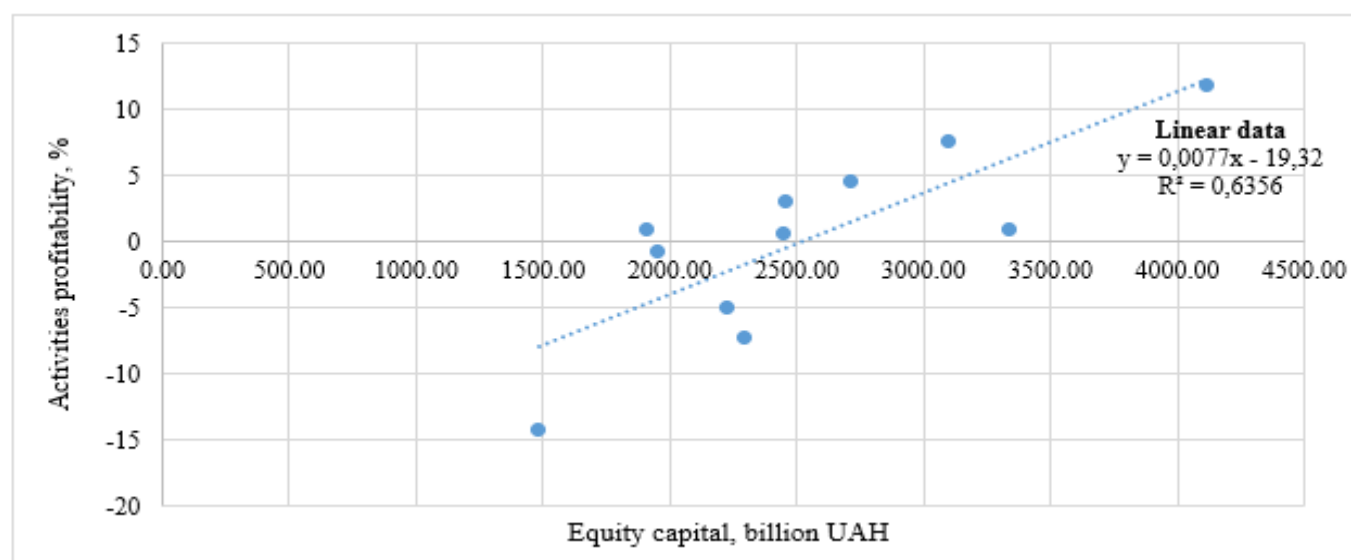
The regression coefficient value can be interpreted as follows: when the amount of equity capital changes by UAH 100 billion the enterprise activity profitability will change by 0.77%.

The equity capital average value at the business entities disposal during 2012-2022 was UAH 2546.40 billion. After substituting the obtained regression coefficient value into the equation, we will obtain a function with which it is possible to get a forecasted profitability (Ulanchuk, 2020).

$$Y = 0.20 + 0.0077(X - 2546.40) = 0.0077X - 19.32 \quad (12)$$

Figure 8 shows a linear regression that characterizes the enterprise profitability dependence on the total amount of equity capital. The change in equity regression model makes it possible to estimate how it will cause an increase or decrease in the domestic enterprises' profitability.

Figure 9. Graph of regression model and correlation field



Source: constructed by the authors based on results of correlation-regression analysis

Using the regression equation, monitoring entities have the ability to analyze the studied parameters by 0.8 level of correlation coefficient. The forecast value of Ukrainian enterprises profitability will depend on the capital structure in 2023, as well as on investment inflow, state and international business support programs. According to the regression equation (Figure 8), if the level of equity reaches the value of 2509.09 billion UAH, then the forecasted profitability will be at the level of 0%. The linear dependence also shows that if the amount of equity capital of enterprises in 2023 reaches the value of the pre-war period (3339.81 billion UAH), then the forecast value of profitability will be 6.4%, excluding other factors.

On the conducted correlation-regression analysis basis, it is possible to establish a strong and reliable dependence between the two characteristics, therefore, the equity capital amount increase, and its structure optimization is a favorable factor for improvement the enterprises' profitability indicators.

6.DISCUSSION

With the beginning of the full-scale invasion and the declaration of martial law on the territory of Ukraine, statistical information was not made public by the State Statistics Service, so most of the data on the activities of enterprises and their financial results were not published on time. At the end of 2022, the State Statistics Service began to post part of the data (the publication date of which was postponed due to martial law) on the official portal. Therefore, the available research and data analysis covers the period from 2015 to the third quarter of 2022, and the correlation-regression analysis was carried out taking into account the data sample for the 2012-2022 ([Ukrainian Center for Economic and Political Research named after O. Razumkov, 2023](#)).

In the research, a significant attention was paid to the financial monitoring system of the enterprise, the tasks of which are to identify the efficiency degree of the equity capital use, justify the optimal capital structure, and determine the level of enterprises profitability dependence on the amount of equity capital ([Utkina, 2022](#)). That is why the loan and equity capital ratio, the financial dependence ratio and the equity capital share in the balance amount of Ukrainian enterprises were calculated during the period from 2015 to the I-III quarters of 2022.

The research results show that the efficiency of Ukrainian enterprises largely depended on general economic and political factors. Starting from 2015, when the military conflict was launched in the Eastern Ukraine, during the restrictions of the pandemic in 2020 and after the full-scale invasion in 2022, the share of equity in the balance amount of large, medium and small enterprises of Ukraine did not exceed 41.3%. That is, this indicator did not reach the normative value of 50%, which shook the financial stability of enterprises ([Ristic, 2020](#)). In 2022, the share of equity capital in the balance amount of such enterprises activities as agriculture, wholesale trade, accommodation and food ser-

vice activities, real estate activities and education did not even reach the level of 10%. This is due to the fact that the number of small enterprises in these areas is quite significant, and therefore they are more dependent on macroeconomic changes.

Publicized statistical information during 9 months of 2022 shows that the percentage of profitable enterprises was 59.5%, despite more negative expectations. However, the average profitability of domestic enterprises during this period was -5%, which is even 5.9% lower than the indicator of 2020 during the pandemic period ([State Statistics Service of Ukraine, 2023](#)).

The developed correlation-regression model confirmed the fact that the growth of the company's equity capital affects the increase in its profitability. At the same time, the closeness and direction of the relationship between the factor of equity capital amount (X) and the resulting factor of the profitability level (Y) is characterized by the correlation coefficient, which is 0.8 and is in the range of 0.66-0.99, that is, it is an indicator of a significant factors' relationship. A regression model was developed to forecast the profitability level depending on the equity capital amount, and predicts that if the amount of equity capital increases by 100 billion UAH, profitability will increase by 0.77%. Unpublished statistics for the fourth quarter of 2022 and the first quarter of 2023 will reflect the negative impact of the military conflict, electricity shortages on business activity and the enterprises' capital structure ([The Center for Economic Strategy, 2023](#)). Therefore, the changes at the end of 2022 may exceed the negative financial results of enterprises received during the I-III quarter, and additional economic losses will lead to a further decrease in profitability.

7. CONCLUSION

Existing researches in the field of equity capital use efficiency are mostly devoted to the problem of accounting and optimizing the structure of the company's own financial resources and assets. A variety of studies confirms equity capital importance in business activity, which determines the level of independence and owners influence on the enterprise. Therefore, this article raised the issue of formation a financial monitoring system at the enterprise, which tasks include determination, observation, and measurement the equity capital impact on profitability indicator.

It can be argued that effective construction of company's equity capital monitoring system is an important aspect in its management. Such a system should include not only the tasks related to increasing the equity capital amount, determining the factors resulting its formation, monitoring its use efficiency indicators, but also the search for opportunities to optimize its structure and the equity capital share in the total balance amount.

The study of Ukrainian enterprises' equity capital and profitability dynamics during 2015-2022 made it possible to reveal a direct relationship between these parameters, and therefore to conduct a correlation analysis and to form a regression model that characterizes the effect of a change in the enterprises' own resources factor value on a deviation of the profitability indicator. The relationship between these factors will be weak if the share of the enterprise's debt burden is more than 70%. Therefore, it is worth monitoring such indicators as loans and equity capital ratio and assets to equity ratio.

During 2020-2022, Ukrainian enterprises were significantly affected by the consequences of the pandemic and the harsh activity conditions in the realities of martial law. Many enterprises were not provided with a sufficient level of financial independence and stability, and therefore the profitability of their activities in 2020 and 2022 decreased sharply.

Thus, in the direction of increasing the enterprises' profitability, an important task is the constant capital structure monitoring, the financial resources distribution efficiency, and the reserves identification for increasing the enterprise's retained earnings.

Taking into account the results of the obtained regression model, the financial monitoring entities can determine the prospects of obtaining the planned profit amount, as well as determine reserves in the equity capital structure that ensure its growth. In the conditions of Ukrainian enterprises insufficient financing, the basis of future research should be deep monitoring and the correlation analysis of equity capital profitability ratios and indicators of financial risk at the micro level.

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RECESSION OR RECOVERY: THE FIFTH STAGE OF THE KONDRATIEV WAVE

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Received 17.02.2023.

| Send to review 27.02.2023.

| Accepted 19.06.2023.

Original Article



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JEL Classification:

E32, Foo

Doi: 10.61432/CPNE0101017m

UDK: 338.124.4:316.4.053(100)

ABSTRACT

The research is based on the analysis of the main theories that determine the characteristics of economic scientific schools, the basis of their factor analysis of the impact on crises and tools for their levelling. The main mathematical models are analysed, which aim to determine the main cycles of crisis phenomena in the world economy. With the help of historical and logical analysis, the article provides the genesis of the main crisis manifestations in the world economy. The method of systematization and comparison made it possible to identify the main stages of crises and systematize their influencing factors. The mathematical basis of the research was the construction of the last cycles of the Kondratiev waves and the confirmation of one of the two “positioning” forecasts of the modern stage of the global economy’s collapse in accordance with the Kondratiev waves. The predictive assessment of the further scenario of the development of the crisis is supplemented by analytical reports of international organizations such as UN, the IMF and the World Bank Group. The used methods and methodology made it possible to achieve the goal of the research, which is aimed at identifying the fifth Kondratiev wave and forming a forecast scenario of the economic development of the world economy

Keywords: *crisis, economic waves, economic crisis, factors influencing, crisis phenomena*

1. INTRODUCTION

The crisis is one of the most popular terms in economics. It is difficult to imagine a modern article on economics that does not mention the crisis of the financial market, the banking system, the crisis of the industry or the collapse of the company’s market value. The economic crisis is considered inevitable and sometimes even a boon for the country. Is it possible to avoid it and how do deal with it? How we determine that a crisis has appeared - we “feel” a significant drop in business activity in a country or several countries. However, the question arises: how to define a “significant decline in the economy”? It is considered a categorical fact that the crisis is part of the economic cycle. Despite the differences in approaches and assessments of different economic schools to the definition of a crisis, their general conclusion is that crises manifest themselves cyclically. The economic cycle model includes the main phases - bottom, growth, recession and peak. An economic crisis can also manifest itself in stagnation and depression - a severe recession when the economy is at the bottom for an extended period. The scale of an economic crisis is measured by three factors: depth, spread and duration. The causes of the economic crisis are grouped in scientific theory. Economic science has developed several theories that explain the causes of economic cycles and, accordingly, the crises that arise. It is not possible to cover all types of scientific schools. The methodology examined

the main directions and sources of scientific research on crises. However, the nature of the crisis phenomenon itself is largely beyond the scope of scientific discourse. As a result, this extremely frequently used term is interpreted ambiguously, and sometimes it refers to completely different phenomena, which, does not contribute to scientific discussion. In this publication, we accept as a basis the existence of the crisis as a fact. It remains to analyze the two main forecasts/scenarios of the fifth wave of Kondratiev, which became the object of our research. So we can say, which aimed at identifying the fifth Kondratiev wave and forming a forecast scenario of the economic development of the world economy ([Gillpatrick, Tom, Boğa, Semra and Aldanmaz, Oncel, 2022](#)).

2.METHODS

The development of ideas about macroeconomic crises originates in the works of the classics of political economy David Ricardo, J.-B. Say and Thomas Robert Malthus. David Ricardo and J.-B. Say viewed the crisis as an accidental phenomenon for economic development. In the works of Malthus, for the first time, the thesis formulated that private crises of overproduction of individual goods or commodity groups are possible and general crises of overproduction in the economy. ([Jacob H. Hollander,1904](#), [Dorfman Robert, 1989](#), [Sergio Cremaschi & Marcelo Dascal, 1996](#), [Sergio Cremaschi & Marcelo Dascal, 1998](#), [Stefan Hopp, 2004](#), [Markus K. Brunnermeier & Ricardo Reis, 2022](#)). From the second half of the XIX century. Works appear in which the crisis is perceived as characteristic of the economy, an inevitable and regularly recurring phenomenon. It can be said that starting with the works of K. Juglar and K. Marx ([Marx K., 1960](#), [Besomi D., 2009](#)), there is a transition from the theory of crisis to the theory of the cycle in economic science.

There are many different types of cycles, each of which exhibits different characteristics, the most obvious being the differences in periodicity. The most important are the Kitchin cycle (3-4 years), the Juglar cycle (7-11 years), the Kuznets cycle (16-22 years), and the Kondratieff cycle ([Aldcroft, D.H., Richardson, H.W., 1969](#)).

The provisions of the theory of economic cycles are being developed in the works of representatives of Keynesianism, neoclassical, the neo-Austrian school: the crisis appears as an expected pattern and scientific controversy flare up on the causes of cyclicity and anti-crisis measures. Let us illustrate it with examples from the works of scientists representing leading scientific areas.

According to K. Marx, the source of crises in society is an economy based on private property, which causes a clash of conflicting interests: crisis” ([Marx K., 1960](#)). Crisis in this sense acts as a phase of the economic cycle and a form of resolving contradictions that have accumulated in the previous period. The immediate cause of the crisis is the contradiction between the tendency of capitalist production towards the unlimited expansion of production and the limited effective demand.

J.M. Keynes’s research defines a crisis as a sudden and abrupt, as a rule, change from an upward trend to a downward trend ([John Maynard Keynes, 1936](#)). Exploring the causes of the crisis, J.M. Keynes comes to the conclusion that the more typical, and often the main explanation of the crisis should be sought not in the growth of interest, but in a sudden drop in the marginal efficiency of capital. In Keynes theory, the factor of the uncertainty of future expectations plays a significant role, which has a significant impact on investment activity. In studies of neoclassical synthesis, monetarism, and the theory of the real business cycle, the uncertainty of the future is reduced to the level of ambiguity, explained by the limitations of human cognitive abilities. In the future, in the works of the post-Keynesian direction, the study of uncertainty is revived. The theory of J.M. Keynes defines it as a fundamental uncertainty. The Keynesian crisis policy involves an increase in government spending, reducing the tax burden, if possible, and monetary expansion. In his research, J.M. Keynes favours short-term analysis without taking into account the catastrophic effects of inflation and excessive public debt. ([John Maynard Keynes, 1936](#)).

J. R. Hicks and Roy J. D. Allen (1906-1983) played an important role in the fact that mathematical tools began to increasingly cover not only macro but also microeconomic analysis. In a joint article with Allen “Revisiting the theory of Utility” ([1934](#)) and then in the book “Value and Capital” ([1939](#)), Hicks brought to the fore the theory of consumer demand and market equilibrium the approach not of the Cambridge, but of the Lausanne school. In the theory of neoclassical synthesis, P. Samuelson

and J.R. Hicks consider fluctuations in the production of durable goods to be the main cause of cyclicity. The main problem was not demand, but the accumulation of resources. In addition, since the recovery was accompanied by inflation and was unstable, there was a need for a more general concept of regulation, suitable not only for recession but also for growth ([Đukić, Aleksandar, Štaka, Mirjana and Drašković, Dajana, 2021](#)). The first logical step was the substantiation of the principle of determining national income. Then, monetary parameters were introduced into the model: the volume of investment is considered to be given, and the consumption function is made dependent not on the rate of interest, as in the case of neoclassical, but on the level of national income. In the monograph "Contribution to the Theory of the trading cycle" (1950), J.R. Hicks proceeds from the very beginning from the premise that the development of the capitalist economy over the past century and a half has been - and will be - characterized by cyclical fluctuations. ([Hicks J.R., 1978](#)). As an anti-crisis policy, a combination of monetary expansion, which stimulates investment processes, and a tight fiscal policy, which helps to neutralize the inflationary gap as a result of increased investment, is recommended.

Monetarists condemned the stimulating fiscal policy, since, according to M. Friedman, an increase in government spending relative to income in no way leads to economic recovery, since it can increase income in monetary terms, but all this increase will be absorbed by government spending ([Friedman M., 1962](#)). To implement this policy, fluctuations in activity must be predicted in advance. Knowledge of fiscal and monetary policy is also required.

The anti-crisis recommendations of the monetarists concerned exclusively the monetary sphere. It is curious that the term "crisis" was not used by them about short-term fluctuations in the economic environment, which were perceived as a simple accumulation of random shocks ([Dorfman Robert, 1989](#)).

Irreconcilable opponents of both monetarists and Keynesians were representatives of a new neoclassical direction - the theory of the real business cycle, the basic provisions of which were published in 1982 in the work of F. Kydland and E. Prescott's "Time to build and aggregated fluctuations" ([Kydland F. & Prescott E., 1982](#)). At present, the theory of the real business cycle is represented by a vast number of works based on the concept of dynamic stochastic general equilibrium, dating back to the studies of J. Muth and R. Lucas. This direction gained recognition at the beginning of the 21st century since it did not limit the analysis of cyclical fluctuations to economic factors. The crisis phenomenon is excluded from the object of study, since the crisis phase only affects the change in the variances analyzed over a long time horizon of the series, and the crisis years are "hidden" – the effect of short crises on the analyzed variances is relatively small ([Grigor'ev L., Ivashchenko A., 2010](#)). In other words, it is rather a series of random shocks.

The evolution of scientific ideas about macroeconomic cycles and crises largely reflects the fundamental changes in the world economy, including accelerating globalization, modernization, and the financialization of the economic sphere. At the end of the XX century. the focus of scientific discussion about the nature of macroeconomic cycles and crises is increasingly shifting to the ambiguous impact of these processes on economic growth.

The problem of cyclicity, which attracted the attention of scientists from the middle of the 18th century, remains one of the central problems of economic theory today. Cyclical development of the economic system as an aspiration to achieve macroeconomic balance is a manifestation of the very essence of economic development. Modern economic and mathematical methods have made it possible to identify 1,380 types of cycles that relate to the economy. But only some of them have theoretical and practical significance, and one of the most significant cycles is M. Kondratiev's big waves. ([Bosserelle Éric, 2020](#)). Kondratiev empirically identified three long waves of the economic situation with a duration of 48 - 55 years ([Blyzniuk T.P., 2005](#)):

- 1 cycle: rising wave from the late 80s - early 90s of the 18th century. until 1810-1817; the downward wave of 1810-1817 - 1844-1851;
- 2nd cycle: rising wave 1844-1851 - 1870-1875; the downward wave of 1870-1875 - 1890-1896;
- 3rd cycle: rising wave 1891-1896 - 1914-1920; the possible downward wave of 1914-1920

He managed to predict the Great Depression of 1929-1939 as early as 1922, that is, 7 years before it began, ahead of the forecasts of the prominent Austrian economists Ludwig von Mises and Friedrich von Hayek, who warned of the next great crisis during 1925-1929.

Today, scientists distinguish five long waves of M. Kondratiev. Based on the study of the works of nineteen scientists T.P. Blyzniuk systematized and calculated the periodization of waves (Table 1).

Table 1. Chronology and duration of long waves by different authors

	Scientist	Year	The Kondratiev wave									
			1st		2nd		3d		4th		5th	
			Be- gin- ning	Peak	Be- gin- ning	Peak	Begin- ning	Peak	Begin- ning	Peak	Begin- ning	End of t he wave
1	M. Kondratiev	1925	1790	1817	1851	1875	1896	1920				
2	A. Spithof	1925		1822	1874	1895	1912					
3	De Wolf	1929		1825	1849	1873	1896	1913				
4	J. Schumpeter	1939	1787	1813	1842	1869	1897	1924				
5	J. M. Clark	1944		1850	1875	1900	1929					
6	Dupre	1978	1789	1808	1846	1872	1895	1920	1939/46		1974	
7	W. Rostow	1980	1790	1815	1848	1873	1896	1920	1935	1951	1972	
8	Mandel	1980		1826	1847	1873	1893	1913	1939/48		1967	
9	Van Dyne	1983			1845	1872	1892	1929	1948		1973	
10	M. Riccione	1985	1769	1799	1816	1849	1873	1897	1921	1946	1973	
11	S. Glazyev	1993	1770		1830		1880		1930		1985	
12	I. Lipsits, A. Neschadyn	1997	1785	1835	1830	1890	1880	1940	1930	1990	1985	2035
13	Y. Yakovets	1999									1974	1998
14	V. Efremov	1999	1785	1845	1846	1900	1901	1950	1951	1990	1991	2020
15	N. Mironenko	2001	1785	1813	1847	1872	1893	1917	1945	1969	1985	
16	O. Gritsay, G. Jof- fe, A. Trevisch		1770		1830		1880		1930		1970	
The results of the calculations												
	Average		1782	1822	1845	1878	1894	1922	1937	1969	1977	2016
	Duration (Du- ration between the Beginnings)			(63)		(49)		(43)		(40)		(39)*
	Duration (Du- ration be- tween the Peaks)				(56)		(44)		(47)		(40)*	

Source: Blyzniuk T.P., 2005

However, in research conducted by T.P. Blisniuk, we see significant differences in the defined beginning and peak of the wave.

2.1. CYCLICAL PHASE MODELS

The model describes the dynamics of output (Y, GDP) of the economic system. Output (Y) is determined by the production function, which describes the dynamics of the number of goods and services produced depending on the costs of labour (L) and capital (K). Produced goods are spent on consumption (C) and investment (I). Investments are used: a) to compensate for the wear and tear of fixed capital, b) to increase the amount of fixed capital (and therefore to increase output). Positive feedback between investments and changes in demand and changes in prices, since prices directly depend on demand; high unsatisfied demand leads to a rise in prices, i.e. to a disruption of equilibrium. Since the economic system in the process of its evolution strives for equilibrium, and if this system is brought out of equilibrium, then damping oscillations will be observed in it. Reduction of time lags, on the contrary, contributes to a faster reaction of the economic system to destabilizing

influences and its return to a state of equilibrium. In this light, the most natural for the economy is the phase of depression, that is, a state of equilibrium and zero economic growth. However, this state does not satisfy economic agents, because with zero economic growth, the profit level is low, and accumulated capitals are not effectively used. Entrepreneurs a priori do not know where to invest money (investments are both expensive and risky, since the products obtained may not find demand, and instead of profit there will be losses), so they wait for signals from the market. As soon as these signals appear, recovery begins. The main signal is an increase in demand for certain types of products (for example, infrastructure, real estate or goods with new qualities as a result of the use of new technologies). This demand is first satisfied by funds accumulated in the economy (recovery phase), and then it begins to be replenished with loans. Autonomous demand, reinforced by the credit system, stimulates investment in those sectors of the economy that has become profitable and leads to general economic growth (boom phase). Since the investment process and the creation of new production units lag behind changes in autonomous demand, after a certain period a situation arises when demand is saturated and begins to decrease, and production capacity continues to expand, which is a consequence of the actions of speculators. An acute crisis arises because business expectations of growth do not correspond to real market trends, which are now on a downward trend, prices of assets and essential resources are falling, credit supply is sharply reduced, bankruptcies occur, debts are not paid, production begins to decline, etc. (decline phase). After that, the economy enters a phase of depression and does not grow in volume until a new “shock” of demand. However, this state differs from the pre-crisis state, as the economy has acquired a qualitatively new form: new industries have appeared, new technologies have been introduced, and new needs have been formed (Korotayev A., 2014, Grinin L., Korotayev A., Malkov S., 2020, Grinin L.).

And the last model - Rate of growth (g) (rate of economic growth) is an indicator indicating the rate of economic development. Consider the following formula for its calculation:

$$g = [(Y_t - Y_{t-1}) / Y_{t-1}] * 100\% \quad (17)$$

Y_t - an indicator of real GDP of the current year;

Y_{t-1} - an indicator of real GDP in the previous year.

This model characterizes the phase of economic development.

3.RESULTS

The first mention of the crisis dates back to 33 p. Not. and is characterized as The Financial Panic of AD 33. 3rd century. Crisis of the Third Century (Military Anarchy / the Imperial Crisis) in the Roman Empire, Twenty Years' Anarchy in the Byzantine Empire (political crisis) and Banking crisis (the crash of the Peruzzi and the Bardi family => crash of the European Financial system)

Let's imagine other periods in a tabular view Table 2. A retrospective analysis of crises characterizes their local, regional and global character. It is almost impossible to determine what will become the main factor in the global crisis, especially at the present stage. However, all crises have common features. The analysis of crises and the analyzed theories allow us to identify the main causes: political events, war, scientific and technical discoveries and the development of scientific and technological progress, demographic situation, migration, the discovery of new deposits, high-interest rates that directly determine the price of debt, affect the reduction in consumer spending and economic activity, the crisis of overproduction. Some of these reasons can be attributed to “behavioural” theories, which interpret the cycle as a consequence of waves of pessimistic and optimistic moods covering the population. The crisis occurs at the stage of investor pessimism and leads to a change in demand, a reduction in investment costs and a decrease in income. The theory of overinvestment claims that the cause of the recession is the lack of correct proportions between industries, and the spontaneous actions of entrepreneurs, which is a consequence of inefficient management and investment in production - the influx of investments accelerates expansion, causing disproportions in the system of the financial and economic mechanism of the system. The period from 2020 is more suitable for real business cycle theories. At the heart of the crisis is an economic shock - a random, unpredictable event that has a wide impact on the economy and is caused by things that go beyond economic mod-

els. Among the types of economic shocks are supply shock, demand shock, financial shock, political shock, and technological shock.

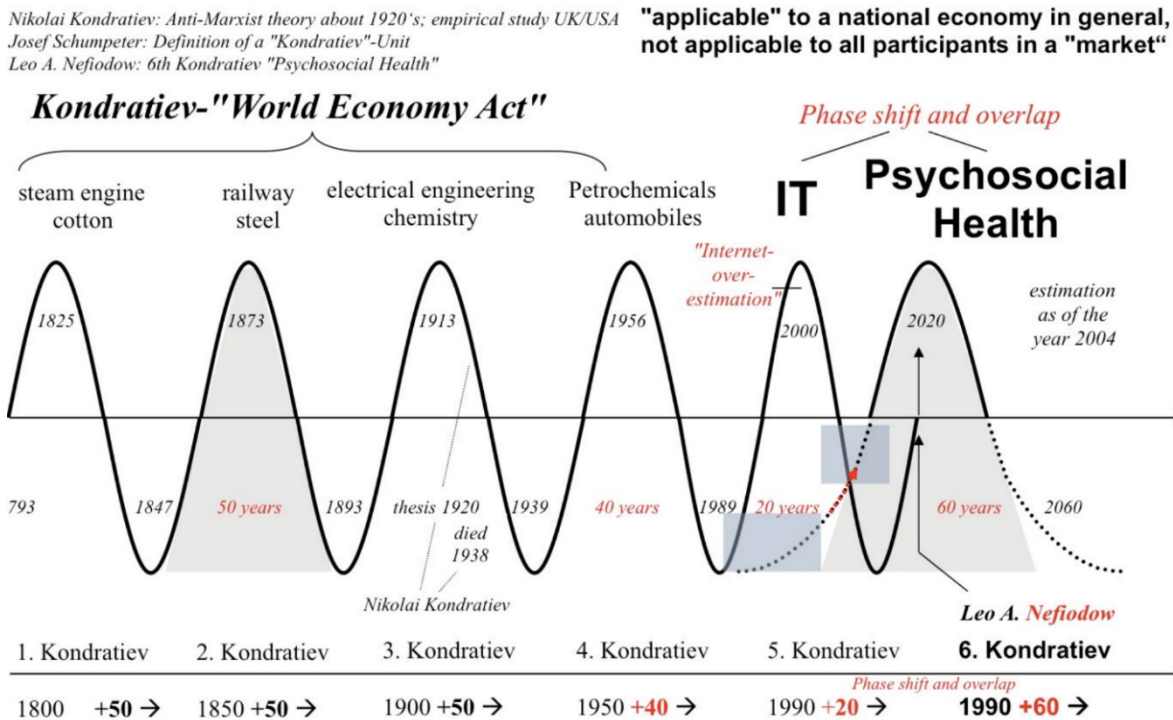
Table 2. List of economic crises

XVIII century		XIX century		XX century	
• Great Tobacco Depression (1703); • South Sea Bubble (1720) (UK); • Mississippi Company (1720) (France); • Great East Indian Bengal Bubble Crash (1769) (India) • Crisis of 1772 – started in London and Amsterdam; • War of American Independence Financing Crisis (1776) • Panic of 1785 – United States; • Panic of 1792 – United States • Panic of 1796–1797 – Britain and the United States		• Danish state bankruptcy of 1813 • Post-Napoleonic depression (post-1815) (England); • Panic of 1819, U.S. recession with bank failures; • Panic of 1825, England; • Panic of 1837, U.S. • Panic of 1847, England; • Panic of 1857, U.S • Panic of 1866 • Great Depression of British Agriculture • Long Depression: Panic of 1873, Panic of 1884, Panic of 1890, Panic of 1893 • Australian banking crisis of 1893 • Panic of 1896		1900's • Panic of 1901, U.S.; • Panic of 1907	1980's • Early 1980s Recession • Chilean crisis of 1982 • Bank stock crisis (Israel 1983) • Japanese asset price bubble • Black Monday (1987) • Savings and loan crisis failure
XX century		XXI century			
1990's • Special Period in Cuba (1990–1994) • Early 1990s Recession • 1991 India economic crisis • Finnish banking crisis) • Swedish banking crisis (the 1990s) • 1994 economic crisis in Mexico • 1997 Asian financial crisis • 1998 Russian financial crisis • Ecuador's financial crisis • Argentine economic crisis • Samba effect		2000's • Early 2000s recession • Dot-com bubble • Turkish economic crisis • 2001 September 11th • Uruguay banking crisis • Venezuelan general strike • Financial Crisis 2007-2009 Late-2000s recession. • 2000s energy crisis oil price bubble a) Subprime mortgage crisis (US) b) United States housing bubble and United States housing market correction (US) c) Automotive industry crisis of 2008–2010 d) 2008–2012 Icelandic financial crisis e) 2008–2010 Irish banking crisis f) Russian financial crisis of 2008–2009 g) 2008 Latvian financial crisis h) Venezuelan banking crisis of 2009–10 2008-16 Spanish financial crisis	2010's • European sovereign debt crisis a) Greek government-debt crisis (2009-2019) • 2010–2014 Portuguese financial crisis • Crisis in Venezuela • Ukrainian crisis • 2014 Russian financial crisis • 2014-2017 Brazilian economic crisis • 2015 Chinese stock market crash • Turkish currency and debt crisis	2020's • 2020 stock market crash • Lebanon liquidity crisis of 2020 • The recession of the coronavirus • Black Monday (March 9) • Black Thursday (March 12) • Lebanon's 2020 liquidity crisis • Texas Energy Crisis (2021) • Crisis in the real estate market in China in 2021 • Israeli-Palestinian crisis (2021) • Azerbaijan-Armenian border crisis 2021 – 2022 • World energy crisis 2021-2022 • Ukrainian-Russian war 2022 - ... • The American Stock Market Crash (2023)	

Created from data: Jon Moen, 2001, Patrick van der Geest, 2021, Martin J., 2000, Thomas Klitgaard and James Narron, 2016, Michael Corbett, 2016, Maria A. Arias, Paulina Restrepo Echavarria, 2015, Shigenori Shiratsuka, 2003, Federal Reserve History, 2023, Stijn Claessens and M. Ayhan Kose, 2009, Gita Gopinath, 2020

The most accurate Kondratiev waves are displayed in the work of Goldschmidt Andreas and Hilbert Josef (Bergheim S., 2020).

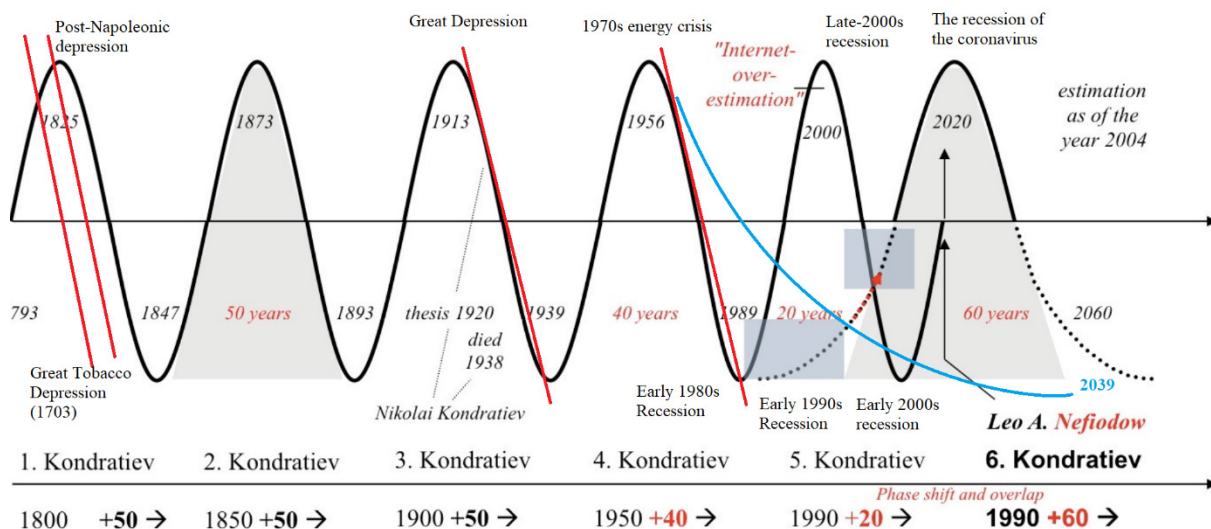
Figure 1. Kondratiev waves



Source: Goldschmidt Andreas JW, Hilbert Josef, 2009

As can be seen from Figure 1, all calculations made by Kondratiev are practically impossible to recalculate due to the lack of statistical data. The second aspect - the analysis of each cycle was based on different industrial sectors. It is undeniable that each of these industries has been a stimulating factor for the entire global economy. However, today, except for the advent of the Internet, it is not possible to equate the same economic effect.

Figure 2. Adapted Kondratiev model



Source: Goldschmidt Andreas JW, Hilbert Josef, 2009

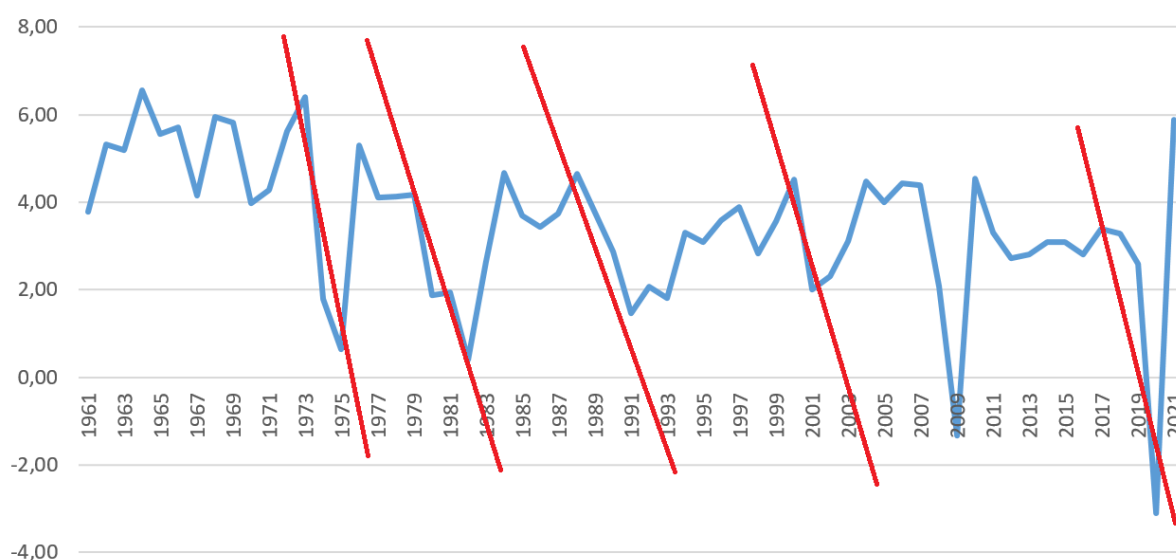
The main aspect is to determine the state of the economic state at the present stage. Goldschmidt Andreas and Hilbert Josef also failed to make an accurate forecast of the economic development of the economy. The first thing we can notice is the duration of the cycles. Comparable with our historical research (Fig. 2).

We have plotted the main recessions (red lines) on the existing model, which we will highlight based on historical and logical analysis. Most recessions follow the basic pattern. However, the energy

crisis of the 70s, the early and late recessions of the 80s, the early recession of the 90s and 2000s, and the coronavirus recession (2020) show 10-year cycles. Moreover, it is almost impossible to single out peaks and troughs. If we take the model with a 50-year cycle as a basis, then after 1956, the next peak should have been 2006. However, during this period, an economic recession began in the United States, which later spread to Europe. If we take the lower point - 1989 - as a basis, the next logical should be 2039 (blue curve) in the figure. Of course, this is a pessimistic scenario.

If we take World Bank national accounts data, and OECD National Accounts data files (2022) for analysis, we have a steady upward trend. If we take GDP growth, and annual % and superimpose the above-mentioned recessions, we have more coincidences (Fig. 3).

Figure 3. GDP growth, annual %

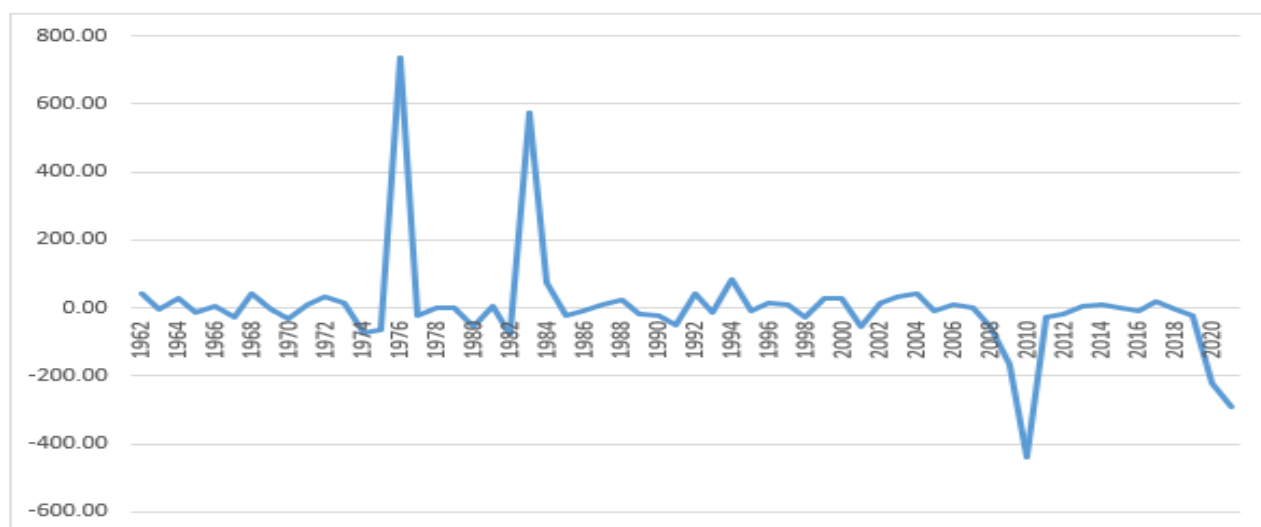


Source: OECD

According to the World Bank, already in 2021, the world economy began to emerge from the downward trend. In the first post-pandemic 2021, the economy grew by a healthy 6% after a 3% Covid recession, but growth slowed to about 3% in 2022, and economists expect only 2.2% in 2022.

However, to confirm the forecast, we will use formula (17) to calculate the Rate of growth (g), which should reflect the phases of the economic cycle (Fig. 4).

Figure 4. Rate of growth (g)



Source: author's analysis

Thus, the Rate of growth (g) model reflects our assumptions. However, all our assumptions are purely logical factors and are debatable.

4. DISCUSSION

To confirm our assumptions, we will take short-term IMF forecasts: World Economic Outlook database (2022), UN: World Economic Situation and Prospects 2023 and the World Bank Group: Justin Damien Guénette, M. Ayhan Kose, and Naotaka Sugawara. Is a Global Recession Imminent? (2023)

In 2022, the global economy was hit by a series of major and mutually reinforcing shocks – the COVID-19 pandemic, the war in Ukraine and its resulting food and energy crises, soaring inflation, a deepening debt burden, and the climate emergency.

In most developing countries, the recovery in employment has been slower in 2022, and these countries continue to face a significant backlog of the labour force. The disproportionate loss of jobs by women during the initial phase of the pandemic cannot be fully offset, with improvements occurring mainly through a resurgence in informal employment.

According to the report, a slowdown in growth, coupled with elevated inflation and growing debt vulnerabilities, threatens to further reverse hard-won gains in sustainable development, exacerbating the negative effects of the current crises already being felt. Already in 2022, the number of people facing acute food insecurity more than doubled compared to 2019, reaching almost 350 million people. A prolonged period of economic weakness and slow income growth will not only hinder poverty eradication but will also limit countries' ability to invest in Sustainable Development Goals on a larger scale.

Another factor of influence was inflation. After a year and a half of lockdowns, the population and businesses rushed to catch up. Demand grew at a record pace, and the supply of goods and services did not keep up, primarily because China never got out of quarantine. Russian aggression has only added to the problems, as it further undermined globalization and world trade. There was a shortage of everything: chips, cars, cheap labour, and transport services. To combat it, central banks have been raising rates at a record pace over the past two decades. Rising prices for loans slowed down consumption, construction, investment, and the housing market.

Against this backdrop, global output growth is projected to slow from 3.0 per cent in 2022 to 1.9 per cent in 2023, one of the slowest growth rates in decades.

The United States and Europe will reduce the pace of economic growth and three-quarters of economic growth in 2023 will be provided by the emerging economies of Asia. For the past half-century, developed economies have only fallen into recession when spending on their main import, energy, has risen sharply. The only exception was the 2020 recession caused by the pandemic. The decline occurred after the cost of electricity, fuel and heat reached 13% of GDP. In 2022, they exceeded 17%.

With high inflation, aggressive monetary tightening and heightened uncertainty, the current downturn has slowed the pace of economic recovery from the COVID-19 crisis, putting several countries (both developed and developing) at risk of recession in 2023. Following the IMF tribute, the GDP will shrink to the mark of 3.2, and in 2023 - to 2.7.

In 2022, growth in the United States of America, the European Union and other developed countries slowed down significantly, which hurt the rest of the world economy in several ways. Tightening global financial conditions, coupled with a strong dollar, have exacerbated the financial and debt vulnerabilities of developing countries. More than 85% of the world's central banks have tightened monetary policy and raised interest rates one after another since the end of 2021 to contain inflationary pressures and avoid a recession. Global inflation, which peaked in decades at about 9% in 2022, is projected to decline in 2023 but remain at a high level of 6.5%.

Global growth will pick up moderately to 2.7 per cent in 2024, according to UN projections, as some of the growth impediments begin to ease. However, this will be largely influenced by the pace and sequence of further tightening of monetary policy, the course and consequences of the war in Ukraine, and possible further disruptions in supply chains.

5. CONCLUSION

The crisis is one of the most popular terms in economics. It is difficult to imagine a modern article on economics that does not mention the crisis of the financial market, the banking system, the crisis

of the industry or the collapse of the company's market value ([Bošnjak, Antonija, Hassan, Abeer and James, Kieran, 2017](#)). It is considered a categorical fact that the crisis is part of the economic cycle. The economic cycle model includes the main phases - bottom, growth, recession and peak. Economic science has developed a number of different theories that explain the causes of economic cycles and, accordingly, the crises that arise in them. In the article, we take as a basis the existence of the crisis as a fact.

We based our research on a historical analysis of existing crises and singled out periods of recession recognized by historians. We compared the periods we have identified with the Kondaryev forecast model, which was published by Goldschmidt Andreas and Hilbert Josef. The overlap of historically recognized recessions coincided with the main waves of Kondratieff. However, the 5th cycle remained controversial ([Morgan M. 2021](#)).

To do this, we took the statistical data of world organizations and built the dynamics of the Rate of growth (g) (1961-2021). This model showed that the 5th Kondratiev cycle has not yet formed and shows a downward trend. It was not possible to build a reliable forecast based on official data, because data is published only for 2021 and the latest 2021 shows global GDP growth. Also, the predictive model cannot take into account such factors as the war in Ukraine and the consequences of imposing sanctions on Russia and other economies. Therefore, in confirming our forecasts, we were able to use only short-term forecasts of the IMF, the World Bank and the UN. Based on their forecasts, the global recession will continue until 2024 inclusive.

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MEASURING THE JUSTNESS OF THE EUROPEAN GREEN TRANSITION

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Received 02.02.2023.

| Send to review 14.02.2023.

| Accepted 25.05.2023.

Original Article



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JEL Classification:

Q01, Q28, Q41, Q42, Q56, Q58

Doi: 10.61432/CPNE0101030m

UDK: 502.131.1:330.33.01

ABSTRACT

The ambitious goals of the green transition of the EU have set numerous challenges, including in the social sphere. The green transition is expected to affect the European households and businesses in various ways (job loss, energy and transport poverty, etc.) leading to a direct or indirect increase in their living costs and company expenses. Thus, research is needed on the policy measures that the EU is taking to tackle the negative social effects of the green transition and on the evaluation of their efficiency. The latest developments in the policy area concerning its social dimension are considered in this paper, as well as the approaches to the measurement of the justness of the green transition. The aim of this review scientific paper is to analyze main methodological approaches to green transition, and specifically to the justness of the green transition in the EU. The methodology of this study includes a desk research, based on analysis and synthesis, descriptive and comparative analysis and systematic approach. The key finding of the study is that despite the numerous policy papers, regulations and recommendations, there is no comprehensive methodology to measure the justness of the green transition in the EU and further research is needed regarding the precision of the indicators that need to be developed and for which statistical data will have to be collected. The author's contribution is insight into this understudied topic, which will have a strong impact on social Europe in the short term.

Keywords: *Green transition, Just transition, Just transition mechanism, European Union*

1. INTRODUCTION

In 2019 the European Commission published a Communication on a new European Green Deal, outlining the most ambitious climate change goals so far in the world. There is no doubt that the transition to a low-carbon, climate neutral economy and society in the European Union will be a complex and costly process. According to the European Commission's (2020) estimates the reaching the 2030 climate target will require additional annual investments of €360 billion on average, which will increase the relevant investments from an average of €683 billion per year in the last decade to around €1,040 billion per year. Approximately one third of the additional investment is expected to be necessary in the field of transport. However, the overall green transition requires a total rethinking of the current policies for energy, economy, industry, production and consumption, large-scale infrastructure, transport, food and agriculture, construction, taxation and social benefits, and even going further addressing environmental challenges beyond climate (biodiversity, chemicals, pollution to air, water and soils). This is why, more professional expertise and academic research is concentrated on the issue connected with the cost of the green transition.

The aim of the research paper is to summarize and analyze main methodological approaches to green transition, and specifically to the justness of the green transition in the EU.

The main research question of this study is to explore whether there is an appropriate methodology in place on EU level to measure the justness of the European green transition.

The research tasks of the paper are: 1/ To contribute to the understanding of the Just green transition and its EU mechanism; 2/ To summarize main methodological approaches to green transition and specifically to the measurement of its justness.

The methodology of this study includes a desk research, systematization, analysis and synthesis, and systematic approach. Processing of statistical data by Eurostat is also applied by the author to illustrate some of her statements.

The key finding of the study is that despite the numerous policy papers, regulations and recommendations, there is no comprehensive methodology to measure the justness of the green transition in the EU. For its development, further research is needed and precision of the indicators that need to be developed and for which statistical data will have to be collected.

2. LITERATURE REVIEW

The following literature review refers to the studies that concern the main aspects of the Just transition in general and the Just Transition Mechanism of the European Union in particular – its establishment and structure, and critical views of its efficiency.

2.1. JUST TRANSITION

[McCauley and Heffron \(2018\)](#) refer to the origin of the term “just transition”, which dates back as early as the 1980s and was invented by the global trade unions. They introduce a new term - “restorative justice” - and argue that the just transition is the right place for such an engagement.

There is no universally acknowledged definition of the just transition. But the concept of just transition has become so ambiguous that a consolidation of academic literature concerning it is necessary to clarify the different conceptions and their inter-relationships ([Wang and Lo, 2021](#)).

On one hand, just transition principles have been increasingly integrated into national and international policy reports and agreements, but on the other hand, the lack of universal definition of just transition creates new challenges. [Henry et al. \(2020\)](#) explain them with the heterogeneous points of view of the different stakeholders in the green transition. It means different things and connotations for the trade unions and workers, for the environmental and climate justice organizations, and for the business. The problem with the green transition is also much different by countries, regions and energy approaches. This is why, it is critically important to document processes, policies, and outcomes within and across organizations, as well as to build coalitions, share information and compare results locally, nationally, and globally ([Henry et al, 2020](#)).

[The International Labour Organization \(2015\)](#) has issued guidelines for a just transition. It has highlighted that the “greening of economies in the context of sustainable development and poverty eradication will require a country-specific mix of macroeconomic, industrial, sectoral and labour policies that create an enabling environment for sustainable enterprises to prosper and create decent work opportunities by mobilizing and directing public and private investment towards environmentally sustainable activities” (p. 6). The aim of the approach suggested is to stimulate the creation of new jobs that are in high value added sectors, which stimulate the upgrading of jobs and skills, as well as to improve productivity in more labor-intensive industries.

The focus of the guidelines is on the need for cooperation between all kind of institutions and businesses on all levels (national, regional, international, global) for the effective integration of the three dimensions of sustainable development.

[McCauley and Pettigrew \(2022\)](#) try to interrelate the performance of the EU Member States in terms of green transition with their performance in terms of social rights. They link the two and analyze the relationship between indicators extracted from the European Green Deal (EGD) and indicators extracted from the scoreboard of the European Pillar of Social Rights (EPSR). Their correlation

analysis shows a clear relationship and a directly proportional trend between performance in EGD indicators and EPSR indicators in most EU members states. As a result, they identify some weakness in the European Green Deal's design and suggest some amendments to better integrate the green with the social goals of the EU.

2.2.JUST TRANSITION MECHANISM

The Just Transition Mechanism of the EU has been considered as a part of a wider turn in EU policy-making towards strengthening of its social dimension (Vesan et al., 2021). Kyriazi and Miró (2023) argue that the final design of the JTF “emerged through the synergistic and antagonistic interplay” between some of the member states (the Eastern bloc) and the EU institutions (especially the European Commission).

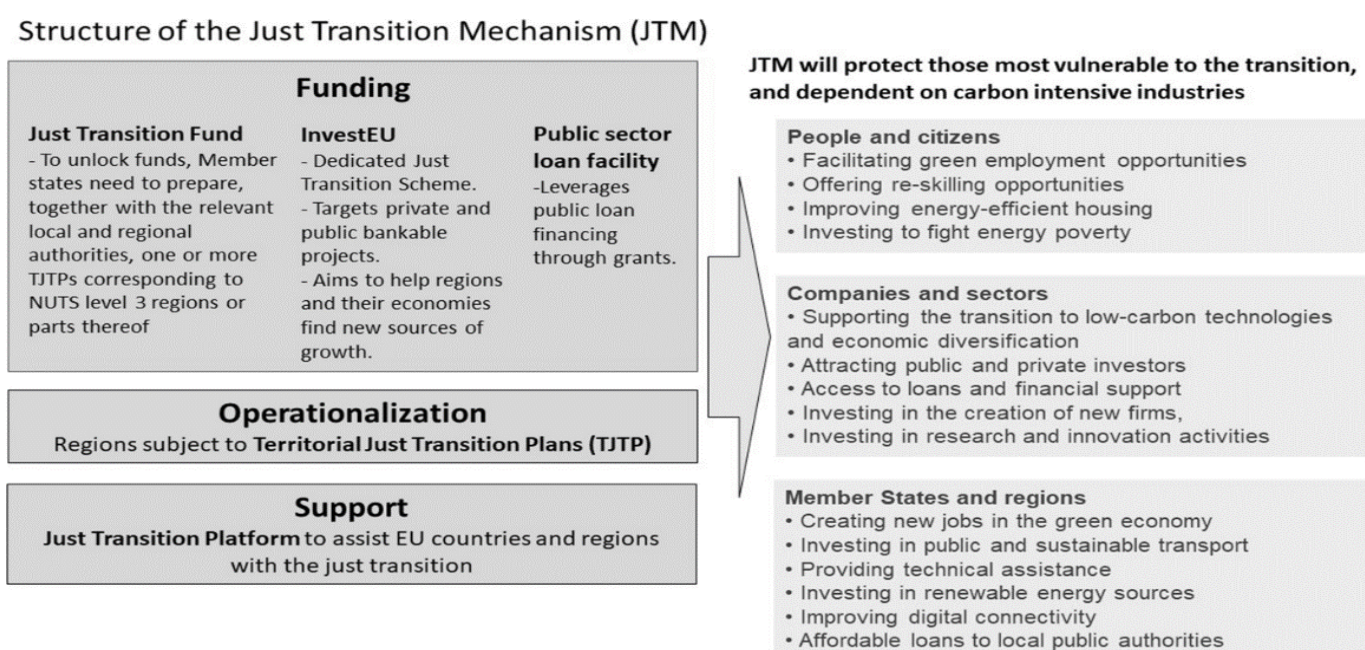
The plan of the European Commission is to have a Just Transition Mechanism, including a Just Transition Fund that “leaves no one behind” (European Commission, 2019). Its main goal will be to support the transition of regions and sectors dependent on fossil fuels or carbon-intensive processes, to provide access to re-skilling programs and new jobs to vulnerable workers, as well as to promote energy-efficient housing. In addition to that, it is said that the “need for a socially just transition must also be reflected in policies at EU and national level”, through territorial plans. The JTM will be financed by the EU budget, the EIB group and other innovative financial sources.

The EU Just Transition Mechanism forecasts that some sectors will be declining while other will continue to exist but will have to transform. The first ones will be sectors with high greenhouse gas emission intensity levels or based on the production and use of fossil fuels (coal, lignite, peat and oil shale). The second type are sectors, for which there will be technological alternatives to carbon-intensive processes, so they will transform. The fund is expected to enhance the climate neutrality of the sectors and regions, and to avoid regional disparities growing (European Parliament, 2022).

To support a fair green transition, the Council of the EU adopted a devoted to the topic regulation that states that: “In order to be successful, the transition has to be fair and inclusive to be socially acceptable for all” (Council of the European Union, 2021). This Regulation establishes the Just Transition Fund to provide support to the people, economies, and environment of territories facing serious socio-economic challenges deriving from the transition process towards the Union's 2030 targets and a climate-neutral economy of the Union by 2050.

The Just Transition Mechanism has been graphically depicted in Figure 1.

Figure 1. Structure of the Just Transition Mechanism and its targets



Source: Sarkki, S., Ludvig, A., Nijnik, M. (2022)

The social aspects of the European green transition were also in the core of the high-level discussion during the event devoted to the fifth anniversary of the European Pillar of Social Rights, where the participants emphasized that the need for commitments to social rights should be an integral part of the green transition. These social aspects should be more deeply integrated in the environmental, fiscal and economic policies of the EU (European Commission, 2022).

The efficiency and expected outcomes of the functioning of the Just Transition Fund in the scientific literature has come to be controversial. The lack or insufficient inclusion of social justice considerations have led to academic research that present very critical views of the European Green Deal. Concerns are related not only to the limited financial allocations of the instruments, but also to governance issues.

The European Parliament presented a comprehensive study that focus on the drawbacks of the European Commission's proposal on the Just Transition Fund, and as a consequence it has given numerous suggestions. Among the recommendations it made were the following: engaging with local stakeholders before and all throughout the transition, using NUTS3-level data instead of NUTS2-level data regarding the fossil-fuel regions in the EU, including targeted labour and welfare policies, ensuring that regions put in place both social support policies and economic policies, requiring the member states to give clear and long-term fossil fuel phase-out goals, and others (European Parliament, 2020).

Sarkki et al. (2022) identify and discuss four paradoxes arising from the EU's Just Transition Fund and the aim "to leave no one behind". They are related to governance scales, offsetting exclusion, equity illusion, and eligibility criteria. Their general advice to policy makers is to incorporate the objective to reach the furthest behind first explicitly into the agendas and practices for advancing fair green transitions, because "otherwise the attempts to leave no one behind will marginalize the weak even further" (Sarkki et al, 2022, p. 777).

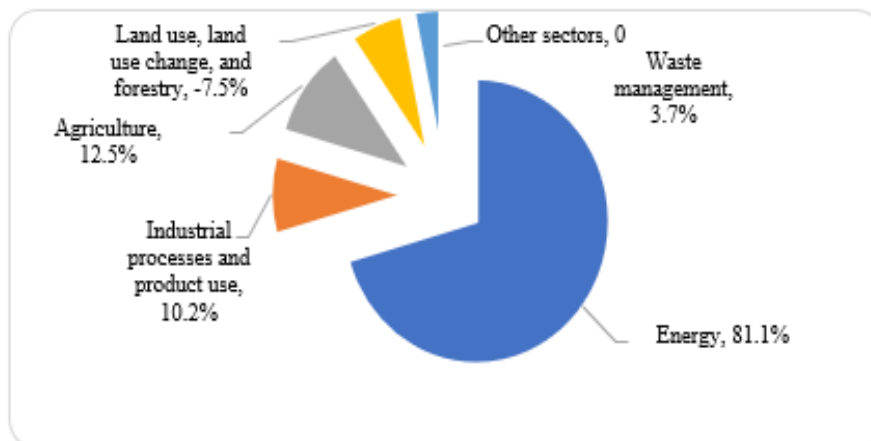
3.METHODOLOGY

The methodology of this study includes a desk research, systematization, analysis and synthesis, and systematic approach. This paper represents a review scientific paper that systematizes some approaches to green transition assessment, looking particularly in the approaches to assessment of the justness of the green transition in the EU, which seem to be insufficient and inefficient. In the first part of the paper some statistical data are presented, which has been processed by the author through statistical data by Eurostat.

4.ASSESSING THE IMPACT OF GREEN TRANSITION

The Eurostat data shows that in 2020 the main source of greenhouse gases (GHG) in the EU was the energy sector – over 81 %. The second biggest share was due to the agricultural sector (12,5 %) and the third was the industry – 10,2 % (Figure 2).

Figure 2. Distribution of Greenhouse gases in the EU in 2020 by sectors

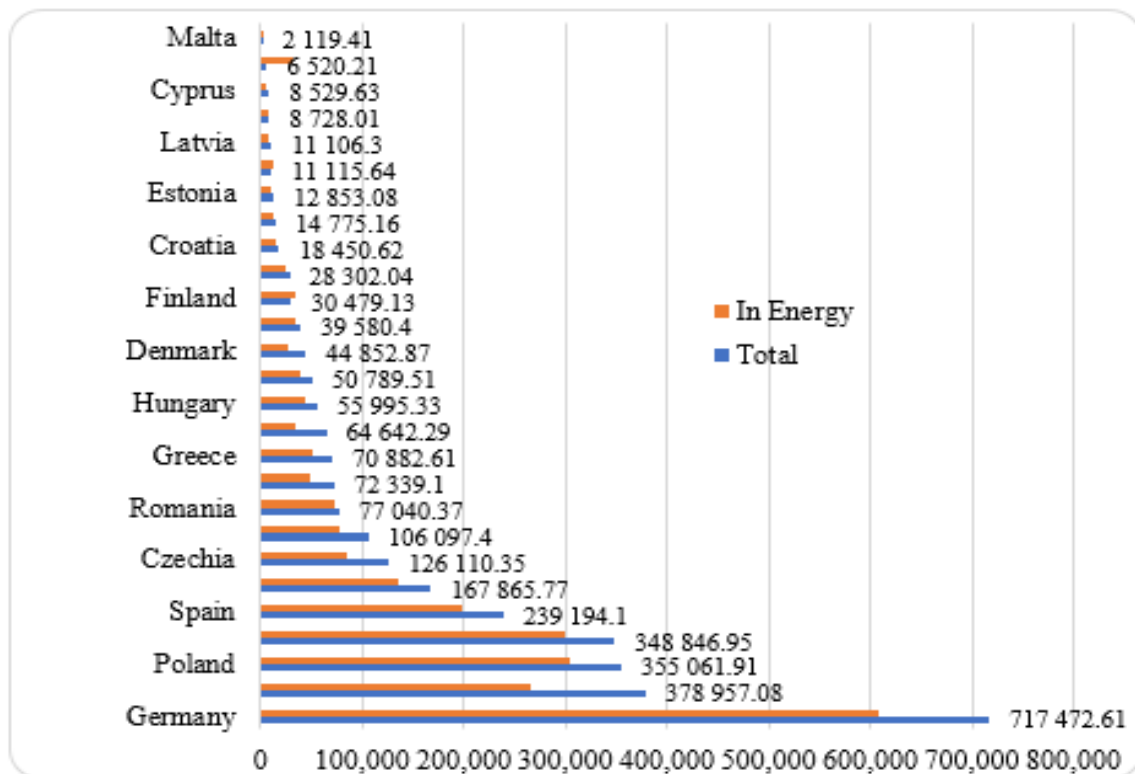


Source: The author based on Eurostat data (Eurostat, 2023a)

Thus, 4/5 of the greenhouse emissions in the European Union in 2020 came from the energy sector. The use of land and forestry sector accounts for 7,5% of the GHS. A big drop in the greenhouse emissions in this sector is evident in the last decade in almost all EU member states except for the Netherlands, Ireland and Czechia (Eurostat, 2023).

As it concerns greenhouse gas emissions by country, in 2020 Germany had the biggest share, followed by France and Poland. The lowest share of GHG had Malta (Fig. 3).

Figure 3. Greenhouse gas emissions, by EU country, in 2020, Total and in Energy, thousand tonnes



Source: The author based on Eurostat data (Eurostat, 2023a)

One comparatively common approach to measure the social cost of the GHG is the concept of so called “Social cost of Carbon”.

The social cost of carbon is the cost of the damages created by one extra ton of carbon dioxide emissions. It is usually calculated through integrated assessment models, which capture the pathway through which an extra ton of emissions leads to a change in atmospheric concentrations, which in turn leads to changes in average global surface temperature and precipitation. This then leads to biophysical impacts on agriculture and sea level, ultimately leading to damages to the economy and human welfare.

With models, researchers first simulate what the path of climate change would be in the absence of a policy change. Then, they augment the model to record how much damage and climate change increases as a result of an extra ton of emissions. The difference in damage is the social cost of carbon (Stanford, 2023).

The social cost of carbon dioxide (SC-CO₂) measures the monetized value of the damages to society caused by an incremental metric tonne of CO₂ emissions and is a key metric informing climate policy. Used by governments and other decision-makers in benefit-cost analysis for over a decade, SC-CO₂ estimates draw on climate science, economics, demography and other disciplines (Rennert et al, 2022).

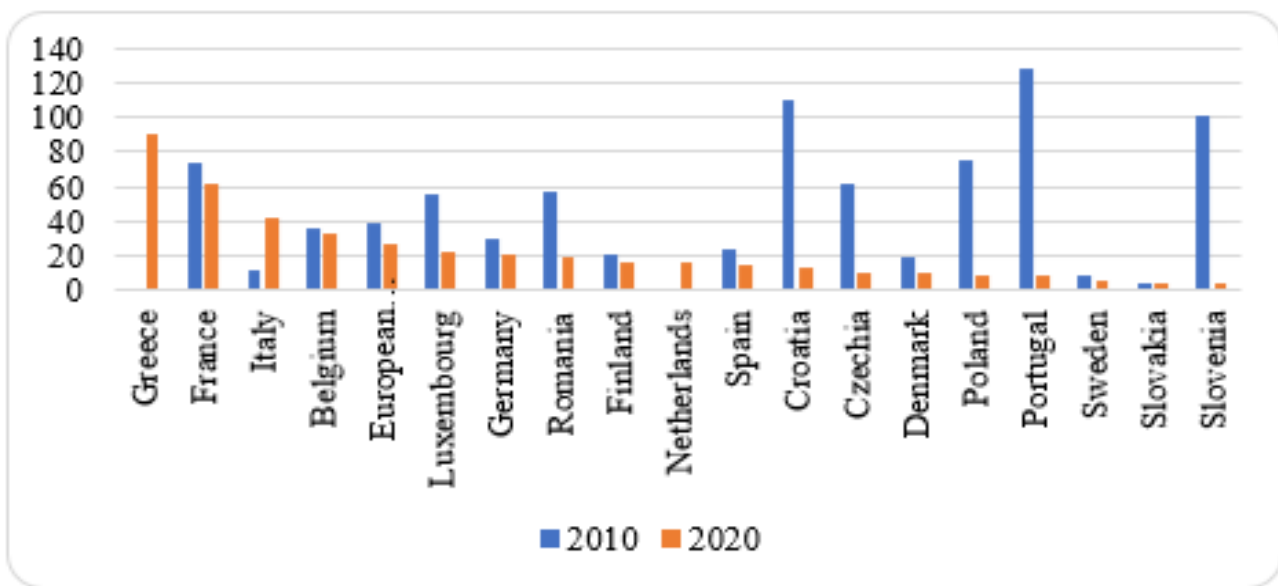
The concept of SCC is applied in decision making in the spheres of project appraisal (project cost-benefit analysis), regulatory impact assessment (policy cost-benefit analysis), setting of economic instrument (input to the setting of taxes, charges, or subsidies) and inn long-term (sustainability) objectives or targets, particularly climate policy (Watkiss, 2020). It is also a very important indicator

in countries like the US and Canada, in which it underpins climate regulations (in the EU the Carbon emissions pricing and a carbon tax are applied).

Kornek et al. (2021) state that the social cost of carbon is a central metric for optimal carbon prices and develop an optimal taxation model of the social cost of carbon that accounts for inequality between and within countries. They prove that climate and distributional policy cannot be separated, because if only one country does not compensate low-income households for disproportionate damages, the social cost of carbon tends to increase globally.

In the case of the European Union, in addition to measuring the volume of greenhouse gas emissions, Eurostat is processing information used to calculate an overall indicator that measures the economic costs incurred by the EU member states as a consequence of climate events (Fig. 4).

Figure 4. Climate related economic losses in the EU and certain member states*, 2010 and 2020, Euro per inhabitant, Annual value



*Only EU member states for which data is available for both years

Source: The author based on Eurostat data (Eurostat, 2023b)

Eurostat definition: The indicator measures the economic losses from weather and climate-related events, including meteorological events (storms), hydrological events (floods, mass movements) and climatological events (heatwaves, cold waves, droughts, forest fires).

The data are based on annual data and a smoothed time-series based on 30-year averages. The indicator is based on data from CATDAT of RiskLayer (Eurostat, 2023c).

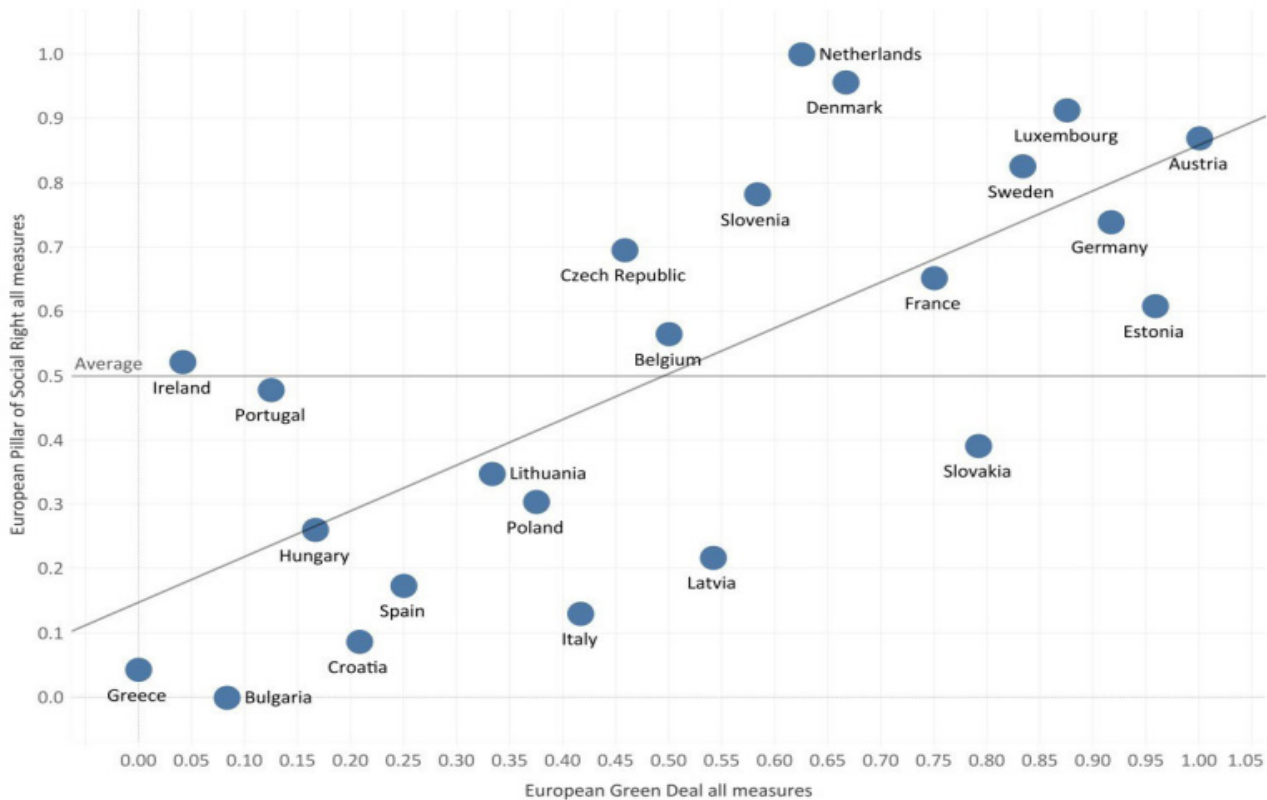
It can be seen that some member states have recorded a record-high drop in their climate related economic losses in the last decade – Portugal, Croatia, Slovenia, Poland and Czechia. This is the opposite for France, Belgium and Finland, and in 2020 Italy there is even an increase in climate related economic losses.

A lot of scientific studies explore the issue with income inequality in the EU, for example on the basis of the Gini coefficient (Kolluru, M., Semenenko, T., 2021) and even suggest some measures for managing it, for example through increased access to educational and training opportunities for disadvantaged groups, and through bigger investment in infrastructure and public services in disadvantaged areas (Dluhopolskyi, O. Zhukovska, A., 2023). However, referring social to environmental indicators is not so easy.

Applying the model of McCauley and Pettigrew (2022) mentioned above, the results they reached in their empirical study are worth mentioning. By linking indicators, which they extract from the European Green Deal and the European Pillar of Social Rights scoreboard, they prove a clear relationship

and a similar directly proportional trend between performance in EGD indicators and EPSR indicators in most EU member states (Fig. 5).

Figure 5. Rank percentile scores of EU member states for the three European Pillar of Social Rights themes vs Eight European Green Deal Action Areas



Source: “Can Europe lead a Just Transition?” by McCauley, D., Pettigrew, K. (2022)

High scores indicate high performance and vice versa. The top performers are Austria, Germany, Sweden and Luxembourg, while the consistently underperforming nations are Greece, Bulgaria, Croatia, Spain and Hungary. Ireland and Portugal are performing better in terms of social rights than in the area of the Green Deal. Slovakia and Estonia have higher achievements in the area of the Green Deal than in terms of social rights.

As it concerns employment, the European Commission has made some calculations regarding the possible loss of jobs due to the green transition. It is diving the jobs into 3 groups: ‘green’, ‘white’ and ‘brown’. The Green jobs (including tasks aiming at reducing the impact of economic activity on the environment) will increase and will require more skills, the brown jobs (in sectors like mining, manufacturing and agriculture) will decrease, disappear, or transfer into green ones, and white jobs (at present neutral in their environmental impact) will face only moderate changes related to the overall greening. As a whole, only slight effects are expected on the EU employment because most jobs in the EU are from the white type. The electricity production, transport, manufacturing, agriculture and mining sectors together account for around 90% of all CO₂ emissions in the EU, but for less than 25% of the employment. On the opposite side, construction, wholesale, retail and other services together employ more than 75% of the workforce, while generating less than 12% of CO₂ emissions. Thus, the total employment effects are expected to be small, but the impact of the green transition could be more significant depending on the sector, job and task levels (Vandeplas et al., 2022).

5. MEASURING THE JUSTNESS OF THE GREEN TRANSITION

Measuring the justness of the green transition seem to be a very difficult and still unclear task.

The most comprehensive framework concerning the green transition on EU level so far is that of the European Commission called Transitions Performance Index (TPI). It is a scoreboard that monitors and ranks countries based on 4 dimensions:

- economic (education, wealth, labour productivity and research and development intensity, industrial base)
- social (health life, work and inclusion, free or non-remunerated time, equality)
- environmental (greenhouse gas emissions reduction, biodiversity, material use, energy productivity)
- governance (fundamental rights, security, transparency, sound public finances).

This model resembles the different kinds of PEST analysis – PEST (economic, technical, political and social factors), STEEP - including environmental factors or STEER, which considers sociocultural, technological, economic, ecological, and regulatory factors, but does not include political factors. However, here the question is how to monitor performance concerning the green transition and get clear indicators that can be measured and compared.

A big advantage of the proposed database is that includes data for third countries as well, which allows international comparisons. The scoreboard shows that in 2011 the EU had a progress rate in the green transition of 4.9%, which was above the world average (4.3%). Since 2011 all EU member states have improved their indicators, except for Hungary. However, even among the top performers, there remains a place for improvement, as no member states is a leader in all four dimensions. The index also concludes that the environmental transition is much different than other transitions and that most countries have not yet set it as a priority ([European Commission, 2023](#)).

However, the Transitions Performance Index cannot measure neither the social cost of the green transition, nor whether it is just enough. This is why, a special field of research is needed as to analyze and develop comprehensive approach to just transition.

[Heyen et al. \(2021\)](#) assess the existing European-level indicators in the socio-environmental sphere on their suitability to serve as Just Transition indicators. They conclude that effective and socially acceptable transformation governance should strengthen synergies between environmental and social justice objectives, and avoid conflicts, i.e., short-term economic hardships and social inequalities caused by transformations. They take into consideration three broad socio-environmental issues - Environmental benefits, pollution & risks, Consumption- and social-participation opportunities for vulnerable groups, and Employment & regional cohesion (as affected by environmental policies and green transition).

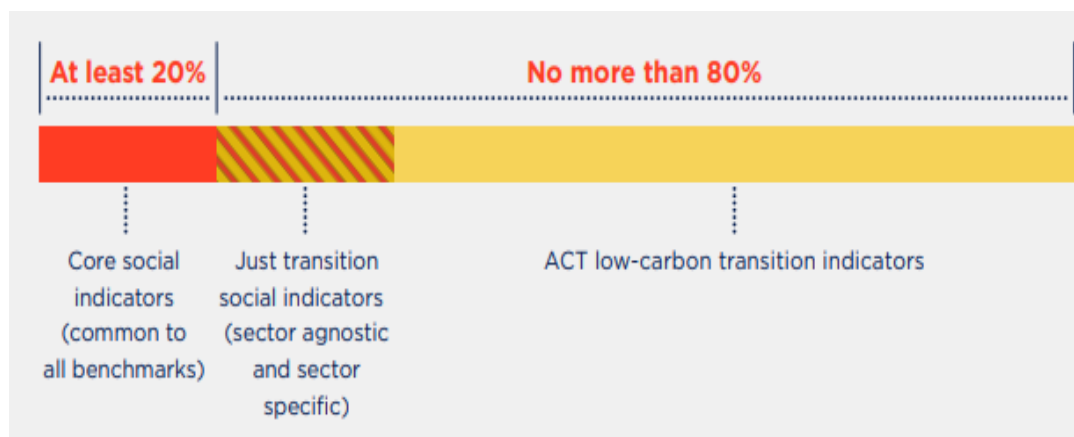
Their paper presents a range of existing European indicators and concludes that the monitoring of the just transition requires a combination of indicators from different areas, some of which could be further adapted to the green transition. For example, the authors make valuable recommendations for improvement of the methodology, as the inclusion of an indicator for public expenditure on (EU) money spent in support of consumers, workers and regions affected by the green transition (which may also include spending on research and innovation, skill developments and infrastructure for the green transition). Another suggestion is the grouping of “carbon-intensive regions” (based on the Just Transition Fund criteria) and measuring the development over time of one or several of the established regional wealth / cohesion indicators for this group of regions. A third suggestion is the introduction of new questions in the EU SILC survey that will allow the disaggregation by different criteria, for example by access to green space, proximity to waste facilities and hazardous sites, personal effects related to extreme weather events, ability to keep home adequately cool in summer, and others ([Heyen et al., 2021](#)).

As it concerns the social cost of the green transition, which will be borne by the business, some organizations and researchers have been trying to measure it.

The World Benchmarking Alliance (WBA) intends to assess 450 companies by 2023 on their contribution to a just transition by assessing their alignment with the goals of the Paris Agreement alongside their approach to addressing the social challenges of a low-carbon transition. These companies are in the automotive manufacturing, electric utilities, oil and gas, transport, real estate, cement, metals and mining, and heavy machinery sectors. The WBA just transition assessments will evaluate the contributions of globally influential companies in high-emitting sectors to a just transition. These assessments can become a unique and critical accountability mechanism of a decarbonisation and energy transformation that leaves no one behind ([The World Benchmarking Alliance, 2021](#)).

WBA plans to develop a set of sector-agnostic just transition indicators along with sector-specific indicators, as required for each industry benchmarked (see Figure 5). WBA's just transition assessments will combine the low-carbon transition assessment and the social assessments:

Figure 6. Just transition assessment approach of the World Benchmarking Alliance



Source: World Benchmarking Alliance, 2021

The “Leave-No-One-Behind (LNOB) Index” by the Sustainable Development Solutions Network (SDSN) is another attempt to measure the justness of the green transition. It is composed of indicators in four dimensions: extreme poverty and material deprivation; income inequality; access to and quality of services and gender inequality. However, similarly to the TPI, the LNOB index measures the social and environmental issues separately from each other. It is considered that since the environmental policy is not an important factor in these indicators, they are not sufficient to monitor environmental policy or transition effects ([Heyen et al., 2021](#)).

In general, the Sustainable Development Solutions Network is rather critical of the EU's policy for green transition in its 2021 Sustainable Development Report, stating that despite the European Commission's leadership on the SDGs before and after their adoption, the European Green Deal contributes directly to only 12 out of 17 SDGs and many social dimensions of the SDGs are not fully reflected in the Green Deal, and that Eurostat in its annual SDG report tracks progress towards quantified targets for only 15 of the 102 indicators, which cover mainly climate change, energy consumption and education. The SDSN recommends to the EU an integrated approach to the SDGs that encompasses three broad areas: internal priorities; diplomacy and development cooperation; and negative international spillovers. ([SDSN, 2021](#)).

6. CONCLUSION

As a result of the analysis, it became evident that despite the numerous policy papers, regulations and recommendations, there is not a comprehensive methodology to measure the justness of the green transition in the EU. For its development, further research is needed and precision of the indicators that need to be developed and for which data will have to be collected. Research has a crucial role to support the path towards a just green transition, which protects communities, territories and specific social groups. Moreover, the transition needs to be just so that it can contribute to achieving to the sustainable development goals. The aim of just green transition needs to be embraced by all stakeholders (states, business, workers, communities) on all levels (international, national and

regional) in order good results to be achieved. Thus, further comprehensive study on the justness of the green transition in the EU needs to be elaborated and represents a significant niche of scientific research.

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THE IMPORTANCE OF DIGITIZATION IN THE POST-WAR RECOVERY OF THE ECONOMY

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Received 17.02.2023.

| Send to review 28.02.2023.

| Accepted 02.06.2023.

Original Article



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JEL Classification:

H56, A10, F43

Doi: 10.61432/CPNE0101042m

UDK: 005.922.52:338.22(477)

ABSTRACT

Ukraine has made significant progress in developing digital technologies in recent years, with an average of 289% improvement in Internet access in all regions over the past decade. However, Russia's large-scale aggression against Ukraine is causing severe problems in this area. There is also a digital divide in providing regions of Ukraine with Internet access. As a result of the conflict in Ukraine, attention has been drawn to the need for digital identification solutions: displaced persons often lose access to their physical documents. At the same time, there is an urgent need to confirm their identification data in host countries. If the war continues, the focus must be on keeping businesses and citizens connected to the Internet and modernizing the communications and infrastructure of public services. Digital technologies should become a critical factor in Ukraine's post-war recovery. The study aims to analyze the characteristics of digitalization in terms of infrastructure, public services, and the digital economy. Thus, the study confirms that the reduction in the level of digital inequality has a high correlation with the growth of digitalization. In addition, the development of the level of digitalization is directly proportional to the efficiency of the IT industry. Thus, the IT sector in the first quarter of 2022 provided export revenue of 2 billion US dollars, which is 28% more compared to the previous year. The war caused significant disruptions to the sector, but increased international attention could open substantial opportunities for future development.

Keywords: digitization, digitization, digital technologies, digital economy, digital divide, digital identification

1. INTRODUCTION

Such phenomena as digitization, the digital economy, and the introduction of digital technologies are inevitable evolutionary development processes in today's world economy. A key priority under modern realities is the development of digital technologies using all their advantages, including expanding the information base, creating information products, minimizing risks, reducing transaction costs, providing the possibility of remote work, the ability to respond to security challenges quickly, etc.

The rapid modernization of existing digital technologies leads to rapid technological changes characterized by a multiplier effect. Thus, according to McKinsey estimates, one new job in the ICT sector stimulates the creation of 2-4 positions in the economy as a whole and leads to the blurring of geographical and physical borders, opening new perspectives for the economic, social, and cultural development of countries in including for the growth of regional and global competitiveness. Objective digitization processes that will gain momentum require countries, particularly Ukraine,

to formulate a balanced digitalization policy, liberalize the regulation of the industry, adapt the legal framework, increase investment, etc.

In the pre-war period, Ukraine made significant progress in developing digital technologies. In recent years, the share of ICT in the country's GDP was more than 4% and had the potential to grow. According to the results of 2021, compared to 2020, the Ukrainian IT sector grew by 36%, reaching the mark of 6.8 billion US dollars in exports of computer services (against 5 billion US dollars in 2020). The share of IT services exports to Ukraine is about 2.7% of the country's GDP. Before the start of the full-scale aggression, Ukraine was one of the European leaders in the level of development of the field of open data (6th place in the rating European Open Data Maturity 2021). Services based on them were used by about 7 million Ukrainians every month. The share of GDP generated by the field of open data was from 0.8 to 1.3%. As of 01.01.2022, the level of coverage of the rural population by fiber-optic networks and the level of coverage by 4G mobile Internet was 89%. More than 100 electronic public services were available on the Unified State Web Portal of electronic services (75+ through the Portal and 20+ through the mobile application). The transformation of administrative service provision centers at district state administrations has begun, and the network of administrative service provision centers has been expanded to 2,891 access points. Internet access has improved by an average of 289% in all regions over the past decade.

However, Russia's large-scale aggression against Ukraine is causing severe problems in this area. Since the beginning of the active phase of hostilities, the number of vacancies in the IT market in Ukraine has halved. Temporary (for the period of martial law) access restriction to the National Open Data Portal to ensure national security interests. As of June 1, 2022, 22% of optical networks and almost 11% of mobile communication towers have been destroyed. The level of destruction of networks of de-occupied settlements reaches 100% in some places. TsNAP was destroyed in the territories that were or are under temporary occupation, as a result, lack of access to registers and information systems or long-term restoration of access to these systems. There is an increase in demand for public services, particularly electronic ones, considering the circumstances of displacement, loss of documents, etc. Many state information resources were subjected to DDoS attacks. Most of them were simply disabled due to their inability to withstand attacks.

Thus, the critical challenges in the field of digitization in the post-war period are:

- Risks of IT companies changing jurisdiction from Ukrainian to foreign and loss of investment capital, a significant decrease in the quality of access to the Internet, and the appearance of a significant number of people who do not have access to the Internet at all.
- The significant need for receiving public services by people who have left their homes or are in temporarily occupied territories.
- A high level of cyberspace threats requires a quick response, and the readiness of technical means and specialists.

In addition, the priorities in the domestic policy of digital transformations are forming a single digital market with the EU and bringing the structure of the digital sector of Ukraine closer to the requirements of the new reality in the conditions of the war and the post-war period.

2. LITERATURE REVIEW

In modern scientific literature, more publications are appearing on various aspects of digitalization processes. In addition, it should be noted that various areas of digitalization are considered: economy, public administration, medicine, transport, etc.

With the strengthening of the digitalization of the economy, several studies on this matter appeared the raised problem of creating new digital resources, in particular digital duplicates of the organization, is significant. Scientists suggest five principles that assist in constructing an organizational digital twin and show how they combine into a dynamic evolutionary process that builds and maintains the digital twin incrementally. Also they discuss the managerial implications of implementing a digital twin and how digital twins create value in an organization (Parmar, Leiponen, A., & Thomas, 2020). The impact of digital transformation on customer value creation in the context of small and

medium-sized firms with the aim of understanding how dynamic capabilities, as enabling mechanisms, may foster digital transformation considered by Italian scientists [Matarazzo, M., Penco, L., Profumo, G., & Quaglia, R., \(2021\)](#).

A study of the impact of digital financial inclusion on sustainable employment in countries showed that digital financial inclusion should be pursued at a moderate pace, especially in upper-middle-income. Initially, it has a significant promotional impact on sustainable employment. Still, after it surpasses the threshold, this impact is reduced because of the increased cost of digital finance and sustainable development. Thus, if digital financial inclusion is pursued too quickly, a loss in efficiency might follow, which could be avoided by designing a strategy with stability in mind ([Geng, Zhechen & He, Guosheng, 2021](#)).

Scientists also pay attention to environmental aspects and examine the influences of digital business and digital public services on environmental innovation (EI) performance in the European region from 2011 to 2019. It is established that European countries should accelerate the digital economy, strengthen the construction of digital infrastructure, and promote digital implementation. Governments should recognize and seize the opportunities presented by digital technology to establish a more effective legislative framework for increasing company technology investment and public attention to environmental improvements ([Hung, & Nham, 2023](#)).

More and more scientists are investigating how digitization can be used for education. In addition to teachers in the classroom, parents at home can also play a key role in shaping students' beliefs about digital media, which are essential antecedents of students' use of technology for learning. Most of them focused on how teachers shape technology use. Besides teachers in the classroom, parents at home may also have a pivotal role in shaping students' beliefs towards digital media, which are, in turn, an essential precursor to students' use of technology for learning ([Hammer, Scheiter, & Stürmer, 2021; Kim, Long, Zhao, Zhou, & Alexander, 2021](#)).

Thus, researching how specialists rooted in digital and analog knowledge domains engage in cross-domain collaboration to create digital innovation jointly, scientists concluded that cross-domain education and interdisciplinary training are increasingly important in the digital era. Digital innovation occurs at the intersection of various sources of knowledge. Thus, integrating digital expertise with other domains of knowledge interests researchers and practitioners alike ([Perschina, Raissa & Soppe, Birthe & Thune, Taran, 2019](#)).

While education, in general, is a significant driver of social and digital inequality, a country's digital development level is crucial for the less educated sections of society. These findings have theoretical and practical implications: first, they challenge the homogeneity of the causal effect and the assumption that people differ only in terms of motivation, access, and digital skills, and second, the study was conducted in Europe, so they indicate that socially disadvantaged Europeans benefit from living in more digitally developed countries ([Lamberti, Lopez-Sintas, & Sukphan, 2021](#)).

Digitization allows businesses better to orient themselves under the emergence of new business environment factors to be more effective and efficient at the global and regional levels ([Đukić, 2018](#)).

Digital technologies contribute to introducing flexible methods, procedures, and rules into the work process, increasing business operations' effectiveness ([Mićić & Mastilo, 2022](#)).

Digital technologies are becoming extremely important for strategic management and gaining strategic competitive advantages. The basis of digital transformational benefits should be the appropriate organizational structure and culture of the company ([Mašić, Vladušić & Nešić, 2018](#)).

Digital innovations are revolutionizing the way companies and industries work. However, the functioning of organizations developing digital innovations is often overlooked. ([Hadjielias, Dada, Cruz, Zekas, Christofi, & Sakka, 2021](#)) The study provided insight into how innovation teams function in digital transformation. The results show that digital innovation teams depend on two cognitive states: team-specific cognitions required for digital innovation and digital project-specific cognitions.

One of the most relevant phenomena in digitization is the digital divide. A study of the corporate gap found that all digital technologies innovations must be supported by demand for related skills and should be integrated into an innovation cycle ([Shakina, Parshakov, & Alsufiev, 2021](#)).

In martial law and armed conflict conditions, the digitalization of state administration is becoming more relevant. Public sector organizations worldwide use digital platforms as part of their transformation strategy. Based on a case study of the digital transformation of a paperless port in Ghana and technology affordability theory, suggestions are made on how digital platforms can contribute to transforming the public sector (Senyo, Effah, & Osabutey, 2021).

Also relevant in martial law conditions, considering the probability of losing paper documents or the impossibility of physically obtaining them due to forced displacement, is the digital identification of the individual. For example, the UK government recently announced its commitment to developing a secure digital identity for citizens. Following a review of information received from this call, the Government said it is looking to develop proposals for a legal framework to remove regulatory barriers that prevent using secure digital identities and establish safeguards for citizens. It will also develop the next generation of digital identity use in Government and promote a pragmatic approach to international digital identity standards (Seifert, 2020).

3. AIM OF THE RESEARCH

The purpose of the article is to study the factors of digitalization of Ukraine in terms of infrastructure, public services, and digital economy comparing pre-war indicators with those that exist during the war, as well as substantiating the importance of digitalization development in the post-war recovery of the economy.

4. METHODS

I. The methodological basis of the article is formed based on a generalization of the scientific provisions of modern scientific research on digitalization, which consider the objectivity of changes occurring under the influence of the development of a dynamic environment. Data processing for this article involved the use of the following methods of data analysis: methods of statistical qualitative and quantitative comparison, analytical, graphic, and tabular methods. The development and substantiation of the study's theoretical, methodological, and applied foundations are based on a significant amount of informational and analytical material, which provides an opportunity to form a comprehensive approach to substantiating the importance of digitization in post-war economic recovery. The conclusions of the conducted research were formulated using the methods of abstract specification, generalization, structural-genetic analysis, and synthesis of the obtained results.

II. One of the critical issues in increasing the country's digitization level is the assessment of its overall level, which is logically carried out by comparing it with other countries according to a set of primary and synthesized indicators.

At the international level, many synthetic indicators are calculated that describe the degree of development of digitalization processes in different countries based on combining partial indicators into synthetic indicators, comparing their values, and determining the overall level of the state. Some of these indicators are currently no longer calculated (e-Intensity (Boston Consulting Group); IDI (ICT Development Index)), and some are calculated only at the regional level - DESI (Digital Economy and Society Index). For the analysis, it is worth using the information on the methodology of calculations of such indices as DEI (Digital Evolution Index); GII (Global Innovation Index); NRI (Networked Readiness Index); WDCI (IMD World Digital Competitiveness Index); DAI (Digital Adoption Index) and information from the Digital Development Dashboard.

It was determined that the assessment of the specified level for the countries of the world should be carried out based on synthetic indicators, which in turn are based on the calculations of primary indicators, analyzing the approaches to assessing the level of digitization at the global level and the methods of calculating the specified indicators.

Summarizing the mentioned approaches, we singled out five generalized synthetic indicators that will form an integral value: Digital/Technological skills are readily available; Digital Business; Digital Governance; Infrastructure; Level of internet activity/mobility. The first three indicators were selected as sub-indices from existing indicators: Digital/Technological skills are readily available – 3

IMD World Digital Competitiveness Index; Digital Business and Digital Governance – Networked Readiness Index.

Two other sub-indices are proposed to be calculated based on partial indicators:

Infrastructure: Active mobile-broadband subscriptions per 100 inhabitants; Fixed broadband basket as a % of GNI p.c.; Fixed broadband subscriptions per 100 inhabitants; Fixed-telephone subscriptions per 100 inhabitants; Households with a computer at home (%); Households with Internet access at home (%); International bandwidth per Internet user (kbit/s).

Level of Internet activity/mobility:

- Individuals using the Internet, total (%)
- Mobile cellular basket as a % of GNI p.c.
- Mobile-cellular subscriptions per 100 inhabitants
- Population covered by at least a 4G mobile network (%)
- Monthly fixed broadband Internet traffic per fixed broadband subscription (MB)
- Monthly mobile broadband Internet traffic per mobile broadband subscription (MB)
- Population covered by a mobile-cellular network (%)

II. The preliminary analysis of the partial indicators must be carried out to determine the practicality of including the specified indices in the sub-index. One of the methods is the clustering method, but to assess the degree of influence of each indicator on the assignment of the research object to the appropriate group. The most common clustering methods are tree-like (hierarchical) and the k-means method.

The hierarchical method involves the sequential merging of smaller clusters into larger ones or the division of larger clusters into smaller ones. The calculation uses similarity measures to calculate the distance between objects, called distance metrics or pounds. Similarity measures are calculated using different methods: squared Euclidean distance, Manhattan distance, Chebyshev distance, nearest neighbor or single bond method, Ward method, unweighted pairwise average method, etc. (Sneath, and Sokal, 1973, Ward, 1963). In our study, we will use the Ward method, as it allows us to obtain compactly grouped clusters. The essence of this method involves the preliminary normalization of the initial data, then the calculation of the matrix of distances or the matrix of similarity measures; after that, a pair of closest clusters merge, and a new cluster is assigned the lower number of connecting clusters. The sum of squares of the distance is calculated according to the formula to form a cluster (Klebanova, Hur'ianova, Chahovets', Panasenko, Serhiienko, Yatsenko, 2020):

$$V_k = \sum_{j=1}^k \sum_{x \in C_j} (x_{ij} - \mu_j)^2 \quad (1)$$

In the future, at each step of the algorithm, those objects or clusters that give the smallest increase in each value are combined

As a result of this analysis, a preliminary number of clusters is obtained, which are then used in the k-means method.

The essence of the k-means method is to select the initial center of clusters as a weighted average for each indicator: , ... (Hastie, Tibshirani, Friedman, 2001).

The object separation algorithm is based on cluster distance minimization. If the mean square norm is used as the distance, then the objective function looks like this:

$$J = \sum_{j=1}^k \sum_{x \in C_j} \|x_i - \mu_j\|^2 \quad (2)$$

where i – i -th object, and j – j -th cluster with center;

x – feature vectors of the classification object

After that, find the distance from the point to the center of the clusters built in the 1st step and assign this point to the cluster with the minimum distance. A new center of gravity is then calculated, and the weight of the cluster increases by one:

$$\mu_j = \frac{1}{n_j} \sum_{x \in C_j} x \quad (3)$$

for everyone i and such that i is calculated:

$$h = \operatorname{argmin} \left\{ \frac{n_j \|x_{ij} - \mu_j\|^2}{n_j - 1} \right\} \quad (4)$$

where n_j - the number of cluster objects

If the condition is met:

$$\frac{n_h \|x_i - \mu_h\|^2}{n_h - 1} < \frac{n_j \|x_i - \mu_j\|^2}{n_j - 1} \quad (5)$$

you should move the object from the cluster j into a cluster h , after which you should list the values of the centers. The iteration ends when the objective function of the given threshold value is reached.

According to the cluster analysis results, in addition to grouping objects into separate smaller sets using the k-means method, it is possible to determine the degree of influence of these variables on the distribution. The value of this coefficient and its statistical significance ($<0,05$) make it possible to attribute the primary indicator to the set of those that should be considered in the calculation of the sub-index. After that, all the primary indicators that remain in the model are standardized, and the arithmetic mean is calculated based on their values, which is used as the level of the synthetic indicator.

III. The taxonomy method is used to calculate the integral value of the digitization level, the content of which is given in fig. 1.

The matrix of observations (X) has the following form:

$$X = [x_{ij}] \quad (6)$$

where j - the country number ($j = 1, \dots, m$);

i - indicator number ($i = 1, \dots, n$);

x_{ij} - the value of the i -th indicator for the j -th country.

S - standard deviation;

Z_{is} - the standardized value of the characteristic s for the unit i ;

m - the number of countries.

As a result of the calculation, the rating of the study countries is obtained, which allows us to qualitatively characterize their level of development in the field of digitalization and to identify weak points for each country based on interval values.

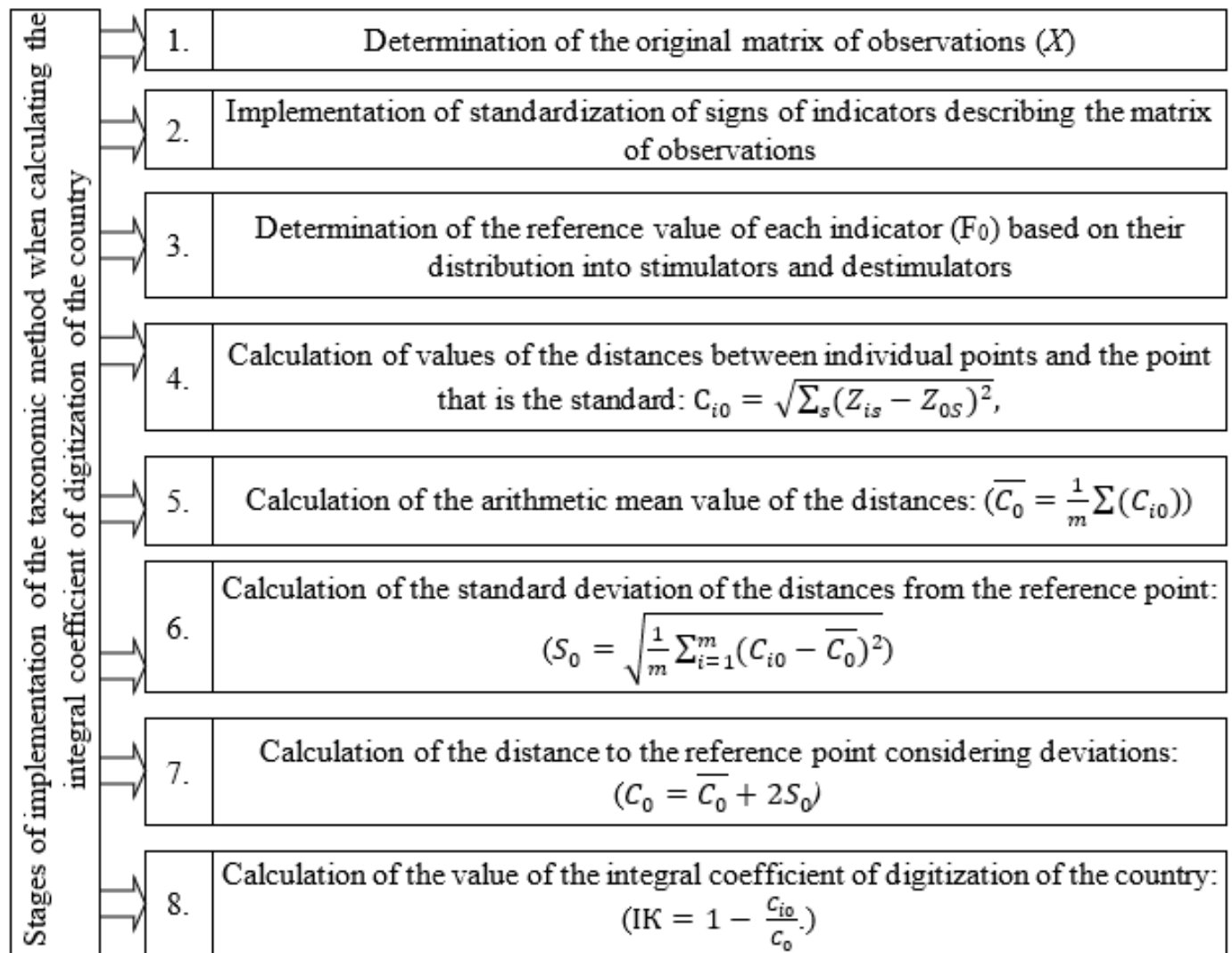
5. RESULTS

Digitalization has been changing our world, lives, and work processes in recent years. Both in professional and personal everyday life, humanity has inevitably become a part of this digital transformation. To adapt to these changes, we need digital skills and competencies: regardless of age, education, or background. Each member of society must be able to respond appropriately and at his discretion to the needs and requirements of digitalization. That is, as the key to information, media, and information literacy is part of the state's responsibility to ensure the right to education, freedom of expression, and democracy of all citizens.

The coronavirus pandemic became a vivid example of the critical importance of digital information, digital communication, and all kinds of digital tools: the Internet has become an essential means of information, education, trade, remote work, shopping, entertainment, and often necessary tool for connecting with relatives, celebrating, honoring the memory, receiving medical information and services. It was a turning point when access to digital communication and the Internet became necessary in professional life and everyday life. That is, access to the Internet has become a "com-

mon good,” the same as electricity or water, so digitalization is a critically important element of modern society.

Figure 1. Algorithm for calculating the integral coefficient of digitization of the country



Source: (Plyuta, V., 1980)

Digitalization processes continue to cover the most remote corners of the planet and an ever-increasing range of spheres of people's lives. Digitization became the first pressing issue on the World Economic Forum 2020 agenda. So, as of April 2022, according to DataReportal, We Are Social, and Hootsuite, there were 7.91 billion people worldwide, of which 57% are urban dwellers. There are 4.95 billion Internet users, which is 62.5% of the planet's total population. In addition, 5.31 billion have a mobile phone (67.1% of the Earth's total population). At the same time, 58.4% of the population, i.e., 4.62 billion people, actively use social networks.

If we analyze retrospective data, at the beginning of the introduction of the global Internet network, there were commercial restrictions on the use of sites, which inhibited the spread of the Internet; when after 1995, they were removed - the number of users increased from 4 million to 50 million in a relatively short time. If we talk about defining scales, the milestone of 1 billion users was overcome around 2005. In 2011 - this figure doubled and reached the mark of 2 billion users, and in 2015 there were already 3 billion network users in the world the Internet, and in 2017 half of the planet's inhabitants used the Internet. However, it is worth noting that in recent years we have seen a slowdown in the growth rate of the Internet's popularity - only 4%, which is quite natural since today, 6 out of 10 inhabitants of the planet are online.

Despite all these positive indicators, about 2.9 billion people still do not use the Internet, which is 37% of the Earth's population, with more than 1/3 of this number living in Southeast Asia.

Every active Internet user spends about 40% of their life on it if we count only the waking hours - an average of almost 7 hours (6 h, 53 min). Young people usually spend more time on the Internet than representatives of the older generation. Young women are especially active in this sense. Statistics show that women between 16 and 24 now spend 8 hours a day on the Internet, meaning many spend as much time online as they do sleep. Men born in 1945-65 spend the least time online - about 5.5 hours daily. Lower Internet awareness occurs daily among older and less educated women from poor countries. Globally, men account for 18% more social media users than women. At the same time, in South Asia, men use social networks almost 2.5 times more often than women. Research shows that the primary motivation for using the Internet, as before, is the search for information (60.2% of 16- to 64-year-olds cited this as one of the main reasons for going online in the fourth quarter of 2021). The second place was maintaining contact with friends and family - 54.7%. The third most common reason for going online was cheating and watching the news: 52.3% of working-age internet users named it their primary motivation. More than half of users (50.3%) cited the search for entertaining video content as the fourth reason in the latest global ranking for accessing the Internet. Also, a relatively high place in the order of reasons to go online is occupied by commercial activities, the search for products and services.

Based on the provided research methodology, a cluster analysis and statistical analysis of the distribution of values by sub-indices Infrastructure and Level of internet activity/mobility was first carried out (Table 1, Figs. 2 and 3). From the cluster analysis, out of 7 indicators, six remained, as the last one was statistically insignificant. This shows that the countries are similar in terms of this coefficient, and it can be excluded from the analysis.

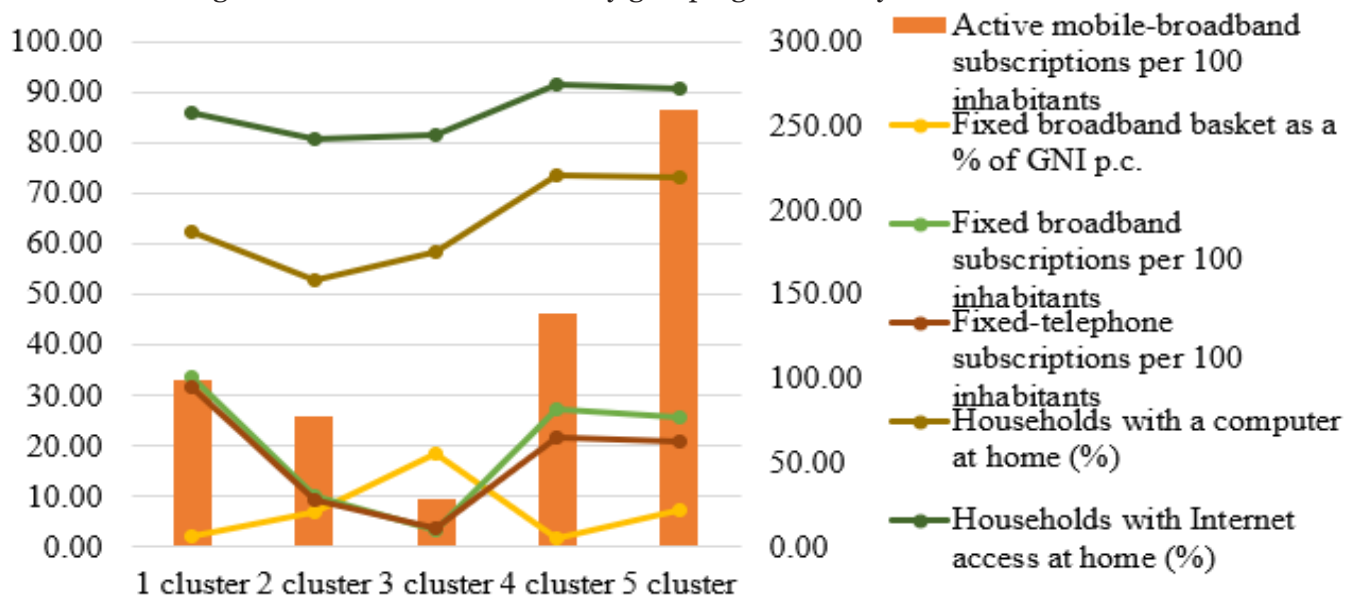
Table 1. Results of statistical analysis by sub-index Infrastructure

Indexes	Mean	Median	Minimum	Maximum	Lower Quartile	Upper Quartile	Std. Dev.	Результати кластерного аналізу	
								F	signif. P
Active mobile-broadband subscriptions per 100 inhabitants	79,64	78,96	0,49	338,48	46,53	105,48	49,07	341,18 (6)	0,000000
Fixed broadband basket as a % of GNI p.c.	8,70	4,48	0,33	71,05	1,55	9,50	11,58	23,87 (3)	0,000000
Fixed broadband subscriptions per 100 inhabitants	16,22	11,60	0,00	57,70	1,30	29,50	15,40	85,61 (5)	0,000000
Fixed-telephone subscriptions per 100 inhabitants	14,92	11,75	0,00	116,70	2,27	20,87	16,26	40,44 (4)	0,000000
Households with a computer at home (%)	59,61	59,60	8,70	99,50	59,60	59,60	12,82	15,85 (2)	0,000000
Households with Internet access at home (%)	83,72	83,70	30,00	100,00	83,70	85,07	9,96	7,26 (1)	0,000019

Source: calculated by the authors

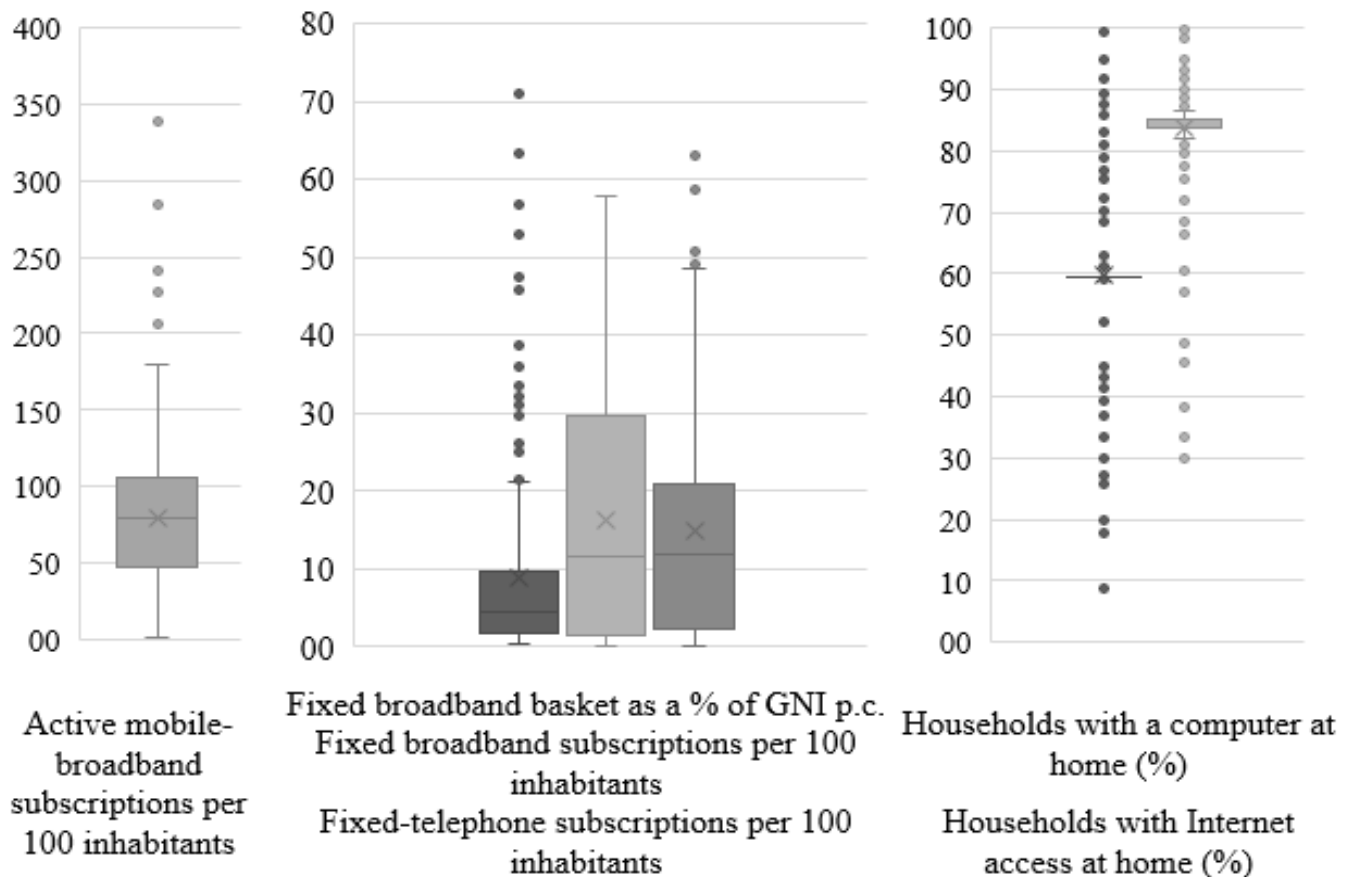
It is worth noting that the average value is very close to the median except for the fixed broadband basket as a % of GNI p.c., confirming the normal distribution approximation. The importance of the lower and upper quartiles is presented in fig. According to the indicator of active mobile broadband subscriptions per 100 inhabitants, Ukraine occupies an intermediate place because the value is very close to the average; instead, according to the fixed broadband basket as a % of GNI p.c. Ukraine occupies one of the lowest places, which indicates its backwardness in this parameter, and to increase the level of its digital development, it is worth concentrating efforts on increasing its value. According to the indicator of fixed broadband subscriptions per 100 inhabitants, the value of Ukraine is higher than the average. According to the following hand - Fixed-telephone subscriptions per 100 inhabitants - Ukraine is significantly inferior to the world average. For Ukraine, such a phenomenon is logical because the population has begun to abandon fixed communication in favor of mobile. On the other hand, this indicator is calculated as a component of digitalization, and because of the potential future increase in mobile communication fees, support for landlines is appropriate.

Figure 2. Classification of country grouping clusters by indices Infrastructure



Source: calculated by the authors

Figure 3. Statistical analysis of the primary indicators of the sub-index Infrastructure



Source: calculated by the authors

The value of households with a computer at home (%) in Ukraine is equal to the average. Still, this infrastructural indicator is fundamental for the country's future digital development, which requires special programs to increase the population's access to standard computer equipment. This task is difficult in the conditions of war because of the unfavorable economic situation and economic stagnation. But in the future, in the post-war period, this requires specific financing (credit programs) and spreading awareness of the use of this technology, especially among the elderly population. A similar situation with Internet access - households with Internet access at home (%) - the value in Ukraine is like the world average, but in general, it is significantly higher than the previous one,

which indicates a more active use of alternative access to the Internet from home, except for stationary computers - that is, through phones and tablets. This indicator indirectly indicates a sufficiently high level of use of these devices by households. In general, Ukraine is inferior to the world's countries in 2 indicators of this group: Fixed broadband basket as a % of GNI p.c. and Fixed-telephone subscriptions per 100 inhabitants. But the main efforts should be focused on raising the level of the first of them.

Grouping by clusters shows that the most significant contribution to the distribution of countries among the primary indices belongs to 1 of them - active mobile-broadband subscriptions per 100 inhabitants. In all other countries, the differences are much more minor, and the most similar countries are the level of access to the Internet from home.

A similar analysis was conducted based on the primary indicators of the Level of internet activity/mobility sub-index (Table 2, Figs. 4 and 5).

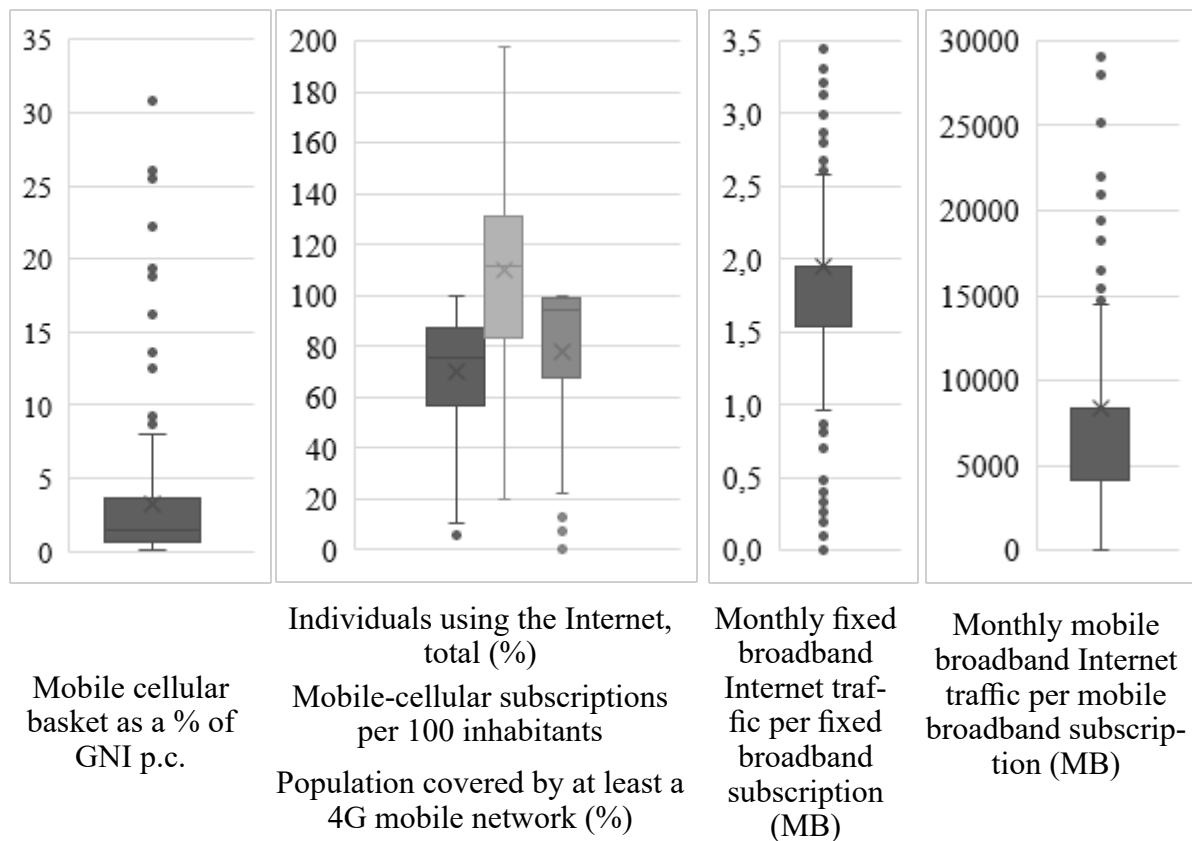
Table 2. Results of statistical analysis by sub-index Level of internet activity/mobility

Indexes	Mean	Median	Minimum	Maximum	Lower Quartile	Upper Quartile	Std.Dev.	Результати кластерного аналізу	
								F	signif. P
Mobile cellular basket as a % of GNI p.c.	3,2	1,5	0,05	30,8	0,6	3,7	4,8	2,44 (1)	0,049
Individuals using the Internet, total (%)	69,7	75,7	5,80	100,0	57,1	87,2	23,4	7,33 (5)	0,000
Mobile-cellular subscriptions per 100 inhabitants	109,8	111,7	19,45	406,8	84,8	130,9	43,7	3,09 (2)	0,017
Population covered by at least a 4G mobile network (%)	78,1	94,0	0,00	100,0	67,7	99,0	29,1	3,29 (3)	0,012
Monthly fixed broadband Internet traffic per fixed broadband subscription (MB)	195357,1	195357,1	0,00	873711,1	154958,4	195357,1	118230,5	731,09 (6)	0,000
Monthly mobile broadband Internet traffic per mobile broadband subscription (MB)	8355,4	8355,4	0,00	92062,7	4173,5	8355,4	8881,4	4,35 (4)	0,002

Source: calculated by the authors

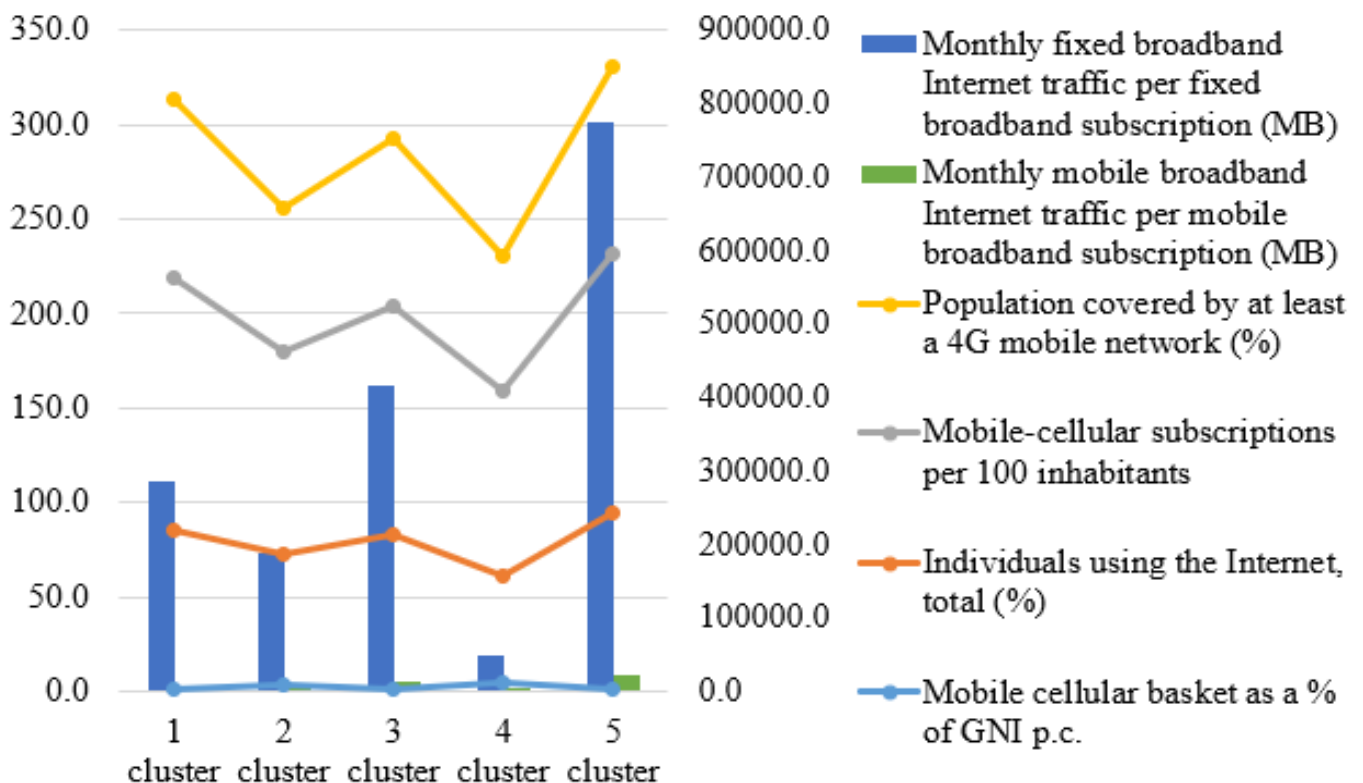
Based on the calculations, we note that all indicators were statistically significant, except for the last Population covered by a mobile-cellular network (%). According to this indicator, the countries do not differ so it can be excluded from the analysis. According to the mobile cellular basket index as a % of GNI p.c. Ukraine is significantly inferior to other countries but falls on the median. The difference between the average and the median indicates that there are outliers in the countries that affect the homogeneity of the research sample. Therefore, Ukraine falls precisely in the middle, inferior to the average value of this index for other countries. On the other hand, Ukraine exceeds the average values for three other indicators (Mobile cellular basket as a % of GNI p.c.; Mobile-cellular subscriptions per 100 inhabitants; Population covered by at least a 4G mobile network (%)), even exceeding the median for the first two. 4G Internet coverage remains a bottleneck for our country, which holds back the pace of digitalization of society. In the post-war period, it will be fundamental not only to restore this coverage in the affected regions but also to fully cover the entire rural area, which traditionally suffers in this aspect. According to the latest indicators, Ukraine's digitization rate corresponds to the global average.

Figure 4. Statistical analysis of the primary indicators of the sub-index Level of internet activity/mobility



Source: calculated by the authors

Figure 5. Classification of country grouping clusters by indices of Level of internet activity/mobility



Source: calculated by the authors

According to the nature of the influence of the studied indicators on the distribution of objects, it is worth noting an even greater spread of values than in the previous sub-index: the decisive section depends on the importance of monthly fixed broadband Internet traffic per fixed broadband sub-

scription (MB), and the countries differ the least according to the mobile cellular index basket as a % of GNI p.c. The results of the calculations of all five sub-indices of the general digitization coefficient of the world's countries are presented in the table. 3.

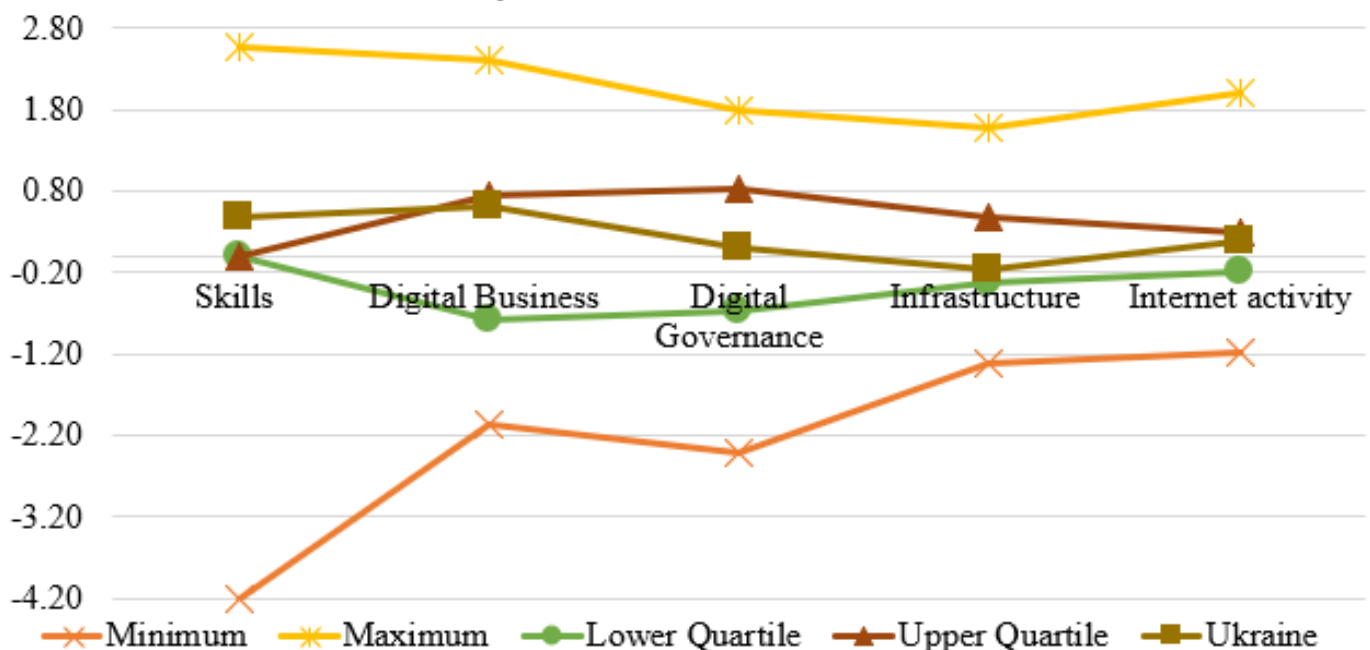
Table 3. The value of the sub-indices of the calculation of the integral coefficient of digitization of the countries of the world

Indexes	Mean	Median	Minimum	Maximum	Lower Quartile	Upper Quartile	Std.Dev.
Digital/Technological skills are readily available	0,00	0,00	-4,20	2,58	0,00	0,01	1,00
Digital Business	0,00	0,00	-2,06	2,41	-0,77	0,74	1,00
Digital Governance	0,00	-0,12	-2,41	1,80	-0,68	0,84	1,00
Infrastructure	0,06	-0,05	-1,31	1,57	-0,31	0,47	0,54
Level of internet activity/mobility	0,07	0,13	-1,17	2,01	-0,20	0,30	0,48

Source: calculated by the authors

The place of Ukraine among these values is given in fig. 6. Such an interpretation makes it possible to determine those areas of digitalization in which Ukraine has a relatively high value and those in which it lags global trends. As we can see, the situation is the best according to the sub-index of digital abilities and skills, which reflects the high level of progress of the human capital of Ukrainians and indicates their increased ability to perceive new information. Also, the level of digitalization of business is relatively high in Ukraine. This indicator also indirectly confirms the Ukrainian nation's high intellectualization level. According to the Internet activity and mobility indicator, Ukraine falls between 2 quartiles, although their difference is not significant enough.

Figure 6. The value of sub-indices



Source: calculated by the authors

According to the value of the digital government sub-index, Ukraine is in the middle between the cartels, reflecting the average value for the sample. This situation demonstrates the weakness of institutions in our country, which requires a review of the digitalization policy and a reduction in the overall level of bureaucracy in Ukraine. They say that the electronic tool, which is quite successfully implemented in our country, simplifies the population's life. However, it has many errors (Action, Electronic medical system, Electronic educational services, etc.). The primary post-war task is to

revise the existing protocols for the functioning of these systems to avoid problems and eliminate errors to increase the state's cyber security level. As we can see, the worst situation has developed for the sub-index of infrastructure, the implementation of which is the most difficult due to significant capital costs to eliminate the digital divide.

Correlation analysis between the considered sub-indices (table 4, Fig. 7) allows you to determine where the closest connection exists between them. The most significant relationship exists between digital government and digital business. Therefore, further deepening of digitalization of the interaction process between government and industry will contribute to the growth of digitalization of the country. There is also a strong connection between infrastructure and digital government, less so between it and digital business. The level of digital abilities and capabilities does not correlate with others, which indicates its trajectory of dynamics. The Internet and mobile activity level is weakly correlated with other sub-indices, but the connection exists.

Table 4. Correlation matrix of sub-indices for calculating the integral coefficient of digitization of the countries of the world

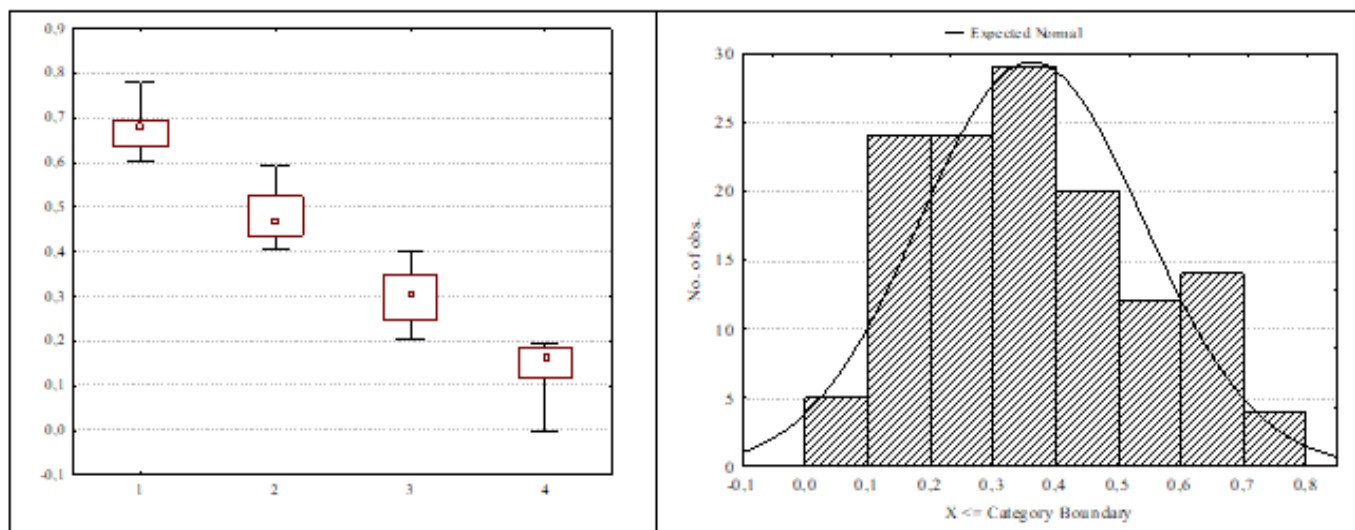
Sub-indexes	Digital/ Technological skills are readily available	Digital Business	Digital Governance	Infrastructure	Level of internet activity/ mobility
Digital/ Technological skills are readily available	1,0000	0,2373	0,2402	0,2803	0,1777
Digital Business	0,2373	1,0000	0,8954	0,6960	0,6203
Digital Governance	0,2402	0,8954	1,0000	0,7115	0,6258
Infrastructure	0,2803	0,6960	0,7115	1,0000	0,4855
Level of internet activity/mobility	0,1777	0,6203	0,6258	0,4855	1,0000

Source: calculated by the authors

The obtained correlation substantiates the expediency of implementing maximum efforts in the direction of the further development of the digital society in Ukraine in the post-war period in the order of the development of electronic governance both because of the high degree of its correlation with other sub-indices and because of the lowest level among the calculated ones.

The results of the grouping of the studied countries according to the level of the integral coefficient of digitization, calculated by the taxonomic method, are presented in Fig. The interpretation of the value of this coefficient is quite simple: the closer the value is to "1", the higher the level.

Figure 7. The results of the grouping of the studied countries by the integral coefficient of digitization



Source: calculated by the authors

The spread of integral coefficient values has a left-symmetric distribution. In most countries, digitization is low and very low, and Ukraine falls into the middle-level group, demonstrating relatively reasonable rates of digital society formation. The obtained results are also confirmed by partial indicators, the analysis of which is given above.

Table 5. Classification of coins by the value of the integral digitization index

Gro- ups	Range	Description	Representatives
1	[0,8; 0,6)	High level of digitization (18)	Denmark (1); Finland; Singapore; Sweden; United States; Switzerland; Iceland; United Arab Emirates; Netherlands; Norway; Hong Kong, China; Lithuania; Canada; United Kingdom; Israel; Saudi Arabia; China; Portugal (18)
2	(0,6; 0,4]	Average level of digitization (32)	Korea, Rep. (19); Luxembourg; Qatar; France; Malaysia; Slovenia; Latvia; Belgium; Spain; Ireland; Malta; New Zealand; Estonia; Australia; Austria; Chile; Cyprus; Bahrain; Ukraine (37) ; Kuwait; Czech Republic; Uruguay; Greece; Jordan; Oman; Serbia; Romania; Türkiye; Slovakia; Taiwan, China; Italy; Bulgaria (50);
3	(0,4; 0,2]	Low level of digitization (53)	Thailand (51); Russian Federation; Georgia; Armenia; Montenegro; Germany; India; Moldova; North Macedonia; Croatia; Costa Rica; Albania; Iran, Islamic Rep.; Azerbaijan; Mauritius; Kazakhstan; Jamaica; Morocco; Tunisia; Viet Nam; Trinidad and Tobago; Dominican Republic; Panama; Egypt; Kenya; Sri Lanka; Bosnia and Herzegovina; Kyrgyzstan; Poland; Lebanon; Cabo Verde; Ecuador; Indonesia; Rwanda; Algeria; Senegal; Ghana; El Salvador; Cote d'Ivoire; Hungary; Mexico; Paraguay; Cambodia; Honduras; Bolivia; Benin; Pakistan; Colombia; Argentina; Bangladesh; Namibia; Zambia; Brazil (103)
4	(0,2; 0]	Very low level of digitization (29)	Nigeria (104); Eswatini; South Africa; Philippines; Mongolia; Madagascar; Tajikistan; Zimbabwe; Cameroon; Tanzania; Nepal; Lao PDR; Burkina Faso; Japan; Malawi; Guatemala; Lesotho; Gambia; Mozambique; Peru; Mali; Uganda; Guinea; Angola; Congo, Dem. Rep.; Ethiopia; Chad; Burundi; Botswana (132)

Source: generalized by the authors

As a result of the research, we proposed our systematic approach to calculating the integral coefficient of digitalization of Ukrainian society, which is based on five sub-indices, three of which are used from universally recognized world coefficients, and two are proposed to be calculated from partial indices according to our own author's methodology. Based on the calculations, a close relationship between the considered sub-indices was revealed based on the values of the correlation matrix - the highest relationship was found between digital business and e-government. In addition, it was established that Ukraine has lower values in comparison with other countries of the world than other sub-indices and a lower level was found for infrastructure components, where Ukraine approaches the lower quartile of the spread of values. In addition, the infrastructure sub-index also has a close correlation with digital business and e-government. Thus, the primary efforts to increase the development of the digital society in the post-war period should be directed at improving the functioning mechanisms of the electronic government and financing the creation of the corresponding infrastructure.

Moving from the global indicators to the digitalization indicators of Ukraine, it is worth saying that according to the international ratings in 2020, Ukraine took 40th place in the Networked Readiness Index (WEF) rating, while in 2016, it was only in 64th place; in the Global Innovation Index rating (INSEAD, WIPO) in 2020, Ukraine increased its rating by 16 positions compared to 2016 - from 56 in 2016 to 40 in 2020; in the ranking of the Global Competitiveness Index (WEF) in 2020, the position strengthened by 35 points compared to 2016 - from 85th place to 50th (cumulative index), which is relatively high indicators.

According to the State Committee of Statistics 2016, there were 14.2 million Internet users in Ukraine, while at the beginning of 2021, this figure doubled to almost 29 million subscribers. The share of Internet users among the population aged 12 to 65 living in cities with more than 50,000 is currently 87%. Over the past five years, most Ukrainians have started using the Internet. At the same time, the growth of this indicator occurs at the expense of small settlements (cities with a population of less than 50 thousand inhabitants and villages). Thus, over the past two years, the number of users in towns with a population of less than 50,000 inhabitants has increased by 10% and in villages - by 18%, respectively.

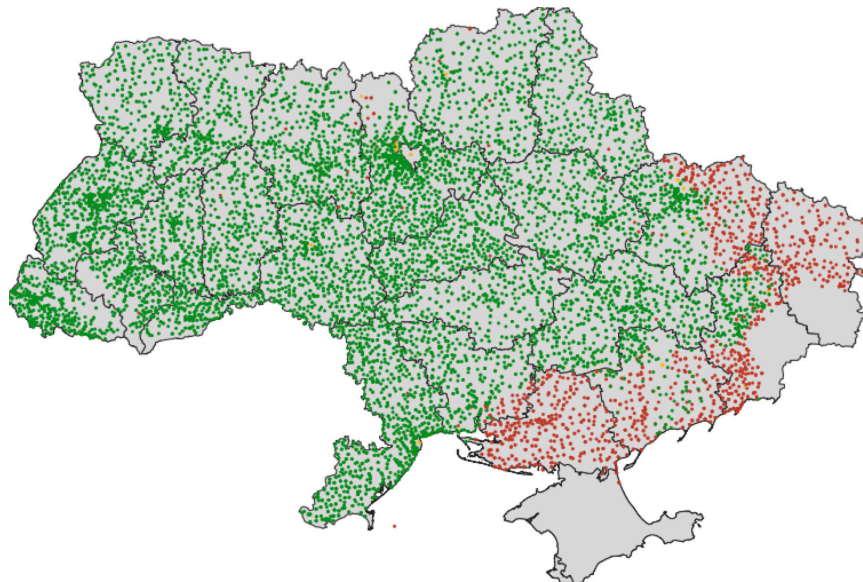
A characteristic sign of the Ukrainian digitalization of society is the growth in Internet users among audiences aged 14-35, approaching 100%. At the same time, there is also an increase in the number of users of an older audience, especially in the age segment of 46-55 years, where this indicator has increased by 20% since 2018, and in the part of 56-70 years - for the same period, it showed an increase of as much as 60%.

Ukraine has somewhat developed broadband access to the Internet, occupying the 77th position in the ranking out of 224 countries and ahead of neighboring countries such as Belarus, Georgia, and Turkey in terms of average connection speed.

According to the State Committee of Statistics, in 2016, there were 14.1 million subscribers of broadband access, and in 2020 there were already 25 million of them; today, most Ukrainians have high-speed access to the Internet. Active penetration of mobile Internet began with the launch of 3G Internet in 2015 when leading Ukrainian mobile operators received licenses. In 2016, 44% of Internet users connected to the network via a smartphone, and in 2021, about 90% of them were already.

Recently, there has been a phenomenon called the “mobile-first generation,” for whom the smartphone is the leading and only device for using the Internet: according to research, for 90% of Internet users aged 12-70, the smartphone is the primary device for using Internet networks, while computers have decreased their share by 42% over the past three years. However, it is worth adding that, on average, one Ukrainian has 2.4 devices; computers, laptops, and tablets have yet to lose their relevance (Fig. 8).

Figure 8. Distribution of non-working mobile base stations



Source: (Kyiv School of Economics)

A prerequisite for the stability and further development of the digital economy is a connection to the global Internet network, which causes serious problems in a large-scale war. Thus, since the beginning of the war, as of May 2022, the quality of data transmission in fixed Internet networks has decreased by an average of 13% and in mobile networks by 26%. In addition, about 12.2% of settlements need access to mobile communication, and 3.1% have only partial access. After the de-occupation of accommodations, the destruction of networks reaches 100%. Stations of mobile operators in different parts of the country were damaged: 3,534 base stations of mobile operators, that is,

almost 11% of them are inactive, and this share is growing. Access to a stable, reliable high-speed broadband network is a critical framework condition for the recovery and development of Ukraine's digital economy.

According to the calculations of the Derzhkomstat, at least 726 operators of electronic communications of fixed access to Internet networks suffered losses because of military operations. The total direct losses of telecom operators are estimated at \$566 million. The field of electronic communications includes:

- Internet networks of fixed operators.
- Radio networks of mobile operators.
- Trunk networks.
- Technical and related means of electronic communications.

Table 6. Estimation of direct losses of digital infrastructure due to war

Types of losses	Number of objects	Number of damaged objects	Loss assessment, million dollars
Damaged, unit			
- operators of fixed communication	4162	726	more than 300
- mobile operators	-	-	more than 200
Total direct losses of the industry	-	-	about 600

Source: ([Ministry of Digital Transformation](#))

Determining the cost of damages for the owners of the infrastructure of electronic communication networks or its components (including objects of unfinished construction) of different categories is different. The following classification is used for these needs:

- National companies and electronic communications operators that provide electronic communication services to citizens of Ukraine throughout its territory. For national companies, direct losses are determined based on the results of inspection/survey of destroyed or damaged electronic communication network infrastructure facilities, if access is available (even if possible in officially uncontrolled territories). The amount of damage is determined in natural units (km, units, etc.) and is also estimated in money based on an approximate estimate of the cost of restoration work.
- Mediums that provide electronic communication services in several areas. For medium and small companies, direct losses are calculated through the estimated cost of restoration/reconstruction of networks or the average subscription fee for 24 months.
- Small, providing electronic communication services within the region.

Several things could be improved. Operators whose networks are completely or, for the most part, located in the occupation or the combat zone support the networks so that the citizens of Ukraine continue to use access to the Internet from the free territory. In this case, incomes are close to zero, and expenses remain.

At the same time, some of these operators have loans from banks. They cannot pay for the loan's use and repay the loan's body. At the same time, banks charge penalties for overdue payments and submit them to credit bureaus as improper borrowers.

The demand for access to high-speed Internet is growing worldwide and in Ukraine. The needs of society are changing - increasingly, the use of stationary and mobile digital devices, e-learning, receiving medical video services, interaction with state institutions, the use of various automated systems, etc., dramatically affects the volume and speed of data transmission.

Considering the listed positive factors, we should not forget certain shortcomings of digitization in Ukraine. First, we have a pronounced gap between the city and the village in the penetration of high-speed Internet - about 30%. About a third of the rural population (33-35%) did not have access to high-speed Internet even before the war, but under certain conditions, they could connect to it

because there are no market barriers, but there are technical barriers - the lack of an opportunity to connect, that is, there is the gap between demand and technical supply of Internet connection. The specialists' data show that provided infrastructure is created in rural areas, the indicated indicators of cities and villages can potentially be almost equal.

However, studies show that for vulnerable consumers, such as low-income families, pensioners, and disabled people, who have meager incomes, the Internet, especially high-speed, is not generally available to the public, regardless of the city or town. It is also worth noting that the level of education of Ukrainians largely determines the availability of high-speed Internet at home. According to research, 54% of people with an average education level do not need high-speed Internet access. This gap points to the need to implement programs to acquire digital skills, which have become vital in today's world.

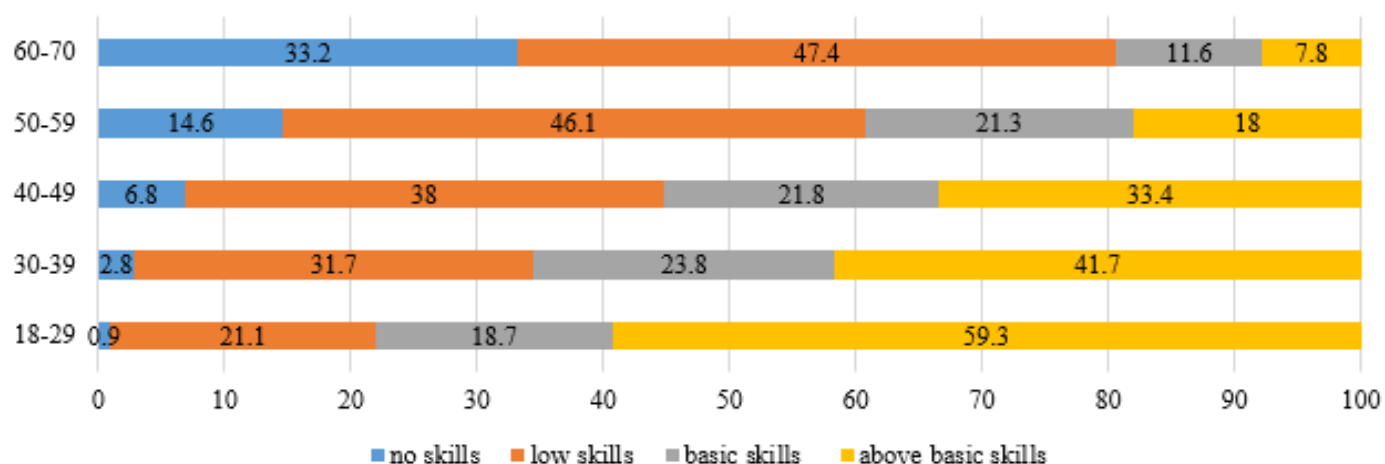
Studies of the state of providing social facilities with high-speed Internet showed that, for example, of the total number of healthcare facilities in Ukraine in 2019, less than 1% of them were connected to high-speed Internet. That is, the gap between hospitals is 99%. That is, the citizens of Ukraine need the opportunity to satisfy their own needs in digital medical services. This leads to unequal access to quality medicine, although Article 49 of the Constitution of Ukraine obliges the state to create conditions for effective and accessible medical care for all citizens. In secondary schools, the rate of access to high-speed Internet is only about 47%; that is, these are schools that have sufficient channel bandwidth to transport the load within the educational process using digital content, and the other 53%, which is 10,067 schools, have no connection at all to the Internet.

Thus, it becomes evident that in addition to ensuring the technical possibility of access to high-speed Internet for every citizen of the country, the population's digital skills are of primary importance. The Ministry of Digital Transformation of Ukraine conducted a national survey in 2019 and 2021 to establish the level of digital skills of the population of Ukraine according to the methodology for assessing digital skills, which the European Commission uses. According to the results of the mentioned study, a positive trend was noted; that is, the digital skills of the population of Ukraine increased significantly.

Thus, in 2019, 53% of the population of Ukraine had digital skills below the basic level, while a repeat survey in 2021 showed a gradual increase in digital skills (Fig. 9.).

In addition, the share of citizens with digital skills below the basic level decreased by 1.42 million people, i.e., by 5.2%, and currently stands at 47.8%. Also, the share of Ukrainians without digital skills decreased by 1.09 million, i.e., by 4%.

Figure 9. Analysis of digital skills by age



Source: ([Ministry of Digital Transformation](#))

It was also found that it is possible to single out certain specifics of digital skills: both in 2019 and 2021, Ukrainians have the most communication and information skills - at a level higher than basic skills - 79.2% and 78.9%, respectively. While solving life problems and creating digital content was

and remained the least mastered by Ukrainians - at a level above the basic skills possessed by 55.8% and 36.8% of citizens, respectively.

Digital skills in Ukraine vary by age (Fig. 9).

Younger generations, particularly young people and teenagers aged 18-29, have the highest level of digital literacy. They have a primary computer, Internet, social media, and mobile skills. Studies have shown that 59.3% of respondents have digital skills at the level of “above basic skills,” 18.7% at the level of “basic skills,” 21.1% - “low skills,” and less than 1% have no digital skills at all.

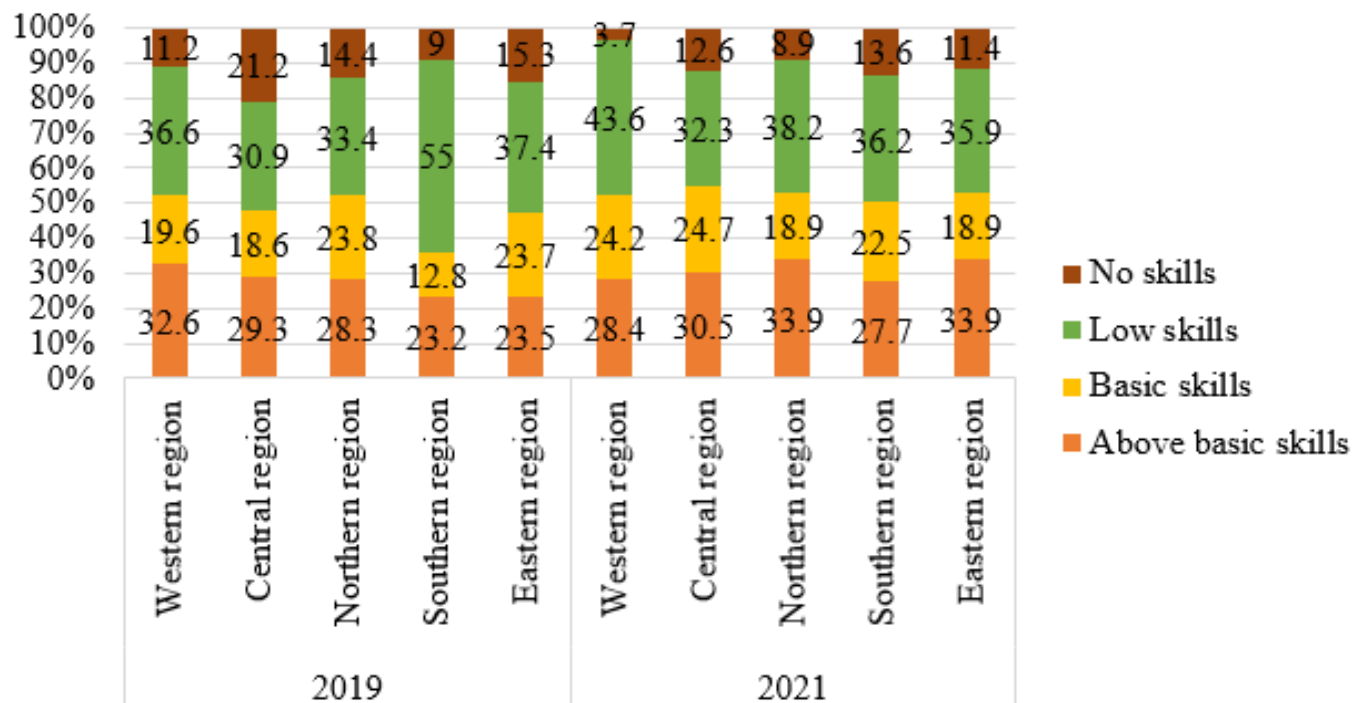
In middle-aged people (30-49 years old), digital skills can be different. Some have a sufficient level of literacy, especially those who actively use computers at work or in their personal lives. However, others may need more field experience and additional training. Thus, in the age group of 30-39 years, only about 3% do not have digital skills, and in the age group of 40-49 years, this indicator increases to almost 7%.

Older generations, the elderly, have a lower level of digital literacy. They need to be more confident in working with computers and the Internet. However, there is a trend toward an increasing interest and involvement of the older generation in learning digital skills, primarily to communicate with family and access information. Among the age group of 50-59 years, 14.6% of the population do not have digitalization skills, while in the age group of 60-70 years, this indicator increases by more than two times.

Ukraine is improving its education system and providing digital skills training at various levels of education. Such measures improve digital literacy in all age groups of the population. However, it is essential to continue to develop digital literacy programs and ensure access to digital technologies in all regions of the country.

The analysis of digital skills by region of Ukraine is shown in fig. 10.

Figure 10. Analysis of digital skills by regions of Ukraine



Source: ([Ministry of Digital Transformation](#))

The Western region includes Volyn, Zakarpattia, Ivano-Frankivsk, Lviv, Rivne, Ternopil, Khmelnytskyi, and Chernivtsi regions; the central region - Vinnytsia, Kirovohrad, Poltava, Cherkasy regions; to the north - Zhytomyr, Kyiv, Sumy, Chernihiv regions and the city of Kyiv; to the southern region - Odesa, Mykolaiv, Kherson regions; to the eastern region - Dnipropetrovsk, Donetsk, Zaporizhia, Luhansk, Kharkiv regions.

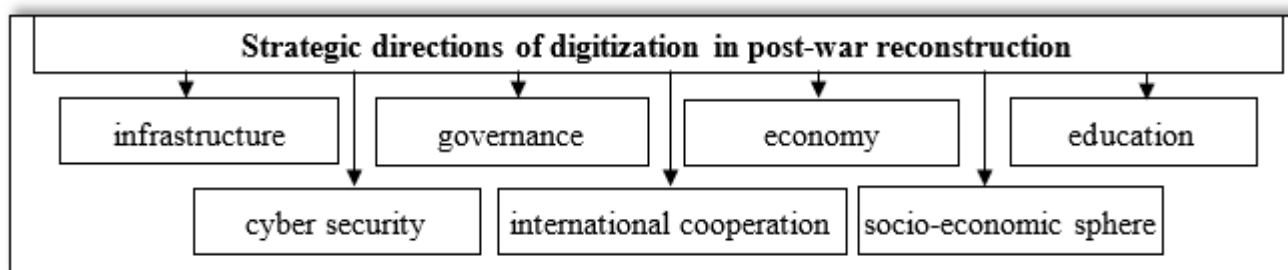
As for the regional level of digitization, it should be noted that there is a digital gap in providing the regions of Ukraine with access to the Internet: Kyiv has the highest level of entry in the country - 84% of households, on the other hand, Rivne Oblast is the region with the lowest level of Internet access, where only 49% of residents had access to broadband services.

Regarding digitizing public administration, Ukraine has a robust administrative service delivery system that includes innovative electronic tools for service delivery, but the war creates severe challenges in this area. The network of administrative service centers across the country remained primarily functional and operational in conjunction with work on the Diya digital application. Both are based on a well-developed catalog of services, which allows you to maintain the level of service provision: existing changed or even the creation of new ones. However, it is not without serious problems, such as large-scale hacking attacks that aim to destroy administrative data, mobilization or migration that causes a shortage of workers, which in turn leads to a decrease in the capacity of service providers and difficulties in accessing digital services due to border, etc.

Ukraine's digital economy is at a high level and developed rapidly both before and after the war, as the Ministry of Digital Transformation and the Ukrainian IT community accelerated their efforts. Thus, the IT sector in the first quarter of 2022 provided export revenue of 2 billion US dollars, which is 28% more compared to the previous year. Also, the number of Ukrainians employed in the IT industry increased from 200,000 to 250,000. The war caused severe disruptions in the sector, but increased international attention could open significant opportunities for future development.

As a result of the conflict in Ukraine, attention has been drawn to the need for digital identification solutions: displaced persons often lose access to their physical documents. At the same time, there is an urgent need to confirm their identification data in host countries. If the war continues, the focus must be on keeping businesses and citizens connected to the Internet and modernizing the communications and infrastructure of public services. Digital technologies should become a critical factor in Ukraine's post-war recovery. The strategic directions of digitization that will contribute to the post-war recovery of Ukraine's economy are shown in fig. 11.

Figure 11. Strategic directions of digitization in post-war reconstruction



Source: authors` development

6.DISCUSSION

The debatable points of the research topic are due to uncertain conditions: the unknown duration of the war and the destruction's consequences, there may be completely different scenarios of the development of events and other aspects. The authors will analyze the state of digitization of Ukraine before the war and the intermediate consequences of the destruction; however, the war is still ongoing, new, and new factors of destruction and damage become known every day, so the topic will require further research.

Studies of ways to approach the European future for Ukraine have shown that one of the most critical aspects is education, particularly acquiring digital skills, which confirms the scientific work of Lamberti G., Lopez-Sintas J., & Sukphan J. (2021). Additionally, the impact of open data and information management practices at the government level should not be underestimated. In the conditions of the post-war recovery of the country, it is worth adapting them to the requirements of the European Union, implementing the best practices to ensure the fastest and most effective recovery

of the Ukrainian economy and society and a transparent process of using international aid for the recovery of Ukraine.

Agreeing with Senyo P. K., Effah J., & Osabutey E. L. (2021), it is worth noting the importance of digitization of public administration. Thus, the Diya application introduced in Ukraine is gradually becoming a super app - a single window of communication with the state- a universal application where you can get all state services and services that people need from birth and throughout their lives. In particular, the mentioned application satisfies the need for digital identification of the individual, the importance of which is emphasized in his research by Seifert R. (2020).

Today's indicators in the IT industry of Ukraine are much better than in other sectors, mainly due to its mobility, portability, and ability to work remotely. For example, according to the NBU, in the 1st quarter of 2022, the IT industry provided a record quarterly export of \$2 billion for all of its existence. That is, it was possible to save 95% of contracts. It is building on the research conducted by Hadjielias E., Dada O. L., Cruz A. D., Zekas S., Christofi M., & Sakka G. (2021) and agreeing with the thesis about the importance of developing organizations that ensure the implementation of digital technologies. Thus, while the country is rebuilding, the IT industry can ensure its economic stability. But for this, you need a concrete plan for supporting the industry, which it needs for development.

7. CONCLUSIONS

In the conditions of digital transformation, each country determines the priority directions for forming strategic development goals. Studies have shown that Ukraine's digitization level is relatively high in the pre-war period and during the war. However, the war caused a series of destructions and damages that greatly complicated the functioning of this system. There is a question of finding ways to restore the country, and one of them is the digitization of strategic areas, including the economy, public administration, infrastructure, education, international integration of the digital sphere, and others. Much has already been done in this direction, but more is needed; as the war continues, the country suffers even more loss and damage, resources are reduced, and the challenges become more difficult to overcome. Studies have confirmed that the reduction in the level of digital inequality has a high correlation with the growth of digitalization. In addition, the development of the level of digitalization is directly proportional to the efficiency of the IT industry. Therefore, special attention should be paid to these aspects: to increase citizens' digital literacy and the IT sphere's development. In the face of the apparent need to build damaged roads, the possibility of laying fiber optic cables and connecting more people should be considered, even if the operators cannot provide service for several years, including in rural areas. The already sufficiently advanced Diya electronic services platform also needs further development; in 3 years, 14 digital documents and more than 25 services have been launched in the application.

As a result of the research, we proposed our own systematic approach to calculating the integral coefficient of digitalization of Ukrainian society, which is based on five sub-indices, three of which are used from universally recognized world coefficients, and two are proposed to be calculated from partial indices according to our own author's methodology. Based on the calculations, a close relationship between the considered sub-indices was revealed based on the values of the correlation matrix - the highest relationship was found between digital business and e-government. In addition, it was established that Ukraine has lower values in comparison with other countries of the world than other sub-indices and a lower level was found for infrastructure components, where Ukraine approaches the lower quartile of the spread of values. In addition, the infrastructure sub-index also has a close correlation with digital business and e-government. Thus, the primary efforts to increase the development of the digital society in the post-war period should be directed at improving the functioning mechanisms of the electronic government and financing the creation of the corresponding infrastructure.

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INFLUENCE OF THE UKRAINIAN REFUGEES ON THE DEVELOPMENT OF HOTEL AND RESTAURANT BUSINESS IN THE COUNTRIES OF CENTRAL AND EASTERN EUROPE

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Received 16.01.2023.

| Send to review 26.01.2023.

| Accepted 07.06.2023.

[Original Article](#)



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JEL Classification:

F22, L8, N4, O15

Doi: 10.61432/CPNE0101064v

UDK: 314.15-

054.73(477):338.486.1.02(4-11)

ABSTRACT

The Russian aggression against Ukraine has had a significant negative impact on both socio-economic and humanitarian indicators within Ukraine and within Europe. Therefore, the study of the impact of Ukrainian refugees on the development of the economies of Central and Eastern Europe is an urgent problem. Scientific publications on the trends of migration flows of refugees from Ukraine reflect not only the negative impact of these processes, but also outline positive economic changes in the host countries. The purpose of the study is to examine the impact of Ukrainian refugee flows on the development of the hotel, restaurant and tourism business in Central and Eastern Europe in order to determine the role of refugees in the development of the housing market in the host countries. The article presents the results of using the methodology of a questionnaire survey of Ukrainian refugees and owners of hotels and hostels from host countries. The survey helped to identify the main items of expenditure of Ukrainian refugees, as well as the sources of their coverage. It was found that Ukrainians spent not only the aid allocated to them by the host government, but also their savings from their own bank cards. Thus, the study confirms the positive impact of the sudden increase in refugee flows on the development of the accommodation and catering industry.

Keywords: war, Ukrainian refugees, Central and Eastern Europe, crisis, economic development, hotel and restaurant business

1. INTRODUCTION

The full-scale aggression of the Russian Federation against Ukraine on February 24, 2022 intensified negative risks for the functioning of the economies of the European countries, which are connected not only with disruption of the established supply chains and the trade relations with Russia, but also with the influx of the Ukrainian refugees. Thus, the problems of economic research in the European countries drifted into the zone of assessment of the consequences of the war in Ukraine for the economy development of the countries of Central and Eastern Europe, which were exposed to a significant influx of the Ukrainian refugees, the number of which was about 9 million in the year of 2022.

One of the actual trends of study of the impact of Ukrainian refugees can be research on the development of the hotel and restaurant business in the countries of Central and Eastern European, especially considering the fact that before the war in Ukraine, this branch of the European economy suffered significant losses due to the quarantine restrictions related to the coronavirus disease pandemic. Therefore, one of the factors of the refugees influence on the economy of the countries of Central and Eastern Europe is temporary resettlement of the Ukrainians in hotels, hostels and rented housing, which in its turn contributed to the additional income of accommodation estab-

ishments at the expense of the refugees' savings as well as the expense of the material assistance provided by the governments of the host countries to pay for accommodation and board.

2. LITERATURE REVIEW

The analysis of the problem of the influence of the war in Ukraine and the flow of refugees on the European economy is increasingly appearing in scientific journals. Thus, in particular, the work (Caliendo, Opromolla, Parro, & Sforza, 2023) is worthy of attention, it is devoted to the analysis of the impact of Ukrainian refugees on the labor force, trade and internal accumulation of capital in the host countries. Using mathematical calculations, the authors prove the positive prospects of the influence of the labor force from Ukraine on the economy development of the European countries. An assessment of the influence of war between Ukraine and Russian Federation on the development of global trade is given in the work (Orhan, 2022), where the author proves the need to reduce import dependence on Russian energy sources and foodstuff, and also justifies the need to apply economic measures aimed at minimizing the negative consequences of energy price increase and food supply disruptions. He also pays attention to the need to expand the financial support for Ukraine in order to improve the logistics of supplying the Ukrainian foodstuff. In general, the author negatively assesses the impact of the war in Ukraine on the development of global trade and production. A similar opinion is held by Mr. Anatoliys Prohorovs (Prohorovs, 2022), who proves the negative impact of the war in Ukraine on the profitability of companies in Europe and the world due to disruption of logistics, prices increase for raw materials, demand decrease in many sectors of the economy, etc. The author makes a conclusion about the long-term negative impact of the war in Ukraine on the global economy, which increases the negative consequences of the coronavirus crisis, and therefore emphasizes the need to adapt the macroeconomic policies of the countries of the world to the realities of the war. The World Bank study (Guenette, Kenworthy, & Wheeler, 2022) somewhat expands the view of the negative consequences of the war in Ukraine, focusing not only on the economic crisis, but also on the humanitarian crisis, which is caused by the displacement of more than 12 million Ukrainians abroad. It is the humanitarian crisis of refugees that deepens the negative consequences of the war, because the flow of refugees increases the pressure on the development of basic services in the host countries. The authors make conclusions about the need for financial support of Ukraine during the war and after its end in order to minimize the consequences of the humanitarian and economic crisis. The authors pay special attention to the need to adapt the macroeconomic policy of the countries of the world to the war challenges.

In the scientific literature devoted to the Ukrainian-Russian war, more attention is paid to the economic consequences of the war, caused by the disruption of logistics, sanctions, changes in demand priorities and other factors (Bonatti & Tamborini, 2022), (Ciuriak, 2022), (Painoli, 2022), however little attention has been paid to the influence of Ukrainian refugees on the economies of the host countries, which, in our opinion, does not reveal the positive consequences of the war in European countries. Nevertheless, it is worth paying attention to the work (Jaroszewicz, Grzymiski, & Krępa, 2022), where the authors justify the need to expand the study of the problems of Ukrainian refugees, focusing on migration aspects related to the war. According to the authors, the positive impact of Ukrainian refugees on the economy of the host countries is possible in case of creation of the unique European model of migration management, based on mass activity and relatively free migration of war refugees from Ukraine. We have to agree with this, because unlike with other refugee crises, today we do not see any tent camp for the refugees from Ukraine in Europe. On the contrary, the refugees get the opportunity to rent housing, settle in a hotel or a hostel and, thus, to provide themselves and their families with relatively comfortable conditions of stay in the host country.

One of the first and few studies of the influence of the Ukrainian refugees on the housing market is the research of the authors (Trojanek & Gluszkak, 2022), who, by means of mathematical calculations, made an assessment of the short-term impact of the refugees from Ukraine on the cost of accommodation and the cost of accommodation renting in Poland. Considering the fact that as of April 1, 2022, the population of Warsaw and Krakow increased by 15% and 23%, respectively, the Ukrainian refugees positively influenced the cost of accommodation in the large cities in Poland and quite objectively significantly increased the demand for all types of housing, which led to prices in-

crease. The rental prices increase and slight increase in housing purchase, although creating inconveniences for the local population, had a positive impact on the development of the local economy. Study of the negative aspects of the Ukrainian refugees impact on the economies of the European countries and on the housing market was carried out in the work (Al Brizat, 2023), where much attention was paid to the problems of providing asylum to the refugees from Ukraine and the housing market in the countries that accepted the most refugees. Undoubtedly, the problem of the refugees influx carries a certain burden for the host countries, however, the majority of the refugees are working population with higher education, which will have a positive impact on the economy of the European countries due to the cheapening of labor and the added value creation, so the impact of the refugees should not be interpreted as negative.

While analyzing the influence of Ukrainian refugees on the economies of the host countries, it is worth paying attention to the issue of their influence on the development of the hotel, restaurant and tourism business, because as some scientists note (Trojanek & Gluszak, 2022), the rapid short-term increase of the big cities population leads to increase in the demand for rent housing, however, the limitation of statistical data does not allow to make a broad analysis of this problem.

In order to optimize tourist and migration flows, scientists are exploring new and interesting ways and objects of international tourism. In the article (Popović, 2017) value of sacred objects like a resource for development of cultural and religious tourism is being emphasized.

Study of the negative aspects of international migration affects an individual's educational choices in their home country was carried out in the work (Abdullov et al, 2020), where much attention was paid to the theory of forsaken schooling phenomenon. This phenomenon shows that low-skilled and skilled home country workers are willing to accept low-skilled positions in host countries. As time goes on, therefore, people who consider migrating abroad will have either lower years of schooling, or generally have not completed professional schools (technical-vocational or tertiary).

The issue of effective tourism destination planning from the perspective of harmonizing stakeholders' interests is researched in the work (Pjerotić et al, 2016), where the authors concluded that there is a strong positive correlation between the level of stakeholder cooperation and implementation of a tourism destination plans.

3. AIM OF THE RESEARCH

Therefore, the purpose of our research is to study the impact of the flows of the Ukrainian refugees on the development of the hotel, restaurant and tourism business in the countries of Central and Eastern Europe in order to determine the role of the refugees from Ukraine in the development of the housing market in the host countries as a whole.

4. METHODS

Considering the limited and unstructured data regarding the influence of the Ukrainian refugees on the economies of the host countries or individual industries, our study is based on the use of the methodology of a questionnaire survey of the Ukrainian refugees and the owners of hotels and hostels from the host countries in order to determine the refugees impact on the financial and economic development of the housing and catering industry. The refugee questionnaires on a variety of topics are used in the scientific literature and are often the only source of data that help to investigate and trace certain trends in the refugees impact on the economies of the host countries.

The questionnaire survey was conducted for two categories of respondents. The first category of respondents included the Ukrainian refugees, who lived in the Czech Republic, Poland and Germany after February 24, 2022, and the second category of respondents included the owners of hotels and hostels in the aforesaid countries. As for the refugees, the questionnaire included 5 general questions aimed at identifying the facts of living at hotels, hostels and rented accommodation both immediately after crossing the border and living there for a long time. The first question concerned determining the place of residence of the refugees after crossing the border, the second question was aimed at determining the place of residence for a long period (more than 2 months); the third question was aimed at determining the place of the refugees catering; the fourth question revealed

how the refugees spent their own savings; the fifth question determined the ways of spending the obtained material assistance from the governments of the host countries by the refugees. The questions were put in the form of a questionnaire created using the Google Forms service. Based on the screening of social networks Facebook and Instagram, by the analogy with the methods proposed in the works of (Kolly-Shamne, 2022) and (Minora, et al., 2022), we found the refugees from Ukraine and determined the country of their residence. Then the formed questionnaire was sent through the social networks Facebook and Instagram to the respondents who resided in the Czech Republic, Poland and Germany. The questionnaires were sent until 200 fully completed questionnaires were collected. 284 questionnaires were sent out (84 questionnaires were incomplete or ignored) in the Czech Republic, 247 questionnaires (47 questionnaires were incomplete or ignored) – in Poland, and 261 questionnaires (61 questionnaires were incomplete or ignored) – in Germany. The study was conducted during the first quarter of the year 2022. The results of the study were grouped in the appropriate table.

Regarding the survey of the owners or the managers of hotels and hostels in the Czech Republic, Poland and Germany, a similar principle of creating a questionnaire via Google Forms was proposed. However, unlike the questionnaire for the refugee respondents, a three-question questionnaire was offered to the owners and the managers of hotels and hostels. The first question related to the fact that the refugees live in a hotel or a hostel; the second question revealed the opinion of the hotel and the hostel owners about the level of positive influence of the Ukrainian refugees on the development of their business; the third question was aimed at identifying the influence of the Ukrainian refugees on the development of the menu of restaurant or catering establishment. The questionnaires were sent via social networks Facebook and Instagram, as well as via e-mail. In the Czech Republic, 58 questionnaires were sent out, of which 30 questionnaires were fully answered; in Poland, 49 questionnaires were sent out, and 30 complete responses were received, and in Germany, 45 questionnaires were sent out, and 30 complete responses were received. The results of the survey were also grouped in the appropriate table.

The questionnaire survey of the respondents – the refugees from Ukraine and the respondents – the owners or the managers of hotels, hostels and catering establishments, was aimed at substantiating two hypotheses put forward in the study:

The first hypothesis. The Ukrainian refugees have a positive impact on the development of the hotel and restaurant business and tourism in the countries of Central and Eastern Europe.

The second hypothesis. A significant economic effect of the presence of Ukrainian refugees is observed in those countries where the number of refugees occupies a high share in the population structure of the country or individual settlements.

5. RESULTS

Development of the hotel and restaurant business in the countries of Central and Eastern Europe is closely dependent on internal and external tourist flows. Being rich in remarkable historical and modern architectural monuments, natural monuments, resorts and other tourist locations, Central and Eastern Europe always attracted a large number of tourists, who were one of the sources of economic development in the region. However, the coronavirus disease pandemic, which led to restrictions on the cross-border movement of tourists and the internal movement of the population, caused a certain decline in the industry of hotel and restaurant business and tourism.

Before analyzing the main trends in the development of hotel and restaurant business and tourism in the countries of Central and Eastern Europe, we note that we chose Germany, Poland and the Czech Republic as the main countries of this region, as the countries which accepted the largest number of the Ukrainian refugees, which probably, in its turn, had a significant impact on the trends of tourist flows.

Thus, according to Eurostat, the average monthly flow of tourists in the European Union as a whole and in the Czech Republic, Germany, and Poland in particular decreased by almost half in 2020, and according to the results of 2022, this indicator has not yet reached the level of 2019 (Table 1).

Table 1. Dynamics of the average monthly flow of tourists to some countries of Central and Eastern Europe in 2019-2022

European countries	2019	2020	Deviations 2019-2020	2021	Deviations 2020-2021	2022	Deviations 2021-2022
European Union (27 countries)	71 146 833,0	32 562 056,0	-54,23	41 060 450,0	26,10	64 433 925,0	56,92
Czech Republic	1 834 129	903 037	-50,76	948 633,42	5,05	1 619 185,1	70,69
Germany	15 426 754	7 925 226,9	-48,63	7 814 130,6	-1,40	13 211 665,0	69,07
Poland	2 972 340,9	1 489 830,8	-49,88	1 849 914,3	24,17	2 854 083,7	54,28

Source: Built by the author based on the Eurostat data ([Arrivals at tourist accommodation establishments – monthly data , 2022](#))

However, these Table data show that the complete elimination of restrictions regarding the cross-border movement of citizens and visiting tourist locations took place during 2021, which already in 2022 led to increase in tourist flows by 55-70% compared to 2021. Evaluating the dynamics of tourist flows in the Czech Republic, Germany and Poland in 2022, it is worth paying attention to the large number of the Ukrainian refugees, whose number actually makes up a half of the average monthly flow of tourists. Thus, according to the UN data, after February 24, 2022, the Czech Republic accepted 504,352 refugees, Germany – 1,056,628 refugees, and Poland – 1,581,148 refugees from Ukraine.

At the same time, despite such a large number of refugees, the available statistical data base of the European Union does not allow to estimate the number of refugees, whom the statistical authorities classified as tourists, and which of those are classified as refugees with a corresponding mark about registration of a person with refugee status. Therefore, aggregating the completeness of statistical data regarding the refugees impact on the development of the hotel and restaurant business and other sectors of the economy is a limitation for this kind of scientific research.

Table 2. The results of the survey of the Ukrainian refugees in the Czech Republic, Germany and Poland regarding the directions of spending financial funds in the host country

Questions	Answer options	Refugees in the Czech Republic, %	Refugees in Germany, %	Refugees in Poland, %
Select the accommodation option where you stayed after you arrived in the country?	Hotel or hostel	60	35	60
	Rented housing	30	55	20
	Housing offered by residents for free	10	10	20
Where do you live during your long stay in the country after emigration?	Hotel or hostel	55	25	45
	Rented housing	45	65	55
	Housing offered by residents for free	0	10	0
Where do you mostly have meals after emigration to the country?	Restaurants	25	35	25
	Other catering establishments	40	35	40
	At home (I cook myself)	35	30	35
What do you spend the most money on?	Housing	100	100	100
	Food	95	100	75
	Medicine and education	40	55	55
	Entertainment	20	15	20
	Transportation	25	35	20
For what purposes do you spend the financial assistance provided by the Government?	Housing	100	100	95
	Food	90	100	55
	Medicine and education	30	40	40
	Entertainment	0	0	0
	Transportation	15	15	5

Source: Built by the author based on the survey results of 200 Ukrainian refugees using the Google Forms service

Thus, one of the main research methods of the nature of the Ukrainian refugees influence on the development of the hotel-restaurant and tourism business is the method of surveying both the Ukrainian businesses and the hotel owners in the countries which accepted the refugees.

So, in the course of our study, a survey of 200 Ukrainian refugees, who emigrated to the Czech Republic, Germany and Poland after February 24, 2022, was conducted. The survey results are grouped in the Table 2.

Analyzing the results of the survey of the Ukrainian refugees who emigrated to the Czech Republic, Germany and Poland after February 24, 2022, we note that 60% of respondents in the Czech Republic and Poland noted that they settled in the hotels or the hostels after crossing the border. In Germany, the number of Ukrainian refugees, who settled in the hotels or the hostels is much smaller than in Poland and the Czech Republic and makes up 35% of the surveyed respondents. Most of the refugees from Ukraine, who left for Germany, rented housing, as mentioned about 55% of the respondents. As for the question about the place of long-term residence, 55% of respondents in Czech Republic said that they lived in the hotels and the hostels, and 45% of respondents in Poland and 25% of respondents in Germany, respectively. Thus, the survey of the Ukrainian refugees shows that the refugees had the greatest influence on the development of the hotel and restaurant business in the Czech Republic and in Poland.

Besides, the important result of the Ukrainian refugees survey in the Czech Republic, Germany and Poland is that in each of the countries, 70% of respondents noted that they eat at restaurants or other catering establishments. Thus, in the Czech Republic and Poland, 25% of refugees eat at restaurants, and 40% at other catering establishments; in Germany, 35% of respondents eat at restaurants, and 35% at other catering establishments. Such parameters shows the influence of the Ukrainian refugees on the development of the hotel, restaurant and tourism business in the countries under study. At the same time, it should be noted that the level of influence of the Ukrainian refugees on the development of the hotel and restaurant business in the countries of Central and Eastern Europe depends on the number of refugees in relation to the population of the host country. In particular, in the Czech Republic, the Ukrainian refugees make up 5% of the population, and a sudden increase in the country's population by 5% can have a positive impact on the development of those sectors of the economy, the consumers of products or services of which the refugees have become.

Studying the statistical information of the statistical authorities of the Czech Republic regarding the development of the hotel and restaurant business, we note the fact that the highest level of sales growth in the field of hotel and restaurant business is observed in the second quarter of the year 2022, which increased by 12.1% in annual terms compared to the same period in the year of 2021. Moreover, according to the data of the Statistics Office of the Czech Republic, the sales in the field of accommodation, public catering and hotel business increased by 54.5% in the second quarter of the year. In accommodation establishments, the sales increased by 146.5%, in catering and hotel business - by 37.3%. However, already in the third quarter of 2022, when the the refugee flows decreased, the Statistical Office of the Czech Republic provides the following data: in catering and hotel business, the volume of sales decreased by 10.8%, in accommodation facilities, on the contrary, it increased by 8.8%. That is, regardless of the holiday season, which usually begins in the third quarter of the year, the volume of sales in public catering and hotel business decreased in the Czech Republic.

Regarding the purposes, for which Ukrainian refugees spend the most money in the host country, 100% of the respondents from the Czech Republic, Germany and Poland answered that they spend the most money for accommodation. Food is somewhat less in the Czech Republic and Poland, followed by medicine and education, transport and entertainment. Evaluating the housing and food expenses of the Ukrainian refugees, it is worth paying attention to the amount and goals of aid to the refugees allocated by the governments of the host countries. For example, the legislation of the Czech Republic ([Novinky v legislativě upravující pomoc ukrajínským uplýmíkům na trělení ČR, 2022](#)) provides for the payment of humanitarian aid to the Ukrainian refugees in the amount of 5,000 crowns per calendar month for a period of six months. Considering the fact that, according to the results of the survey of the Ukrainian refugees, the main fields of spending the received humani-

tarian monetary aid in the Czech Republic are the payment for housing and food, it should be noted that such monetary aid has become one of the sources of stimulating the development of the hotel and restaurant business and tourism industry.

As for Poland and Germany, the governments of these countries also provided financial assistance to the Ukrainian refugees. Thus, the Government of Poland provided several types of financial assistance for the Ukrainian refugees: PLN 500 of aid per child; PLN 300 of one-time aid for those refugees, who crossed the border of Poland for the first time after February 24, 2022; PLN 400 aid for a child's stay in a nursery; subsidies for families with many children in the amount of PLN 500-1000 ([Jaką pomoc finansową połączyć otrzymają Ukraińcy w Polsce?, 2023](#)). Financial assistance for the Ukrainian refugees in Poland is somewhat less than in the Czech Republic, but all allocated funds are actually returned to the Polish economy, including by paying for accommodation and board of the refugee families.

The German government provided financial assistance to the Ukrainian refugees under the Hartz IV program, according to which an adult receives EUR 449 of aid, and aid per child from EUR 285 to EUR 376, depending on the number of children and their age ([Sandig, 2022](#)). That is, the amount of assistance for the Ukrainian refugees in Germany is quite significant and allows covering the basic needs of the refugees in accommodation and board. At the same time, it should be noted that in Germany the majority of Ukrainian refugees live in rented apartments, which somewhat diverts the costs of paying for housing in the field of hotel and restaurant business.

So, in the course of our study, a survey of 30 hotel and hostel owners in the Czech Republic, Poland and in Germany as well (Table 3).

Table 3. The results of the survey of the hotel and hostel owners in the Czech Republic, Poland and Germany regarding the Ukrainian refugees living there

Questions	Answer options	Hotel owners or managers		
		Czech Republic %	Germany %	Poland %
Did Ukrainian refugees live at your hotel/hostel in 2022?	Yes, they lived	67,7	43,3	63,3
	No, they did not live	33,3	56,7	36,7
Did Ukrainian refugees have a positive impact on the revenue generation of your hotel and restaurant business?	Yes, they had a positive impact	53,3	26,7	43,3
	The impact of Ukrainian refugees on the dynamics of financial and economic indicators of the hotel and restaurant business was not decisive	13,3	20,0	20,0
	The Ukrainian refugees did not have a positive impact on the financial and economic indicators of the hotel and restaurant business	33,3	53,3	36,7
Did the Ukrainian refugees have a positive influence on the development of the menu of your restaurant/catering establishment?	Yes, they had. The Ukrainian dishes, which were in demand among visitors, appeared on the menu	40,0	20,0	33,3
	Yes, they had a minor impact that led to a minor increase in food service sales	26,7	26,7	30,0
	No, they didn't influence at all	33,3	53,3	36,7

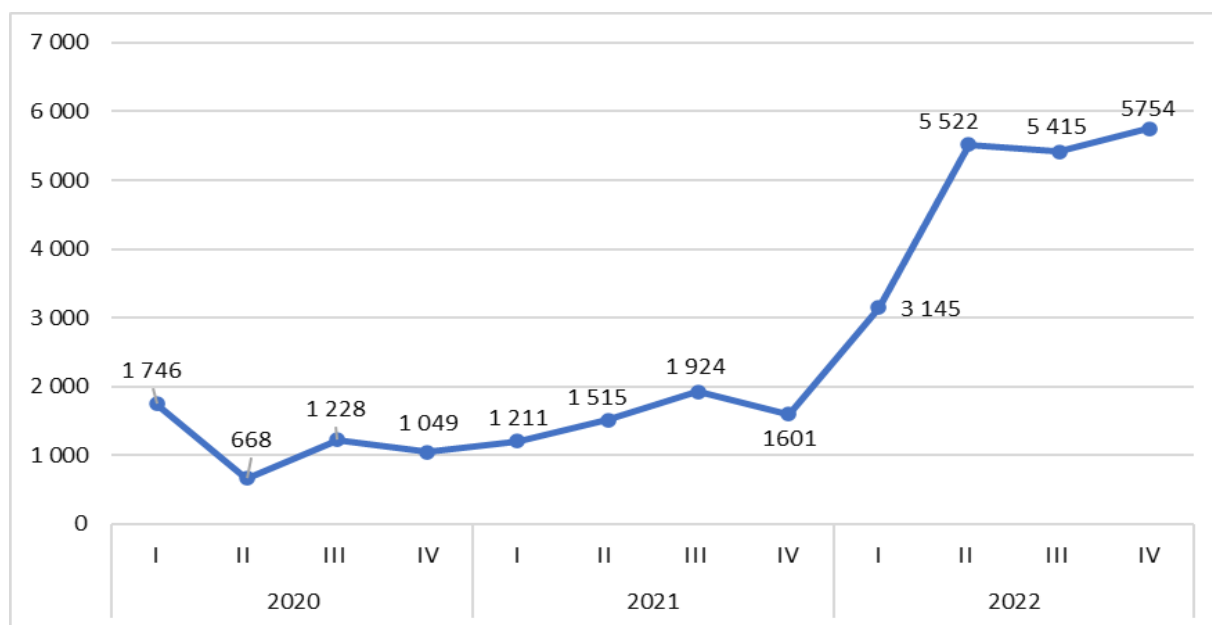
Source: Built by the author based on the survey results of 30 hotel and hostel owners in the Czech Republic, Poland and Germany using the Google Forms service

Data in the Table 3 show that the interviewed respondents – the owners of the hotels and the hostels in the Czech Republic, Germany and Poland evidence that the Ukrainian refugees temporarily lived in their hotels. However, 53.3% of the owners of hotels and hostels in the Czech Republic, 43.3% in Poland, and 26.7% in Germany, where the Ukrainians lived, answered about the positive impact of refugees on the financial indicators of their hotels and hostels. At the same time, 40% of respondents, the owners of hotels and hostels in the Czech Republic, noted that Ukrainian dishes appeared on the menu of restaurants and catering establishments at the hotels. A similar question was answered positively by 20% of respondents in Germany and 33.3% of respondents in Poland.

Thus, taking into account the results of the survey of the Ukrainian refugees and the owners of hotels and hostels in the Czech Republic, Germany and Poland, it is possible to conclude about the positive influence of the refugees from Ukraine on the development of the hotel, restaurant and tourism business in the host countries, because the main amount of material assistance provided is highly likely settled in the field of accommodation and catering.

Moreover, one should pay attention to the statistical data of the National Bank of Ukraine, which make it possible to evaluate the scale of spending costs by the Ukrainian refugees from their own card accounts abroad (Fig. 1).

Figure 1. Expenses dynamics of the Ukrainians abroad under the balance of payments item “travel” in the years of 2020-2022



Source: Built by the author according to the data of the National Bank of Ukraine ([External Sector Statistics, 2022](#))

Data in the Figure 1 indicate a significant increase of the costs spending by the Ukrainians abroad in 2022, because the services import under the balance of payments item “travel” indicates that in 2022 the Ukrainians spent about 20 billion US dollars from their own savings accumulated in Ukraine. As it is shown in the Figure, the highest rate of the expenses increase occurred in the Ist and the IInd quarter of the year 2022, that is, at the time when the largest number of people emigrated from Ukraine. If we count the number of Ukrainian refugees as a percentage for each country, then 9.5% of all refugees from Ukraine are concentrated in the Czech Republic, 20% – in Germany, and 30% – in Poland. Therefore, mathematically, the Ukrainian refugees probably spent 1.9 billion US dollars in the Czech Republic, 4 billion US dollars – in Germany, and 6 billion US dollars - in Poland. Taking into account the results of our survey of the Ukrainian refugees regarding the ways of spending their financial funds, we can come to the conclusion that the lion’s share of the refugees’ expenses was directed to the accomodation and food sectors, which became one of the drivers of the development of the hotel and restaurant business and tourism, as well as public catering establishments and retail trade.

6.DISCUSSION

Our study of influence of the Ukrainian refugees on the development of the hotel, restaurant and tourism industry in the countries of Central and Eastern Europe, and in particular in the Czech Republic, Poland and Germany, allowed us to refute the conclusions about the negative impact of the war in Ukraine on the economies of the European countries, which tried to substantiate such researchers as ([Guenette, Kenworthy, & Wheeler, 2022](#)) and ([Al Brizat, 2023](#)). Our study, based on the survey of Ukrainian refugees and the owners of hotels and hostels in the Czech Republic, Germany and Poland, made it possible to prove the positive short-term impact of the refugee flows on the

development of the hotel and restaurant business, because, according to the respondents, it was the payment for accommodation that became the largest expense item, both from the personal financial savings and from the material assistance provided by host governments. Thus, the results of our research partially confirm the conclusions made in the article (Trojanek & Gluszak, 2022) that the Ukrainian refugees have significantly increased the demand for rental housing in big Polish cities.

Besides, the attention should also be paid to the fact that due to the war prolongation, the Ukrainian refugees will stay for a longer period in the Czech Republic, Poland and Germany, which will lead to the keeping consistently high demand for rental housing, hotel and restaurant business services and public catering establishments in the places of the refugees concentration. At the same time, we should note that the Ukrainian refugees will have a positive impact on the development of Ukrainian cuisine in the host countries, because there are already known cases of opening the Ukrainian catering establishments in Poland (Restauracje w Polsce z kuchnią ukraińską, 2022) and the Czech Republic (Goldbergerová, 2022).

7. CONCLUSION

Conducted research of the Ukrainian refugees influence after February 24, 2022 on the development of the hotel and restaurant business and tourism in the countries of Central and Eastern Europe made it possible to make a conclusion about the positive impact of the sudden increase of the refugees flow on the development of hotels, hostels, restaurants and other public catering establishments in those countries, which accepted the largest number of the refugees from Ukraine. Survey of the Ukrainian refugees regarding the direction of spending of financial funds in the host countries, and interrogation of the hotel owners and the statistical data analysis of the National Bank of Ukraine concerning the level of the expenses of the Ukrainian refugees abroad allows us to confirm the first hypothesis put forward in the work, because the responses of the refugees indicate that after crossing the border, about 60 % of the respondents settled in hotels and hostels, and after some time about 50-55% of respondents in the Czech Republic and Poland rented apartments, in Germany this percentage is even higher. The survey confirms that the refugees from Ukraine mainly spent the aid provided to them by the governments of the host countries on accommodation and food, which in practice created the effect of indirect state stimulation of the development of the hotel and restaurant business after the crisis of the coronavirus disease. Significant expenses of the refugees' own savings accumulated in Ukraine were also mainly directed to paying for housing, food and retail trade, which definitely had a positive impact on the development of both the hotel and restaurant business and rental housing.

As for the second hypothesis, the experience of the Czech Republic makes it possible to confirm it, because the number of the refugees equivalent to 5% of the country's population arrived in this country, which caused their primary settlement in hotels and hostels. In its turn, significant financial assistance from the Government of the Czech Republic and significant amounts of expenses of the refugees' own savings had a positive impact on the development of the hotel and restaurant business in this country. In addition, it is worth noting that positive influence of the Ukrainian refugees on the development of the hotel and restaurant business in the Czech Republic and Poland is also characterized by the fact that Ukrainian cuisine appeared in local restaurants and public catering establishments, which contributed to the expansion of the menu and the increase of the customers from Ukraine, and therefore, it has a certain positive impact on the financial performance of hotels, restaurants and catering establishments.

At the same time, it should be mentioned that work limitation is the lack of formed series of statistical data concerning the direction of the costs spending by the refugees, the refugees participation in tourist flows, the employment directions (including in the field of hotel and restaurant business) and creation of added value in the host countries. Therefore, promising areas of the research regarding the influence of the Ukrainian refugees on the development of hotel, restaurant and tourism business in the countries of Central and Eastern Europe are the study of behavioral patterns of the refugees, the evaluation of the prospects of a long stay in the host countries, as well as contribution of the refugees to the development of the local economy.

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INCLUSIVE INVESTMENT IN THE SUSTAINABLE DEVELOPMENT OF THE AGRICULTURAL SECTOR AND RURAL AREAS OF UKRAINE

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Received 16.01.2023.

| Send to review 26.01.2023.

| Accepted 07.06.2023.

Original Article



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JEL Classification:

Q01, R00, Q19

Doi: 10.61432/CPNE0101075S

UDK: 338.43(4-12):316.334.3(477)

ABSTRACT

This scientific study is devoted to solving the tasks of overcoming these negative trends at the expense of substantiating the mechanism of inclusive investment. The article examines the essence and role of the inclusive investment mechanism in agricultural business. Based on the system of fundamental indicators, an assessment of the current level of sustainable development of the agricultural sector of Ukraine was carried out. The main trends accompanying the agrarian sector's transition to sustainable development principles have been identified. The main directions of investment in the rural business of Ukraine have been revealed. An analysis of the sources, volumes, and dynamics of agricultural investment in solving the problems of sustainable development of agribusiness and rural areas was carried out. A prospective assessment of the amount of inclusive investment resources in the agricultural sector and the rural regions is given. The main problematic aspects related to the process of inclusive investment in Ukrainian agrarian business are characterized. The critical organizational and economic principles of forming a sustainable business model for developing an agricultural industry based on inclusive investment are substantiated. The conducted studies confirmed the presence of transformational changes in the economy of the agricultural sector of Ukraine in the direction of achieving the goals and objectives of sustainable development. The research results formed the basis for substantiating practical proposals and recommendations for improving the process of attracting inclusive investments in agricultural business and the development of rural areas.

Keywords: *investments, agrarian business, inclusive gaps, economic and social development, performance*

1. INTRODUCTION

The agricultural sector of Ukraine is vital for the national economy and determines the strategic vector of its further development. Under the conditions of the military conflict in the country, agriculture remains practically the only branch of the economy that continues to provide steady inflows of currency from exports, replenishment of the country's budget at the expense of tax fees, and creation of additional value. The role of the agricultural sector of Ukraine in ensuring the food security of its population and achieving the global goals of sustainable development through the supply of agricultural raw materials to the world food market is essential. The prospects of Ukraine's further integration into the European socio-economic community, gaining competitive advantages in the world food market, and improving the quality of life of the country's population are closely related to ensuring the sustainable development of agriculture and rural areas. The transition to sustainable development requires a change in strategic priorities, paradigms, and values that form the plane of criteria and conditions for the effectiveness of agribusiness functioning.

FAO identifies several critical conditions for ensuring the sustainable development of agriculture in the context of solving global human problems: 1) the ability to promote the development of ecosystems and ensure rational management of natural and biological resources; 2) meeting the needs of current and future generations by achieving a balance of business profitability, social-ecological and economic interests of all members of society; 3) the presence of a management system that will contribute to solving all these tasks (FAO, 2021).

Kociszewski (2018) considers the sustainable development of agriculture as a combination of the concepts of SARD, MRD, multifunctional agriculture, and sustainable development.

Farmers understand the content of sustainable development from a wide range of perspectives. Scientists have identified about 19 prerequisites for ensuring the sustainable development of agriculture. However, all of them can be systematized into components of an ecological, social, and economic nature, the impact of social responsibility and inclusiveness of agricultural business and the corresponding methods of their management (Lauretta et al., 2018).

Luo et al. (2016) consider the sustainability of agriculture through the efficient use of resources and management capabilities to ensure the sustainable production of material goods that are sufficient and affordable for the entire population. Resource conservation and agroecological methods of agricultural production are also the basis of achieving a state of sustainability of the farm output in the approaches of other scientists (Zhang et al., 2021). We share this systematic approach of the authors and agree that sustainable agriculture should ensure the inclusive development of rural areas.

A significant number of scientists who studied the problem of increasing the level of sustainability of agricultural production paid particular attention to the ecological component (Ngo et al., 2021; Sarkar et al., 2021). Moreover, further studies have shown that economic and social components are more significant in achieving the goals of sustainable development of agribusiness since they can ensure the receipt of necessary investments and the use of management methods that are necessary for the sustainable development of agriculture (Linlin et al., 2022).

Scientists are researching the forms and methods of sustainable development to solve the inclusive tasks of the development of rural areas: ensuring equal and fair access of the population to clean natural resources, opportunities to obtain affordable socio-economic benefits, gender equality and social protection, personal development, preservation of the family and youth (Dal Moro et al., 2022), equal employment opportunities for the population and overcoming social exclusion (Guirado et al., 2017). The critical aspect of ensuring the sustainable development of agribusiness is providing producers with equal and fair opportunities for integration and capital markets and the sale of agricultural products (Collazos et al., 2020).

Among the main reasons that lead to different levels of sustainable development in rural areas are: other trends in economic growth, incomes of rural families, economic inequality, lack of equal and fair access of agricultural producers and residents of rural areas to investments (Calicioglu et al., 2019).

Achieving the goals of sustainable agriculture in Ukraine requires solving the tasks of implementing reliable methods of agricultural management and agribusiness into practice, increasing the share of energy and resource-saving production technologies, activating the development of circular processes, and overcoming existing inclusive gaps between the level of growth of the population of cities and rural areas. Today, ecological, socio-economic, and gender-cultural inclusiveness are the critical tasks of the transformational transition to a model of sustainable development of agribusiness and rural areas. Solving these tasks requires increasing the flow of socially responsible inclusive investments in the country's agriculture. Assets form the prerequisites for ensuring multifunctional inclusion, justice, and equality, creating the basis for achieving the goals of sustainable development of the industry and the country's economy.

2. LITERATURE REVIEW

The impact of investments on the possibility of achieving sustainable development goals is the subject of active scientific discussions by many scientists and international organizations. The United Nations 2020a report emphasized the need to stimulate investment in all sectors relevant to implementing the Sustainable Development Goals, while agriculture was singled out as a priority

area (Sustainable Development Goals 2,13,14,15) (UNCTAD, 2020). The quality of life of 42% of the world's population depends on agriculture, which requires sustainable land use, which is impossible without ensuring social and environmental investments in the development of rural areas (Aznar-Sánchez et al., 2019). Over the past decade, investment in facilities related to clean energy, clean technologies, sustainable agricultural production, and food security has increased significantly. Among the priority financial investment instruments the authors call "green" and social bonds promising (Zhan et al., 2021). A key motivation for US agribusiness investors is to participate in creating sustainable value chains (Van Zanten et al., 2018). Grzelak (2022) proved that economic sustainability positively affects the ratio of assets and income of EU farmers. The increase in support results from the increased volume of investments due to the growth of environmental and social functions in agriculture.

Velten et al. (2015) substantiated four main principles of inclusive investment in sustainable development:

1. Ensuring a balance between private and public investments.
2. Attractiveness in the ratio of risk and profitability of investments.
3. The balance between liberalization and regulation of the investment process.
4. The need for the scale of inclusive investment to cover all sustainable development goals.

Havemann et al. (2020) also identify the importance of agriculture in achieving global sustainable development goals. The authors see the possibility of increasing the volume of inclusive investment flows in the sustainable development of the agricultural sector and rural areas in the creation of new investment structures, which should be formed based on mixed financing with state support (subsidies, preferential fiscal policy, guarantees for private investors). As financial instruments of the investment process, the authors see primarily grants, securities, soft loans, and investors' capital). Such inclusive investments in sustainable development may cause significant costs without a guaranteed financial return. However, the long-term beneficial effect of such assets will manifest itself over time in increasing sustainability and achieving sustainable development goals. Responsible investments are also considered the primary driver of sustainable development of agriculture and rural areas of Ukraine and the Czech Republic (Plastun et al., 2021).

Mastilo et al. (2017) investigated the impact of inclusive investment on ensuring sustainable value creation management processes. Zhan et al. (2020) suggest further developing investment models of SDG zones to develop inclusive investment processes for sustainable development goals. Integration of sustainable production and consumption, preservation of biodiversity, and creation of socio-ecological sectors of justice and sustainability are also key areas of inclusive investment in agriculture (Imasiku et al., 2020, Guerrero-Pineda et al., 2022). The priority strategic direction of inclusive investments in agriculture is the further development of the "green" economy (Soderholm et al., 2020; Ahman et al., 2017).

3. AIM OF THE RESEARCH

The purpose of the article is an economic assessment of the current state and impact of investment on the effectiveness (profitability) of the economic activity of agricultural enterprises and the justification of promising drivers for the activation of the attraction of inclusive investments in the industry.

4. METHODS

The materials for the article were data obtained based on generalizations of domestic and foreign scientific literature on sustainable development issues. The information base of the study was supplemented by data from the State Statistics Service of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, forecast indicators of the development of agriculture of the country's leading scientific institutions (NNC IAE of Ukraine).

When studying the subject, a set of general scientific and specific economic research methods was used, the basis of which was a systematic dialectical approach to the knowledge of socio-economic phenomena and processes. Based on the monographic method of research and the method of abstract systematization and specification, a review of scientific literature was conducted, and a plane of

the authors' vision of the realities of existing inclusive gaps in the agriculture of Ukraine was formed. Also, with this method's help, the current state of investment support in the industry was studied. The method of synthesis, induction, and deduction, as well as the scientific-abstract systematization of the results of scientific research, became the methodological basis for substantiating the authors' approach to distinguishing the characteristic features of inclusive investments in agriculture. With the help of the concretization method, indicators were selected from the set of indicators of sustainable development, which form the basic idea of the current state of sustainable development of the agricultural sphere and rural areas. Based on the index method of economic and statistical calculations, the indicators of the sustainable development of the agricultural economy of Ukraine were calculated. The comparison method supplemented the research results in identifying trends and changes in these indicators. The methods of the system approach, abstract systematization, and logical structuring were used in the justification of the inclusive drivers of sustainable development of agriculture and rural areas of Ukraine. Analytical observation and comparison methods were the basis of the description of the professional discussion in the part of the discussion of the obtained results and the degree of influence of inclusive investments on the results of the activities of rural business structures.

Part of the material for the article was obtained by method of collecting and analyzing the annual financial statements of medium and small agricultural companies of Ukraine (excluding extensive agrarian holdings of Ukraine). Internal management reporting of farming enterprises, which does not have an official status and is not regulated by current legislation, was added to the financial reporting. Based on the received materials, economic and statistical data on agricultural enterprises' investments, the availability of land, and the financial results of their activities were collected. The basis of the statistical sample was 93 medium- and small-sized agricultural companies in Ukraine's Odesa, Vinnytsia, and Mykolaiv regions. Based on the application of the economic and statistical method, an assessment of the impact of investment size on the final performance indicators of the economic activity of agricultural companies was carried out. A two-factor mathematical model of multiple linear regression was used as a specific methodological technique of the economic-statistical method, which showed a high-reliability level of 64%. The multiple linear regression equation model had two main factors:

$$Y_i = b_0 + b_1 x_{1j} + b_1 x_{2j} \quad (1)$$

where

Y_i – the amount of net profit per 1 agricultural enterprise, a thousand UAH;

$b_1 x_{1j}$ – the number of capital investments per 1 agricultural enterprise, a thousand UAH;

$b_1 x_{2j}$ – the number of foreign investments per 1 hectare of arable land, a thousand UAH.

5. RESULTS

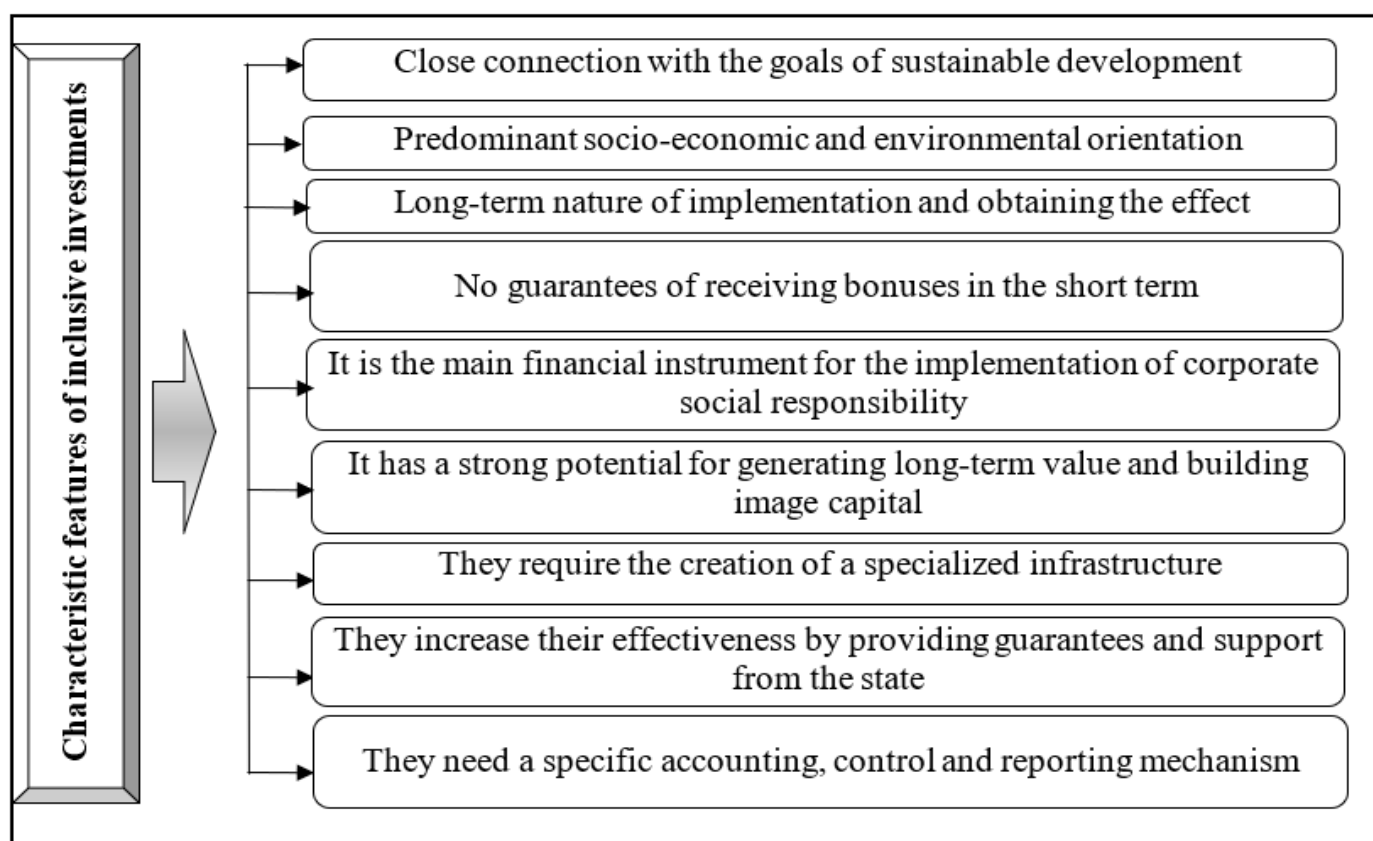
Agriculture is a traditional type of economic activity in Ukraine, which ensures stable functioning even under the conditions of the existing military conflict in Ukraine. A significant part of the total resources of the country's economy is concentrated in the agricultural sector, and agricultural business has remained one of the most profitable types of business for many years. Moreover, it is precisely in agriculture and the boundaries of rural areas of Ukraine that the most significant inclusive gaps of both socio-economic, political, and environmental origin are observed. The conducted research made it possible to determine the critical problems of the existing inclusive holes: high indicators of the Gini index (0.72), which indicates a significant imbalance and unevenness in the distribution of income within the agricultural sector; high concentration of profits of extensive farm holdings (10% of farming companies accumulate more than 60% of the total income of the industry) and limited access of medium and small agricultural structures to resource, capital, and sales markets; a high level of inequality in income opportunities among households (more than half of Ukrainian households receive income from agricultural activities of less than 500 euros), only half of the homes in rural areas have access to convenient public transport, only 13% of the rural population has a higher education). The amount of wages in agriculture traditionally remains one of the

riskiest types of economic activity in Ukraine (12,287 UAH), which is 30% less than the average for the economy. The negative trends of deterioration are determined by the rural population's access to medical services and the improvement of professional skills; about a third of households in rural areas do not have access to the Internet, which significantly reduces the potential of access to participation in the socio-cultural and political life of the country. In general, the average income level of households in rural areas is 25% lower than the urban population and, in the pre-war period, was 424 dollars per month.

It is possible to overcome inclusive gaps with investments in developing agriculture and rural areas. Considering Ukraine's significantly limited budgetary and financial potential, we believe that socially responsible agricultural businesses should shoulder the investment burden to a large extent. The main motives of inclusive investments in the development of agricultural production and rural areas on the part of the agrarian business should be the achievement of strategic competitive advantages based on the principles of sustainable development of agribusiness and the countryside.

The study of the essence and meaningful parameters of inclusive investments made it possible to determine their key characteristics (Fig. 1).

Figure 1. Characteristic features of inclusive investments



Source: created by the authors

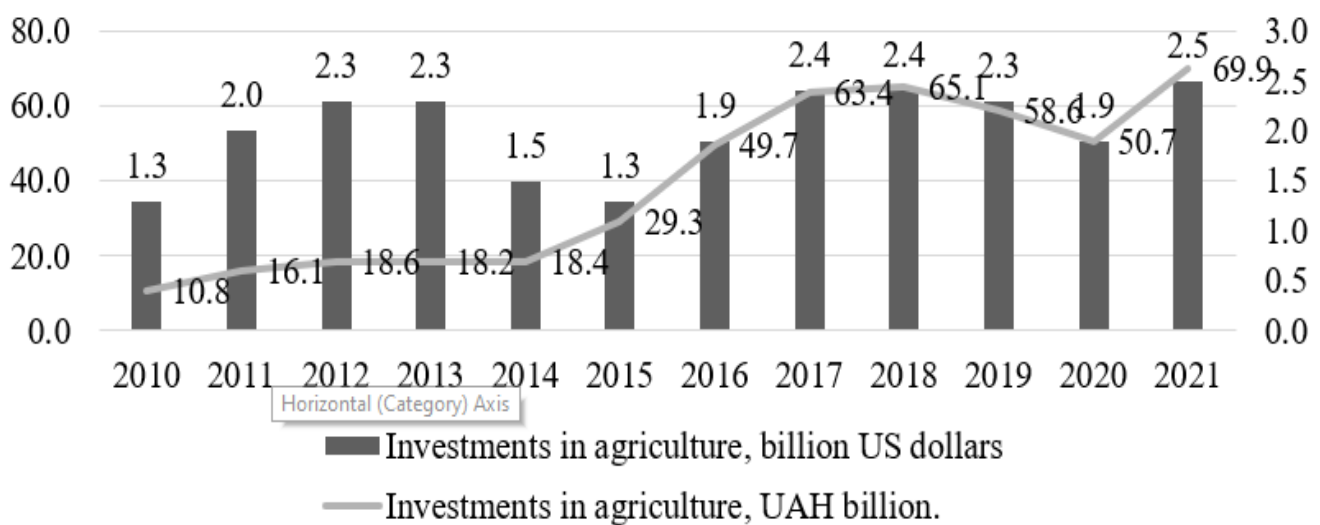
In practice, inclusive investments in agriculture and the development of rural areas are manifested in the following forms:

1. Expansion of access opportunities for farmers to resource and capital markets, creation of sustainable product chains, and equal opportunities for integration, partnership, and cooperation for agricultural companies regardless of their scale and size.
2. Variety of investment strategies, projects, and investment products.
3. Creation of a transparent mechanism for attracting and using investment resources.
4. Formation and effective functioning of a specialized infrastructure of inclusive investment on the basis of digitization and broad access by all participants in business relations.

5. Achievement of sustainable development goals by investing in environmental and socio-economic projects for the development of agriculture and rural areas.
6. Reduction of inclusive gaps and improvement of the quality of life of the rural population.

Investment support for agribusiness and rural areas is characterized by complex trends in the field of instability of investment processes and a decrease in the level of investment attractiveness of agriculture; inadequate specialized infrastructure, limited financial and investment potential of domestic donors, in particular, state donors; the factors of political and macroeconomic instability, the pandemic, and the uncertainty of the mechanism for completing the land reform also added to the negative impact. In the structure of sources of financing of assets of agricultural business entities, own capital prevails with a share of 49-54%. The specific weight of long-term obligations, which are a source of capital investment and expanded reproduction of agricultural production, has been 4-9% over the past few years. Thus, own funds remain the main source of financing economic activity for agribusiness. Despite the presence of problematic aspects, the volume of investment flows into the agricultural sector of Ukraine increased annually and reached 2.5 in 2021 (Fig. 2).

Figure 2. Volume of investments in agriculture of Ukraine



Source: compiled by the authors based on the data of the State Statistics Service of Ukraine

The mathematical model built based on economic and statistical indicators of the activity of agrarian companies is as follows:

$$Y_i = 622,8 + 1,47x_{ij} + 21,44x_{ij} \quad (2)$$

The conclusions of the conducted research were formulated using the methods of abstract specification, generalization, structural-genetic analysis, and synthesis of the obtained results. The graphical visualization method presented part of the results of the conducted study, authors' developments, and recommendations.

In the pre-war period, the average amount of investments per agricultural enterprise in Ukraine per year (excluding extensive agricultural holdings) was about UAH 1,250 million (USD 45,000). In terms of types of economic activity, the amount of investment in agriculture is significantly lower than in other sectors of the economy of Ukraine. The amount of investments in industrial enterprises on average per year is about 5,000 million UAH (178,000 USD), the financial sphere – 1,762,000 UAH (63,000 USD), and enterprises in the transport sector – 2,499,000 UAH (89,200 USD). (State Statistics Service of Ukraine, 2023). Furthermore, over the past ten years, the agricultural business has been the most profitable among all types of economic activity. It maintains stable activity indicators even during the country's martial law, as the farm business's profitability level is 18%.

To assess the level of impact of investments on the sustainable development of enterprises in the agricultural sector of Ukraine, data from the annual financial statements and internal management reports of 93 medium- and small-sized agricultural companies (Shustov Agro LLC, Kirov LLC, Kumary LLC, AF Mayaki LLC, PJSC "Agrofirma "Kolos", SVC "Rodyna" and other agricultural enter-

prises of the Odesa region, LLC “Peremoga” of the Vinnytsia region and others) were analyzed. Giant agricultural holdings were excluded from the selection due to their strong investment potential and high level of inclusive investment activity. The research results showed a relationship between the size of investments and the profitability of agricultural companies with a degree of statistical influence of 64% ($R^2 = 0.64$).

The value of R^2 with a depth of 64% shows that the degree of the actual influence of the size of investment investments on the profitability of agribusiness is average.

Regression components b_1 and b_2 - account for the independent contribution of two main factors to the result of the economic-mathematical model (average size of net profit per enterprise). According to the obtained modeling results, it was found that the influence of the first independent factor b_1 (the amount of capital investment per agricultural enterprise). The value of this coefficient shows that if the amount of capital investment for one agricultural enterprise increases by 1 thousand UAH, the net profit per enterprise will increase by 1.47 thousand UAH. The independent factor b_2 - the size of foreign investments per 1 hectare of arable land - showed a more significant influence on the profitability of agricultural companies. According to the obtained results, with an increase in foreign investments of 1 thousand UAH per hectare of arable land, the net profit of agricultural companies increases by 21.4 thousand UAH. Thus, the assessment of the influence of two independent factors - the amount of capital investment per farm enterprise and the amount of foreign investment per hectare of arable land show that the increase of net investment flows, the object of investment, is more promising, economically profitable and profitable for agricultural companies which are formed by agricultural land. This influence is explained by the fact that capital investments are mainly related to increasing non-current assets (updating agricultural machinery, purchasing agricultural machines, equipment, etc.). Such investments are a material capital part of investments and can bring economic benefits. However, economic benefits and the overall effect of capital investments are formed in the medium and long term and require an appropriate time to be reflected in the financial results of economic activity (the amount of net profit).

The second factor of the economic-mathematical model (b_2 - the amount of investment in 1 ha of arable land) additionally includes current assets. Current assets are quickly transformed into finished products, providing agricultural companies with short-term financial results. In this regard, in the developed economic-mathematical model, factor b_2 was more effective and promising for ensuring the profitability of the agricultural business.

The indicator of the constant b_0 shows the amount of profit an agricultural enterprise can get if both factor characteristics (b_1 , b_2) are zero. According to the results of the model, in the absence of investments and capital investments, agricultural enterprises can remain profitable. However, the amount of profit will be 4.2 times less than if investment investments were made (according to actual calculations of the amount of net profit per agricultural enterprise).

The obtained results confirm the economic feasibility of increasing investments in the agricultural production of Ukraine but also indicate that capital investments and investments are not the only determining factors for ensuring profitable economic activity.

The obtained data confirmed the hypothesis that inclusive investment in agriculture is determined by the long-term deferred effect and does not always provide bonuses for investors in the short term. In addition, the agricultural sector has specific signs of business activity, which are manifested in a long period of asset turnover, prolonged operational and financial cycles, and increased risk of economic activity. The obtained results explain the motives of investors who refuse to invest in agriculture and the development of rural areas in anticipation of urgent short-term benefits, which ensure the investment of funds in non-agricultural types of economic activity.

Conducted studies have shown that the share of capital investments in agribusiness in the structure of economic activities of Ukraine has been relatively constant in recent years and does not exceed 10-11%. Agriculture is not the leader in rating the most investment-attractive types of economic activity. However, it remains a higher priority for investors than the food processing industry. The volume of investment flows in the agricultural sector is characterized by a positive trend of growth,

which at the end of 2021 was 2.5 billion dollars. Moreover, the critical areas of investment flows differ significantly from the priorities of the European investment policy. The construction (reconstruction) of livestock farms and complexes occupies the largest share in the structure of agricultural investment projects of the national economy: in the field of pig breeding – 10.4%, cattle breeding – 21.6%, poultry – 6.3%; priority among plant-growing industries is given to investments in the processing and storage of grain, technical and vegetable crops – 18.9%, about 2% is occupied by investments in the creation of alternative energy sources. In the industry's investment portfolio structure, the maximum share comprises projects whose value does not exceed UAH 10 million – 49.3% (State Statistics Service of Ukraine, 2023). Such investments can create opportunities for improving indicators of sustainable development of agricultural production. However, they are indispensable for ensuring the goals of sustainable development of rural areas and its population (Table 1).

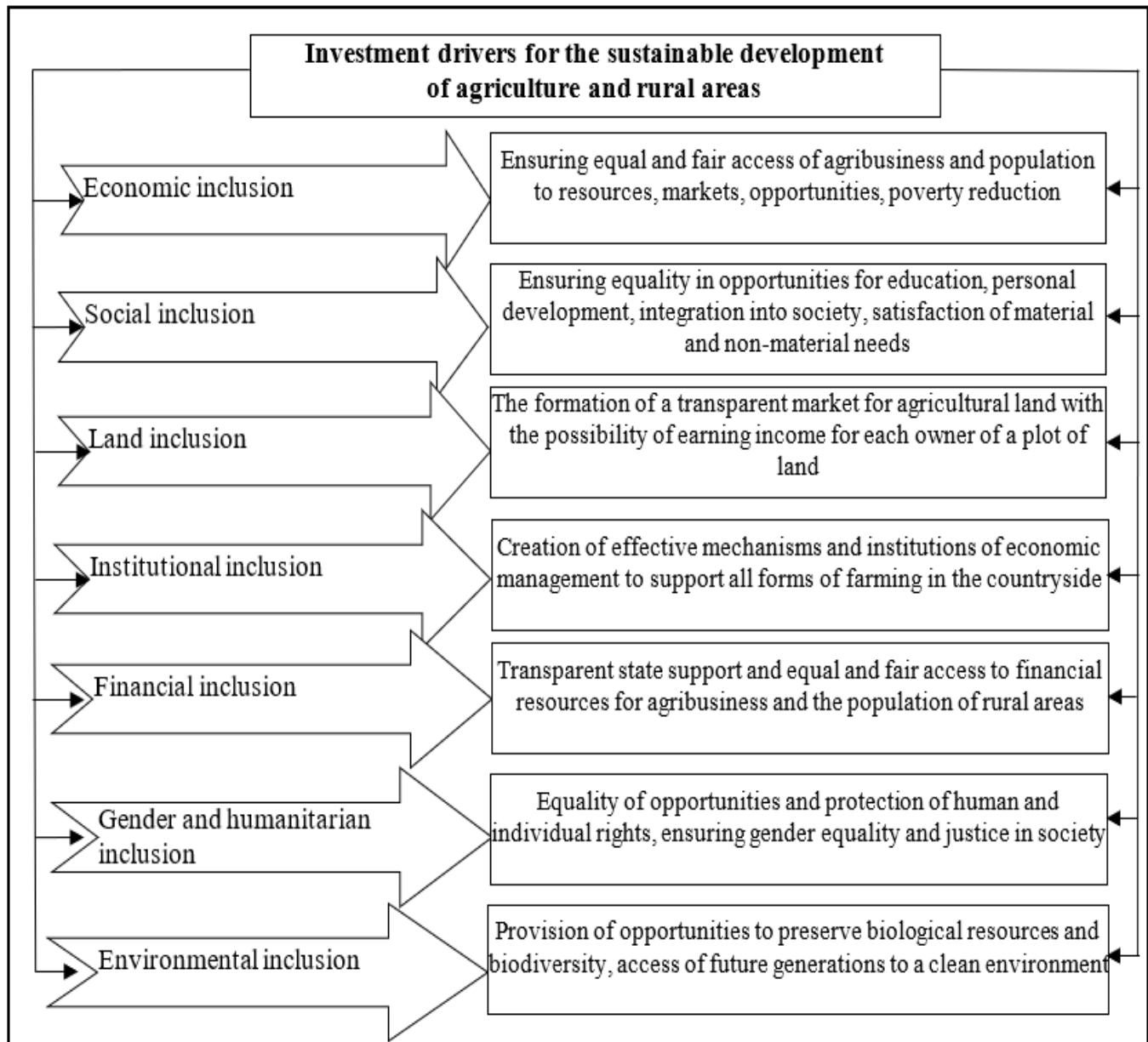
Table 1. Indicators of sustainable development of agriculture in Ukraine

Indicators	2000	2010	2015	2018	2020	2021
<i>Ecological component</i>						
The percentage of ploughing. land, %	77.8	78.1	78.4	79.1	79.5	79.6
The amount of applied mineral fertilizers per 1 ha, kg	60	84	98	134	152	154
Area treated with pesticides, %	28.5	37.7	42.6	89.5	91.4	92.0
Share of the area on which organic products were produced, %	78.0	30.0	19.0	9.0	7.0	7.1
Preservation of biodiversity, thousands of cattle	9423.7	4494.4	3750.3	3332.9	2874.0	2644.0
Emissions of carbon dioxide from the industry, thousand tons	512.0	718.1	1110.4	1174.0	1187.5	1461.8
Share of industry in CO ₂ emissions, %	0.3	0.4	0.8	0.9	1.1	1.3
Share of used water for production needs in rural areas, %	23.6	26.4	20.3	24.5	21.8	22.4
<i>Economic component</i>						
Share of industry GDP, %	8.4	8.2	11.9	10.2	9.3	10.1
Gross value added of the industry, billion US dollars.	5.4	10.4	10.9	13.3	14.4	20.7
Share in total added value in the economy, %	16.3	8.3	14.2	11.9	10.8	12.4
Trade openness, %	8.5	14.3	31.8	33.0	38.3	40.7
Annual amount of capital investments, million US dollars	297.2	1458.8	1380.7	2430.3	1879.8	1754.5
including for the 1st enterprise, thousand US dollars	14.0	25.8	30.4	49.4	39.5	44.6
Yield of grain crops, tons/ha	18.3	27.6	43.8	52.2	46.4	59.3
<i>Social component</i>						
Salary of workers in the industry per month, hryvnias.	114.0	1472	3309	7557	9734	12287
including in % to the average for the economy	49.5	63.9	74.8	80.8	84.0	70.4
The share of persons employed in rural areas production, %	18.6	19.3	17.5	18.0	17.1	17.2
Relative level of rural poverty (by expenditure), %	-	24.1	27.9	31.6	43.8	44.1

Source: calculated by the authors based on the data of the State Statistics Service of Ukraine

The analysis results showed threatening trends in the deterioration of land resources (an ecological component of sustainable development of agriculture in Ukraine) and traditional acute problems of a low quality of life of the population of rural areas (a social part of sustainable development). All this emphasizes the need to increase the flows of inclusive investment in agriculture and rural areas of the country to overcome existing disparities and achieve sustainable development goals. The authors propose the critical drivers of inclusive investments in sustainable development, as it is shown in Fig. 3.

Figure 3. Inclusive drivers of sustainable development of agriculture and rural areas of Ukraine



Source: created by the authors

The study of the current state of investment provision of the agricultural sector and rural areas of Ukraine made it possible to substantiate the critical priorities for the further development of inclusive investment processes: 1) optimization of the capital structure of agrarian business entities in the ratio of borrowed and own capital as 2:1; 2) ensuring equal access of agricultural producers to investment resources, regardless of the size and scope of the business, at a level not less than 200-250 dollars based on 1 ha of cultivated area; 3) increasing the level of transparency and availability of financial and credit infrastructure to cover the needs of farms by at least 65%; 4) increasing the degree of inclusiveness of capital markets, material and technical, and labor resources for small and medium-sized agricultural farms at a level not lower than 100%; 5) creation of inclusive supply chains and creation of additional value in the agricultural and industrial sector for all agricultural producers. According to the calculations of leading Ukrainian scientists, to achieve the inclusive goals of ensuring sustainable development, it is necessary to invest about 97 billion UAH (2.5 billion USD) in the agriculture of Ukraine in the period until 2030 (Malik et al. 2022).

The promising instruments of inclusive investment in the agriculture of Ukraine are:

- 1) food futures. Increasing the availability of futures: one of the most popular financial instruments in global practice, in Ukraine, is ensured by the operation of specialized investment funds

such as WisdomTreeWheat (investment in grain product), Teucrium Cjrn Fund (investment in grain product – corn), WisdomTreeSugar (investment in grain product);

2) use of the services of the corporate investment fund, the First Ukrainian Agrarian Fund, whose action is aimed at facilitating the access of Ukrainian farmers to capital markets and investment resources, as well as providing a wide range of consulting and advisory services in investment activities.

3) corporate bonds. In Ukraine, there is a state-guaranteed mechanism for attracting investment funds by purchasing securities; state debt receipts perform the role of such securities. These are securities issued in dollars, which have the whole level of profitability for investors (6-7%). Today, such a tool is actively used by extensive agricultural holdings.

Land plots are one of the most priority areas of inclusive investment in the agriculture of Ukraine. From July 1, 2022, the agricultural land market began to operate in Ukraine (Law of Ukraine “On Circulation of Agricultural Lands”). Increasing the transparency of investments and preserving the agricultural land fund’s natural and biological potential is the country’s main task for sustainable development. Agricultural land is the most attractive object of investment in the farm business. Today, the cost of 1 hectare of Ukrainian land is much lower than in EU countries – 33 thousand UAH. (about 1000 USD) for 1 ha of land. According to Eurostat, the average cost of 1 hectare of agricultural land in Poland is 11,000 euros, in the Czech Republic – 9,000 euros, and in Romania – 7,000 euros. The average rent for 1 hectare of land in Ukraine is 3.5 thousand UAH (about 100 dollars) (Ministry of Agrarian Policy and Food of Ukraine). From 2024, legal entities will have the right to purchase agricultural land in Ukraine. This forms the prerequisite for attracting significant investment flows to the agricultural sector. Therefore, we believe the only requirement for attracting investments should be their inclusive nature, a high level of responsibility of landowners, and the willingness to invest in inclusive socio-economic and environmental projects. The promising tool for increasing agricultural investments’ inclusiveness and social responsibility should be non-financial reporting, which will reflect the state, directions, and funding volumes of projects aimed at overcoming inclusive gaps within the country’s rural areas.

In recent years, Ukrainian agricultural holdings have been actively participating in the best global practice of socially responsible inclusive investments characterized by solid investment potential. Such companies’ investment areas are environmental protection programs, personnel development, construction of social infrastructure facilities in rural areas, education, science, and charity. Inclusive investments, by their nature, have limited potential for direct economic efficiency and only sometimes ensure business benefits in the short term. Moreover, a distinctive feature of inclusive investments is their ability to contribute to building up agricultural companies’ image capital and obtain long-term bonuses for society and competitive advantages for businesses. Significant difficulties for the agricultural sector of Ukraine at the current stage are the involvement of medium and small rural business companies in the practice of inclusive investment. The lack of financial resources remains the problem of activating the process of inclusive acquisition of small and medium-sized agricultural companies. Financial inclusion should become the basis for ensuring the sustainable development of agriculture and rural areas of Ukraine. Today, specialized digital service platforms, created as a tool to support the global strategy of inclusive, sustainable agriculture, are becoming a priority for increasing the level of access of agricultural business entities to the sources and necessary volumes of investment and credit capital. The specialized Digital crowd-drafting platforms SAI, AcreTrader, Farmtogether, FarmFolio, and Steward credit platforms, which are created based on managing a single system of chains in agriculture and unite donors and recipients of investment and credit resources from around the world, have proven themselves well. The action of investment platforms is implemented within the framework of inclusive development business models, which provide all its participants with equal access to financial resources. Investment platforms allow investors to reduce risk, use practical insurance tools, and provide advisory and consulting assistance to agribusiness in implementing investment projects. The potential of attracting additional investment resources through the digitalization of the financial capital market is the most powerful and one of the most promising today.

The military conflict, which has been going on in Ukraine for the second year, has significantly impacted the country's investment ratings and the ability of agriculture to attract investment resources. The crisis in the geopolitical sphere is supplemented by a set of factors of instability and risk to the business environment, which is the reason for the reduction of the investment potential of the country's agricultural sector. Nevertheless, the negative consequences of the military conflict increase the urgency and need for inclusive investments, which will be necessary to restore the natural and biological potential, and social infrastructure, ensure equal opportunities for the development of the rural population, and improve the quality of life. According to the estimates of scientists at the National Institute of Agrarian Economics, the total need for investments at the first stage of the recovery of the agricultural sector in the post-war period will amount to 72 billion UAH (about 1.9 billion US dollars) (Malik et al. 2022).

6. DISCUSSION

The research results leave specific debatable points concerning the size and impact of the volumes of inclusive investments on the performance of agricultural business structures. The authors will analyze the management reporting of Ukraine's small and medium-sized agricultural companies, excluding extensive agrarian holdings. The substantial investment potential and the number of financial resources of large farming companies, and the active practice of inclusive investments in their practical activities require further scientific research to clarify the nature and timing of the impact of investments in sustainable agriculture on the final financial result. The time of receiving economic and non-economic benefits for agricultural businesses from implementing inclusive investments also requires further research to understand better the motives and incentives of investing in sustainable development. According to the authors, such studies should be differentiated according to the scale and size of agricultural businesses.

7. CONCLUSIONS

The conducted studies showed that increasing investment volumes is necessary to eliminate existing inclusive gaps in agriculture and rural areas of Ukraine and ensure their development based on sustainability. Inclusive investments have significant differences from traditional investments, the main of which are:

- Socio-ecological orientation
- Close connection with the goals of sustainable development of rural business
- Strong potential for generating long-term values and image capital

At the same time, studies have proven that a characteristic feature of inclusive investments is also the lack of guarantees of receiving benefits in the short term and their strategic orientation. Aggregate assets have a more significant impact on the final financial result of agricultural enterprises (the amount of net profit) than capital investments, as part of them. This explains the desire of farming investors to invest in the formation of current assets, which provides more opportunities for accelerating the rate of capital turnover and returning investments in the form of profit in the short term. As a result of the time-delayed economic effect, the aggregate share of capital investments in Ukrainian agribusiness in recent years is at most 11%. At the same time, the dynamics of investing in the agricultural sector and rural areas of Ukraine showed that agrarian business is an attractive field for investors from the point of view of business profitability. The volume of investment in the industry is growing annually, and in 2021 amounted to 2.5 billion dollars. The most attractive and promising for investors in the Ukrainian agricultural sector are the poultry industry, processing and storage of grain, technical and vegetable crops, and the creation of alternative energy sources.

At the same time, agriculture is significantly inferior to other industries in the rating of investment attractiveness for domestic investors. One of the reasons is the perennial problems of the development of rural areas, which require significant amounts of investment in the social and environmental sphere, which can be afforded mainly by extensive agricultural holdings at this stage. Inclusive investments are closely related to the ability of farming companies to increase the level of business sustainability. According to indicators of sustainable development, the results show that Ukrainian agriculture has significant problems in terms of all three components of sustainable development: economic, social, and environmental. The most threatening trends are

defined as:

- The state of land use in Ukraine.
- Preservation of biodiversity.
- Social inclusion gaps in the income and poverty level of the rural population compared to the urban population.

As the calculations showed, the main problems of the sustainable development of rural areas of Ukraine remain a high level of plowing of agricultural land, high rates of loss of biodiversity, and poverty of the rural population. The article substantiated the critical drivers of investment, which groups classified according to the vision of inclusion: economic, social, land inclusion, institutional, financial, gender-cultural, and environmental inclusion to solve the issue of attracting inclusive agricultural investments. According to Ukrainian experts, the country's farm sector and rural areas have the potential for high recovery rates in the post-war period. However, ensuring such a recovery at the expense of attracting investment funds for about 72 billion dollars is possible.

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THE TRAUMATIC EXPERIENCE OF THE MARIUPOL CIVILIANS' FORCED MIGRATION AND ADAPTATION ABROAD IN 2022

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Received 14.03.2023.

| Send to review 25.03.2023.

| Accepted 17.07.2023.

Original Article



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JEL Classification:

J610, J11

Doi: 10.61432/CPNE0101089t

UDK: 314.15-024.64:355.1-058.65

ABSTRACT

The article presents the interim results of the “Mariupol: past, present, future” research project, which is being conducted by the author since May 2022. The objective is to investigate the problems of social adjustment and integration of civilian residents of Mariupol who were forced to go abroad due to the war in Ukraine and the occupation of Mariupol. The article analyzes the socioeconomic aspects of the forced migration of military migrants abroad and their adaptation in the host communities. Special attention is paid to the analysis of the impact of the traumatic experience of war and evacuation on the successful adaptation of Mariupol civilians in the country of their temporary stay. Qualitative methods of sociological research, analysis of statistical data and documents related to the problem of forced migration and adaptation of Mariupol citizens abroad are used to collect data. The collected empirical material made it possible to clarify and supplement the information about the previous period of the sociological analysis of the society of the city of Mariupol during the war, in particular, evacuation experience, going through the “filtering” procedure of Mariupol civilians, evacuation from the occupied city. Special attention is paid to such issues as the experience of evacuation during this period after a long stay in the occupied city (evacuation in April-September 2022), the experience of internal displacement on the territory of Ukraine and forced migration to different countries of the world; as well as the views of Mariupol residents on their immediate and/or distant future.

Keywords: *civil residents, evacuation, forced migration, involuntary displacement, problems of adaptation, social adjustments of migrants, traumatic experience, war in Ukraine*

1. INTRODUCTION

The full-scale military invasion of the Russian Federation in Ukraine, the constant danger to life and health, the siege and occupation of Ukrainian cities, the energy crisis, the desire to ensure safe conditions for children to study and develop - all this forced millions of Ukrainians to leave their city of residence and seek shelter abroad. Refugees from Ukraine recorded across Europe - 8,173,211 people. Refugees from Ukraine registered for Temporary Protection or similar national protection schemes in Europe - 5,008,482 people (UNHCR, 2023). One of the Ukrainian cities that suffered the most during the full-scale military invasion of the Russian Federation in Ukraine is Mariupol, a large industrial city in the south of Donetsk Oblast. According to the State Statistics Service of Ukraine, the population of the city of Mariupol (Donetsk region) was 425,681 (as of January 1, 2022). Since the beginning of the armed conflict in Donetsk and Luhansk Oblasts in 2014, Mariupol has become the most important strategic point, the object of contact between the opposing sides. With the deterioration of the situation in Donetsk and Luhansk Oblasts and with the beginning of the armed conflict escalation, residents of the temporarily occupied territories began to move to

Mariupol. In 2019, 97,058 people were officially registered as internally displaced persons (IDPs) in the city of Mariupol, most of them being women with children and elderly people. According to the Office for Emergency Situations Victims Social Protection of the Ministry of Social Policy of Ukraine, the number of internally displaced persons in Mariupol who were registered was the following: in 2015 – 91,030 people, in 2016 – 105,288, in 2017 – 95,964, in 2018 – 99,967, and in 2019 - 97,058 people correspondingly.

On 24 February 2022, the Russian Federation launched a large-scale military invasion in Ukraine, announcing the so-called «special military operation» in Ukraine. Very quickly, the city of Mariupol found itself amidst constant shelling and on the verge of a humanitarian catastrophe. At the beginning of the war, the exit from the city was blocked. Chances for evacuation by private transport arose in mid-March, but at Mariupol residents' own risk, as the «green corridors» did not work officially due to the occupiers blocking all attempts of the Ukrainian authorities to open humanitarian and evacuation corridors. Only those civilian residents of Mariupol had the opportunity to evacuate who possessed surviving personal transport, a supply of fuel or dared to leave the city on foot. In May 2022, the city was completely occupied. According to the Mariupol City Council, since the beginning of the full-scale military invasion of Russia on the territory of Ukraine, the number of residents of the Mariupol has decreased fivefold. At the moment, it is not possible to establish the real number of Mariupol residents who died during active hostilities and during the occupation, those left the city of Mariupol or remained there. It is worth noting that at the time of writing this article, it was not possible to obtain real statistical data on the population of the city of Mariupol, due to the fact that the city is under occupation, and the Ukrainian authorities do not have access to this information. As mentioned above, Mariupol was blocked and surrounded since the first days of the full-scale military invasion of Russia, and the civilians of Mariupol did not have the opportunity to leave the city.

With the help of qualitative methods of collecting sociological information, the ways of evacuation of Mariupol civilians from the surrounded and occupied city were determined. The experience of leaving Mariupol was traumatic. But after the civilians of Mariupol who survived the blockade left the occupied and destroyed Mariupol, they are forced to face a new problem – adaptation and integration in a new place of residence abroad.

The problems of forced migration are not a new phenomenon for the modern world in the global perspective. [Maggie O'Neill and Tony Spybey \(2003\)](#) note that forced migration can be caused by wars, ethnic cleansing, environmental disasters, political conflicts, and so on. Scientific publications analyze the consequences of evacuation and migration, in particular, cognitive, emotional and personal consequences of a natural disaster, and the impact of evacuation ([Knez et al., 2021](#)); a comparative analysis of psychological trauma experienced by children and young adults in two scenarios: evacuation after a natural disaster vs forced migration to escape armed conflict ([Myles et al. 2018](#)). At the international level, data on forced migration are collected and/or compiled by various intergovernmental organizations (IGOs), such as the Office of the United Nations High Commissioner for Refugees ([UNHCR, 2023](#)) and the International Organization for Migration (IOM), as well as non-governmental organizations (NGOs), such as the Internal Displacement Monitoring Centre (IDMC). According to IOM, forced migration is “a migratory movement which, although the drivers can be diverse, involves force, compulsion, or coercion”. According to UNHCR, the number of forcibly displaced people both within countries and across borders as a result of persecution, conflict, generalized violence, human rights violations or events seriously disturbing public order has nearly doubled in the last 10 years; there were 41 million forcibly displaced people as of the end of 2010, and the figure was 78.5 million by the end of 2020 ([UNHCR, 2023](#)).

At the end of 2021, the total number of people worldwide who were forced to flee their homes due to conflicts, violence, fear of persecution and human rights violations was 89.3 million. This is more than double the 42.7 million people who remained forcibly displaced a decade ago and the most since World War II. This represents the highest number available on record ([UNHCR, 2023](#)).

After February 24, 2022, with the beginning of a full-scale military invasion of Russia on the territory of Ukraine, Ukrainians were forced to leave their homes and change their place of residence. Mass internal and external migration processes have become relevant, namely: migration abroad (more

than 8 million people, as of March 28, 2023), internal displacement within the country, and illegal deportation of Ukrainian citizens to the Russian Federation. According to the data of the analytical study of the National Institute of Strategic Studies, the volume of migration exceeds all indicators for the period of Ukraine's independence since 1991. The demographic situation in Ukraine during 2022 is rapidly changing, both quantitatively and qualitatively. These changes affect the socio-economic sphere, the country's defense capability, its positioning in the world and lead to consequences that will affect Ukrainian realities in the short- and long-term perspectives (Potapenko et al., 2023). The problems and condition of Ukrainian forced migrants are also a subject for modern research. In particular, in the article «Immediate physical needs of refugees during the Ukrainian armed conflict of 2022» (Roitblat et al., 2022) the authors investigate the physical needs of Ukrainian refugees and internally displaced persons during the ongoing Ukrainian armed conflict of 2022. According to the results of the conducted research, during an armed conflict, even healthy refugees, IDPs, and regular inhabitants of a country are affected somatically but to varying degrees. For refugees, group-organized travel abroad with a known outcome is the best option. The second good strategy is to remain an internal refugee/internally displaced person. The most difficult from physical status point of view strategy is to travel abroad independently on an individual/family basis (Roitblat et al., 2022). Regarding the socio-economic consequences of the evacuation and forced migration of war refugees, then forced migration has potential consequences for host populations, migrants themselves, and for the populations at origin (Becker, Ferrara, 2019). Let's consider the impact of the experience of a long stay in the blockade and shelling, complicated evacuation on the adaptation of refugees abroad on the example of residents of the city of Mariupol. There are no statistics on the number of Mariupol residents who are currently abroad. This number approximately varies from 100 to 150 thousand people. Besides, the location of military migrants is a dynamic process, because for various reasons, both the city and the country of temporary stay can change; someone temporarily stays in the country until they receive a visa to other countries, such as Canada or the United Kingdom; someone returns to the territories controlled by Ukraine; someone returns to occupied Mariupol.

At the same time, in terms of the problem under study, it is important to dwell on the issue of social adjustment and integration of Ukrainian forced military migrants who have a traumatic experience of war, survival inside a blocked city, evacuation and moving abroad.

2. MATERIALS AND METHODS

Research project: «Mariupol in Past, Present and Future» is an interdisciplinary study. Formation of the archive of stories of survival surrounded by civilians of Mariupol began in April 2022 and continues now. Qualitative methods were used during the collection of information and the formation of an archive of the stories of civilians of Mariupol, which made it possible to record and preserve the real stories of people, to reproduce the chronology of events during the war, occupation, evacuation and migration abroad, as well as to analyze the life strategies and socio-economic problems of civilians of Mariupol. For the researcher those social meanings were the most significant ones, which could be recognized and interpreted due to the use of qualitative methods of social reality research. Qualitative methods have long been used in sociological and socio-economic research of social reality. Most often, within the framework of combined strategies, that is, a combination of qualitative and quantitative approaches. At the same time, qualitative methods are used at the exploratory stage of the research. But, in some cases, the independent use of qualitative methods for a more detailed and in-depth analysis and understanding of the essence of the problem, studying the unique or traumatic experience of a person who has experienced a crisis or stressful event is justified. In the «Qualitative research in sociological practices» (Kostenko, Skokova, et al., 2009, 2017) thesis by Ukrainian sociologists of the Institute of Sociology of the National Academy of Sciences of Ukraine, general methodological and methodical problems of qualitative research, problems of using computer methods of qualitative data analysis are considered, as well as the application of qualitative research in various spheres of life, including social conflicts, labor migration, economic morality, the history of everyday life of townspeople during the war, analyzes the use of the biographical method in the study of traumatic experience in her scientific works.

Using the technologies of qualitative research of the experience of people who survived the traumatic experience of war, occupation, and migration during the Second World War by representatives of the Polish sociological school was important for this study. In particular, Research in which diaries commissioned by researchers being the source of knowledge, are an original contribution of Polish sociology to the methods of social research. Analyzed the Polish tradition of diary studies - the diaries of the unemployed, peasants and emigrants, etc. The projects of Polish researchers dedicated to the study of the war traumatic experience through memories, war memoirs, correspondence, oral histories of war, prisoners, residents of occupied territories, testimonies of refugees and migrants are of high interest (Libich, Sadzik, 2022). Qualitative methods are also used to study the state of modern problems, for example, the collective work of Polish scientists named «Pandemic Diaries», created on the basis of materials collected as part of a diary contest. More than 400 people participated in this contest. They described their experiences during the first months of the coronavirus pandemic (Głowacka et al., 2022). Another example of holding a diary competition to collect and analyze people's life stories is «Diaries of LGBT». This work publishes the texts sent to the competition in 2020 conducted by the Laboratory for the Research of History and Identity of LGBT+ at the Institute of Applied Social Sciences of the University of Warsaw in cooperation with the Adam Mickiewicz Henryk Böll Foundation in Warsaw. The diaries reveal the variety and diversity of individual experiences as well as the common challenges faced by LGBT+ people in Poland (Bednarek et al., 2021).

On the basis of this experience, of the methods of my research was chosen - electronic diaries, in-depth unstructured interviews and documents analysis (photo, audio, video documents) that contain testimonies of the war. It was the qualitative methods of collecting sociological information that made it possible to collect and preserve the real life stories of Mariupol civilians who experienced terrible events during the complete blockade and occupation of Mariupol.

As of March 2023 Mariupol in Past, Present and Future» Database Research project includes the following:

- more 2 thousand life stories of Mariupol citizens published in various open sources (films, photo-video documents, magazines, special sites, social networks, etc., including those published on the website «Collection of the Online Museum of Civillian Voices» (1.04.2022 – u.n.). The «Voices of the Civilians Museum» project of the «Rinat Akhmetov Foundation» charity organization is a collection of stories of civilians, how they were affected by Russia's war against Ukraine. Stories have been collected since 2014. All stories posted in the Voices of the Civilians Museum were told by their authors in the first person and are the opinion and experience of a specific narrator. These stories were collected and published with their authors' permission. As of March 2023, the project archive collected 66,044 real life stories of civilians, including the civilians' stories from Mariupol (Collection of the Online Museum of Civillian Voices, 2014-2023);
- 40 E-Diary of Mariupolite during the War (May-June 2022);
- 120 in-depth interviews with Mariupol residents (September 2022 - March 2023). Including 70 in-depth interviews with Mariupol residents who were abroad at the time of participation in the study;
- 9 Diaries of volunteer students from Mariupol: war memories and experience of volunteer work (January 2023).

To collect information, two contests for electronic diaries of Mariupol citizens were held: in May 2022 and January 2023. The sample included respondents who have different experience of evacuation from the city of Mariupol and different durations of stay in the blockade and occupation. This made it possible to collect various life stories of Mariupol civilians. Among the collected stories is also the story of internally displaced persons in 2014 due to Russia's military invasion of the territory of Ukraine and the occupation of some part of the Ukrainian territory. During the interview, one of the respondents shared that: «My son, parents and I are doubly displaced persons. In 2014, we left our native Donetsk, then we had been living in Mariupol for 8 years, and now our unchanged team has arrived in Dnipro. The family is proven by time and all hardships» (R59, 45 y.o., female).

Basing on the analysis of research materials, a chronology of events in the city was reproduced starting from February 2022. The collected material was structured according to the following thematic blocks: 1. Life before the war (including the experience of internally displaced people in 2014). 2. Day of the beginning of the war. 3. The first days of the war until the complete blockade of the city. 4. The blockade. Humanitarian catastrophe. Survival under constant shelling. 5. Life experience in the occupation. 6. Evacuation experience. Filtration. 7. Integration into new host communities in Ukraine and abroad. 8. Social assistance and social support for Mariupol residents in Ukraine and abroad. 9. Thinking about the future.

Within this article, we will consider in more detail the experience of evacuation from the surrounded and occupied city of Mariupol, the experience of forced migration abroad and the problems of adaptation of forced migrants in their host communities. Special attention will be paid to the socio-economic problems of forced migrants who have a traumatic experience of war. It is worth noting that the sample included respondents who at the time of the interview were in 17 different countries, in particular, more than half of them were in Germany or Poland. Interviews were mainly conducted with women aged 18 to 75.

3.RESULTS AND DISCUSSION.

Migration is a familiar process for the modern development of society and has its own distinctive features related to the availability of information, globalization and relatively easy decision-making on migration (Maciej St. Zięba, 2006). Forced migration occurs when human living conditions change dramatically and there are threats to life and health associated either with conflicts or with natural disasters. In general, the migration process is traumatic for the individual. After all, a person has to live in a new environment, adapt to a different economic and socio-political structure, get used to a new mindset, and learn to fulfil their potential in other professions. Interesting are studies that show that a significant risk for migrants is a decrease in social status, especially for professionals, people with higher education. In this case, the migrant can choose an educational direction in order to increase his chances of obtaining a professional job in the host community in the future and gradually increase his status (Abdullov I. et al., 2020). The issue of ensuring the official employment of migrants, participation in the tax system, which allows, if necessary, to use the services of the social security system, including the pension system of the host country, is especially relevant. (Mastilo Z., 2019). All these socio-economic issues are extremely important for migrants, and are especially intensified for forced migrants from the zone of active hostilities. This situation is further complicated by the fact that the person was not ready to move in advance. Besides, during the move (evacuation from cities of active military operations and occupation), the person was repeatedly in crisis situations that were accompanied by risks to life and health. Such a person may evacuate without documents, without savings and necessary possessions and in a grave psychological and emotional state. As one of the respondents noted, «there was only one desire – to run as far as possible from the horror that was happening in Mariupol. I relaxed a little only when my child I were in a foreign country, but as far away from Mariupol as possible» (A38).

The reception of forced migrants due to war is a familiar phenomenon for the European Community. But now, with the war in Ukraine and a large number of Ukrainian forced migrants, the reasons for forced migration are the same, but the characteristics of the migrants themselves are different. According to the data of the online survey of Ukrainian forced migrants by Info Sapiens, presented in the information and analytical report of the Razumkov Center (Kyiv, Ukraine), the vast majority of Ukrainian forced migrants in EU countries are women with higher (93%) or unfinished higher education (83%). The average age of refugees is 36.9 years. The majority of refugees are skilled workers (36%), specialists in technical/humanitarian profiles, natural sciences (18%), entrepreneurs (15%) and heads of enterprises/institutions/departments (11%), housewives (12%) and pupils/students (10%). The most common fields of activity are education (13%), accounting and finance (10%), wholesale and retail trade (9%), IT (7%), marketing/management/medicine (6% each). 88% of refugees crossed the border with close people: children under 18 (63%) and parents (21%) (Filyak, 2022).

This significantly changes the perception of a military migrant refugee amongst the host communities of European countries. But, at the same time, it is worth paying attention to the region from which the forced migrant originates and the degree of their psychological trauma, which certainly affects the level of adaptation and integration in the host country.

In the context of military aggression and war on the territory of Ukraine, and resulting huge flow of refugees, the Council of Europe and the European Union demonstrated their desire to adhere to international standards for the protection of human rights and freedoms and respect for Ukraine and Ukrainian forced migrants.

From 24 February 2022 till the present time, several waves of migration can be distinguished. It is noteworthy that it was in the first waves of migration that the greatest assistance was provided to Ukrainian forced migrants both on the way to their destination, and in terms of providing free housing and humanitarian aid. Later, assistance to Ukrainian forced migrants changed significantly and became more systematic and institutional. European governments continue to support Ukrainian forced migrants and declare preparations for new waves of migration due to the deterioration of the situation in Ukraine arising under military operations, energy and humanitarian crisis.

Let us dwell on the specifics of the forced migration of Mariupol residents from the area of war and occupation. In order to understand the specifics of the forced migration of civilians from Mariupol, it is worth first stating certain facts. On 24th February 2022 the Russian Federation began the large scale military invasion on Ukraine. According to the testimonies of Mariupol residents, from February 26-27, it was impossible for Mariupol civilians to leave the city. The city of Mariupol was surrounded. Gradually the whole city was deprived of all supply of water, electricity, heating, gas, internet and means of transportation. A humanitarian disaster in the city. On 14th/15th March the evacuation of Mariupol started and 30 000 people left but only with the help of private transportation. The defense of the hero city Mariupol lasted for 86 days, 82 of which it was completely surrounded. The exact number of victims is still unknown. The city that used to be called - Marys City, the Showpiece of the Donetsk Region, the Cultural and Tourist Hub of the Azov Region, and a City for People has been turned into a ghost town. During May 16-20, 2022, the defenders of the city came out of the shelter at «Azovstal». The city of Mariupol is occupied. December 2022 - about 120,000-150,000 Mariupol civilians live in the city. At the time of writing, the city of Mariupol is temporarily occupied (Tashkinova, 2021). Thus, the civilian residents of Mariupol have the experience of war and being in the epicenter of hostilities, being surrounded and blockaded, they know well what hunger, losses, constant stress and trauma, not only physical, but also psychological, are.

At the beginning of the full-scale invasion, the majority of Mariupol civilians did not plan to leave the city, because on the morning of February 24, 2022, missile strikes were launched across the territory of Ukraine, panic and chaos began and, according to Mariupol residents, they decided to stay in the city for a while and to see how the situation will develop further. The local authorities assured the residents of the city through mass media that the city is protected and the situation is under control. But after a few days it was impossible to leave the city. Civilians from Mariupol made attempts to leave the city, but in majority such attempts were unsuccessful, as evidenced by interviews and diaries of Mariupol residents. First successful attempts to leave the city of Mariupol were March 5 and after March 13-15. But the official «green corridors» for the departure of civilian residents of the city were never provided. Columns of private cars leaving the city were constantly fired upon by the enemy. In such a situation, it was very difficult for a person to make a decision to leave the city. It is worth paying attention to the fact that people were out of touch and had no information about what was happening outside the city. Many people said that while experiencing all the horrors in Mariupol, people were sure that the same thing was happening all over the territory of Ukraine. That is why they continued to stay in shelters. According to the respondents during the interview: «... I understood that I had to leave. But I understand people who don't leave there. I understand, because it is very difficult to leave the house when it all hurts, you do not understand what will happen next. This is to leave the house, which seems to be still intact, you want to go home, you are drawn there and long to stay there. Well, I think it's stress that affects this condition a lot, so it's hard for people to get out of there. To make that decision and leave. That's why. Those who have small chil-

dren leave just because of the children. Whether you want it or not, you have to leave. But as for the older generation or those who do not have children, I understand them, I understand why they stay there» (A38).

Evacuation experience. Evacuation routes were diverse and depended on many factors: on the area of the city residence, on the car and fuel supply, on the possibility of receiving a phone message from the authorities with the evacuation route. People tried to save themselves and looked for any opportunity to leave the city. Some of the Mariupol civilians decided to stay in the city. They feared for their lives and decided not to leave the city. For those who decided to take a risk and leave, the most important value was the undamaged car and fuel.

People hoped for safe «green corridors», but they were never provided due to constant shelling by the enemy. The people of Mariupol remained blocked in the city. «We were waiting all the time for the humanitarian corridor, but it was not there» (829, male, «Voices of the Civilians»). Periodically, some civilians tried to leave the besieged city, but these attempts were unsuccessful. According a woman, «they shelled a column of cars going to the evacuation near our house» (1610, woman, Collection of the Online Museum of Civillian Voices, 2023).

According to a resident of Mariupol who managed to leave the city on March 5 with his family, a friend of his, whom he met outside, told him about the possibility of leaving. There was no connection. «He told me that a convoy will be organized to leave Mariupol. Evacuation. Even then, I doubted whether I should go or not. There was no connection, no electricity either. The day before, several mines had exploded near our house and damaged the gas pipeline. Before leaving, I tried to organize the neighbors. (...) We had 40 minutes to get ready. There was still room in our car. I offered it to a neighbor with a child. (...) It was a very difficult trip. We stood in the field. The temperature dropped to 10 degrees below zero. We reached the turn to the village of Donetsk region, and there was a gang, people in camouflage. They said: «We don't know anything. We are from the «DPR» and we were told not to let men under 60 go» (...). With great difficulty, the man managed to get his family out of the besieged city. (2085, male, Collection of the Online Museum of Civillian Voices, 2023).

The first sporadical mass departures from the city took place on March 13-15. According to a woman from Mariupol, on March 13, a small car convoy left the city of Mariupol. «People gathered and decided to leave the city. On March 14, there was a gathering near the Drama Theater. Our men went there. They returned after 10 minutes and said that a decision had been made to organize a convoy and leave. Someone was able to contact the convoy that left on March 13th. There were about 25-30 cars there. And they said that they had reached Berdyansk. And we were told that we have two hours for the meeting... (cries).... I said that I will not go anywhere, because I have a mother and grandmother. But my brother and I could not go to them, because the area was heavily shelled. There were extensive street fights. Everything was on fire. I didn't know how to leave, I had no contact with my relatives. But we were persuaded to leave. (...) There were about 100 cars. We stood near the Drama Theater from 12.00 to 12.30. People came for information. (...) In total, about 120 cars left. We went to the sea, across the embankment and further through the village of Sailors. We drove up to Primorskyi region. The road was very scary. People saw cars driving past them. Women, children, old people came out. They started asking to take them away. Cars drove slowly. People immediately got into these cars and drove with us. Some just stood and watched. Someone was just asking people to take their children (cries). It was scary. Then we went to Mangush. And then there were checkpoints» (2094, woman, Collection of the Online Museum of Civillian Voices, 2023).

The evacuation route in the direction of the territory controlled by Ukraine passed through the temporarily occupied territory, further to Vasylivka. Then departure to Zaporizhzhia took place. This category of interviewees testifies to the fact that they traveled «at their own peril and risk» and had absolutely no idea what awaited them next. «...it was very scary to pass all the occupiers' checkpoints with the column of cars being fired upon by the Rushistss» (P8, 33 y.o., female). According to a woman from Mariupol who moved to the territory of Ukraine with her family, they learned about the possibility of leaving from their friends and decided to take the risk. Their evacuation route was through the crossing point in the village of Vasylivka and further into the territory controlled by Ukraine: «We cooked food outdoors. There was nowhere to get food from, we only had what was at

home. We wanted to leave right away, but we don't have our own car. I hoped that there would be an evacuation, but it did not take place. And then on March 16, my husband's employee stopped by and said that there is an opportunity to leave, we have 15 minutes to get packed. We grabbed what we could, took the children and left. Of course, everyone was in shock, especially our children were stressed out. We didn't let the children out all this time, they sat in the house all day. We are lucky. Word of mouth worked: someone said that people were starting to leave, and we grabbed everything and left, thanks to my husband's colleague. And I don't know, maybe otherwise we wouldn't have been alive anymore. We were driving in a column, car after car. The column was very large, we spent the night in the village, because in Vasylivka the Russians did not let us go any further. They stopped us and told us to spend the night in the field. But it was not possible to turn on the lanterns or light a fire. Good people in the village sheltered us, fed us, and the next morning we drove on through Vasylivka to the Dnipro» (333, woman, Collection of the Online Museum of Civilian Voices, 2023).

In March, it was possible to leave the territory controlled by Ukraine through the occupied Berdyansk. Those who had the opportunity to leave this way, during the interview, talked about the difficulties that arose when leaving further to the territory controlled by Ukraine. «When my whole family and I drove from Mariupol to Berdyansk in our car, only there we managed to get a connection and see all the necessary evacuation details. After that, it was decided to go to the Netherlands. Our journey took nine days.» (P14, 18 y.o., female). The residents of Mariupol said that once they were in the occupied territory, they had no opportunity to quickly leave for the territory of Ukraine. «There were many difficulties, leaving the occupied territories was especially difficult. It was very hard to find transport from the Nikolske village (as the occupiers called it: «Volodarskoye») to Berdyansk. The carriers charged a very high price (from UAH 2,000 to UAH 15,000 per person), but we were lucky to find a person who charged us UAH 500 per person (there were four of us). It was also difficult to find humanitarian transport that takes people to Zaporizhzhia. Due to the lack of communication and information, we had been waiting for a week for any news about transport. We decided to act radically and went on foot to wait for the promised humanitarian buses at the «roundabout» where they were supposed to arrive. We had been waiting for 8 hours on the highway, but no buses ever came. The occupiers ordered us to spend the night in the premises at the gas station, I'll be honest: it was a pretty tiny room in which more than 300 people were crammed. An hour later, we received information that the local authorities from the village of Troyany found out about us. We were taken by bus to the school, where we had been staying for 5 days. After that, we finally got into the humanitarian buses that took us to Zaporizhzhia. It was there that we got on the train and went to visit our friends in the Ivano-Frankivsk region « (P73, female, 19 y.o.).

«Our path to the Dnipro was difficult and consisted of 2 stages. The transfer from Mariupol to Berdyansk was about 20 hours, a huge queue of 1000 cars, Russian roadblocks, checks men for tattoos, phone contents, etc. In the city of Berdyansk, we encountered a lack of gasoline from the word «at all». It could be found at some dealers for 300 hryvnias per liter. We spent the next 10 days trying to find fuel at a lower price and move further out not to stay in the occupied territory any more. And so the journey from Berdyansk to Zaporizhzhia took us about 6 hours: 12 checkpoints: «Kadyrovtsi» together with the DPR and the local collaborators checked cars, documents and people even more thoroughly than when leaving Mariupol. They undressed our son, checked his phone. We were lucky that on that day we finally got to Zaporizhzhia! And in 2 hours we arrived in Dnipro» (No. R-59, 45 y.o., female). On the way to evacuation, Mariupol residents also faced the problems of lack of temporary housing and high prices at the local stores. «When I left for Urzuf on April 2, 2022, it was very difficult to find housing, very difficult. We (8 people) had to live in a 2-room hut, which was not heated at all. It was simply impossible to withdraw funds, as there was only 1 person in Mangush who exchanged funds at 20% from the bankcards. Shops were open, but it was very expensive there» (P70, female, 19 y.o.).

During the evacuation, Mariupol civilians were in constant danger due to continuous shelling, provocations and inspections. Evacuation convoys of Mariupol civilians came under fire. «We stayed in Mariupol for a long time, and on March 24, my colleague was supposed to leave the city, but we needed to find a canister of gasoline. Fortunately, we found it. Our convoy consisted of ten cars.

People had a newborn baby, so it was necessary to somehow agree that there would be at least some kind of "corridor". We left on March 24 at about eleven o'clock, and when we crossed the exit border from Mariupol in the direction of Melekine, shelling began from the sea. Our convoy came under fire. A man and a dog died. People ran out of the cars, lay down on the roadside, and the shelling continued" (344, man, Collection of the Online Museum of Civillian Voices, 2023). From the story of another Mariupol woman, we found out that she and her family dared to leave on March 15: "(...) we had a young organizer who gathered all those whose cars were not damaged, and we went in a convoy of 12 cars. But our car broke down and we fell behind. When my husband repaired our car, we lined with another convoy, but did not get to Zaporizhzhia that day - we spent the night right on the highway near Vasylivka. Then we got to the Dnipro and spent the night with friends. During the trip, many horrors were saw. A car blew up in front of us, but everyone drove by, not paying attention to it. Further on the way, another car blew up on a minivan. It was very scary" (374, woman, Collection of the Online Museum of Civillian Voices, 2023). A woman who always lived in the basement with her relatives and went outside only to prepare food on a fire says that due to constant shelling, they decided to leave the city at "their own risk and fear." During the departure, they saw many killed, how people were digging graves for their dead loved ones. He says that they still reached Zaporizhzhia normally, but the convoy that was following them was shelled upon from "Grad". (840, woman, Collection of the Online Museum of Civillian Voices, 2023).

On the way to evacuation, the civilians of Mariupol faced not only constant danger due to shelling, the need to drive along an unknown mined road, but also constant inspections by the occupiers: «(...) we faced some difficulties while driving the car to the exit from Mariupol, we were repeatedly fired upon, and then our journey was very delayed due to the fact that we had to go through many checks due to the fact that my father had just recently turned 60 y.o. and he was suspected of connections with the Azov. In the end, it took us two weeks to get all the way to Germany.» (P15, 18 y.o., female). «They searched our car, things, stripped the man. It was very creepy. But it was not possible to do anything» (P21, female, 25). «I was in Mariupol from February 24, 2022, for almost 20 days, and after the morning explosion in the Drama Theater, on March 16, I left with my family to the city of Berdyansk, Zaporizhzhia region, as the starting point» (P-59,45, female). «I could not evacuate from the city during hostilities, it was not possible. Therefore, I left the (occupied) city on my own (with the support of relatives living abroad) in the end of June 2022» (No. P-2, 22 y.o., female).

A Mariupol woman, who was one of the organizers of the Mariupol citizens convoy formation to leave the city on March 15, said that the evacuation was very dangerous. There were constant checks of both possessions and phones: "I deleted everything possible from the phone. They (Russian soldiers at the checkpoints) checked the photos in the phones. I had many photos from occupied Mariupol. Our car was the first, they checked it and let us go. But I saw in the mirror that my brother's car had been stopped. They found Ukrainian groups and photos in my brother's phone. And they started clinging to my brother. (...) I had hysteria and started begging, crying. We began to negotiate with them to let my brother go. (...) The senior in rank arrived. He checked my brother and then released" (2094, woman, Collection of the Online Museum of Civillian Voices, 2023).

According to the residents of Mariupol, the occupiers introduced a filtering procedure for those civilians who wanted to leave the city of Mariupol. This special check was a very stressful moment for people. It included checking documents, questioning and establishing the person's contacts and connections with the Armed Forces of Ukraine.

According to the residents of Mariupol, the only way to leave the city was a surviving car. «We exchanged food for gasoline to leave the city» (887, woman, Collection of the Online Museum of Civillian Voices, 2023). Residents of Mariupol talked about the fact that some of them had to pay money for the opportunity to leave the city. «20 thousand hryvnias per person to leave Mariupol» (1200, woman, Collection of the Online Museum of Civillian Voices, 2023). «The difficulties were that the transport did not go from Mariupol at all. Only after private carriers started working, I had to pay money to leave. And for those who did not have money, it was impossible at all» (note: she left in July 2022) (R-3, female, 54 y.o.). There was also mutual help and support of Mariupol residents: «I was in the city until April 10. I left with my neighbors by their car» (R 6, female, 21 y.o.).

There are known cases when relatives or close people organized evacuation trips to the city of Mariupol in order to take out their relatives. The practice of volunteer trips to evacuate Mariupol civilians from the besieged city was also widespread. People who did not have their own car were forced to leave the city on foot. According to a woman from Mariupol who was walking out of the city of Mariupol: «We didn't have a car. We were waiting for evacuation and went to the Drama Theater every day, waited for the buses to come. We had such a hope. Then, when the city began to be shelled from fighter jets, we realized that there would be no salvation. You have to survive. Then on March 24, our grandmother died. And we went on foot. The shooting was already in the center of the city. We no longer had the strength to stay there. We took the cat and left the city on foot. There was no hope of getting out alive. There was no more fear. We went towards the Primorsky district. We were told that it is easier to get out to Ukraine. In fact, we had no information. We did not know what was waiting for us. I want to say that the worst thing is not the lack of water and food. This is information hunger. But we got out of the apocalypse» (1517, woman, Collection of the Online Museum of Civillian Voices, 2023).

After Mariupol civilians left for occupied Berdyansk, they had to wait for a long time for the opportunity to leave for Zaporizhzhia. In the words of a resident of Mariupol, «When we arrived in Berdyansk, people helped us a lot. Then we tried to leave for Zaporizhzhia, but there were many people going out of there. «We waited for buses, signed up in queues, but there were no buses, because they were not allowed. They tried to leave the sports complex several times, but then they drove us to Novoazovsk. We had been trying to leave there for four days. We had to spend the night in the village. We are thankful to those people who sheltered us» (344, man, «Voices of the Civilians»). With the reference to a Mariupol woman who was first with her family on the Left Bank in Mariupol, then in the center. After the house where they were hiding in burned down, they decided to leave the city. «We managed to get first to Berdyansk, which was also occupied. We stayed there for about three weeks, because there was no communication, no gas, and no safe exit corridors. Somehow we still risked going to Zaporizhzhia, and we succeeded» (856, woman, Collection of the Online Museum of Civillian Voices, 2023).

Another way of evacuation for the civilians of Mariupol was leaving through the temporarily occupied territories of Donetsk and Luhansk regions, as well as Crimea. «It was difficult to leave because the road ran through Russia, where everyone was carefully checked and they languished us in queues at the border for a very long time. Then my path lay through Latvia, Lithuania, Poland, Germany. I had been travelling for 4 days on 7 buses, so I was very exhausted» (P9, 26 y.o., female). «Parents had to overcome the route Mariupol - Uncontrolled territories - Russian Federation - Belarus - Ukraine... The journey from Ukraine to Ukraine lasted for 9 days» (729, male, Collection of the Online Museum of Civillian Voices, 2023). This evacuation route was possible due to the coordination of those children who were in the territory of Ukraine and whose parents were able to contact them. Departure from the temporarily occupied Ukrainian territory through the territory of Russia to Ukraine or other countries was possible if there were financial opportunities, as well as external coordination from relatives or friends who helped orientate and draw up the evacuation route. But, unfortunately, not everyone had such an opportunity, primarily financial. A Mariupol woman who left the city with her family on the third day of the full-scale invasion, but her brother and his family, who had lived in the Left Bank district, remained in the city, shared; «My brother and his family moved to our apartment in the city center. They hid in basements, had problems with water and food. They were able to leave only on March 28. I was shocked that my brother and his family were «evacuated» to Taganrog. It was impossible to get out to Ukraine at all. They had already made their way to Poland from Taganrog through the whole of Russia. Before my relatives found out that they wanted to send them somewhere to the outback of Russia, they decided to go out themselves» (2086, woman, Collection of the Online Museum of Civillian Voices, 2023).

Motives for choosing a country for a temporary stay. The main motive for choosing a country of temporary stay was the presence of relatives or acquaintances who provided the immediate support after the move. Responses related to the presence of relatives, family members who previously left the occupation, friends, and acquaintances predominate: «We went here with our family, because

we have relatives who agreed to welcome us at their homes» (R15, Greece); «My own aunt lives here, so I decided to go to her place» (R30, Greece); «I have many friends and acquaintances here. There are more prospects and a higher standard of living here than in Prague» (R58, first stayed in Prague for three months, then moved to Germany); «because our relatives live here» (R82); «There are several of our friends here, we trusted their opinion about this country. During the move, there were difficulties arising primarily under leaving the occupied territory» (R101); «Because this is the only city in which we have friends who could shelter us and help us with registration. In fact, it was difficult to get abroad due to the huge influx of people, we were waiting in queue for the evacuation train from five in the evening till six in the morning, there were a lot of people, it was impossible to breathe, let alone sit down normally. It was cold, the trains were delayed, after we managed to get inside, the train still did not move for another hour, and then at the border it stood for six hours. After we got to Poland, we faced difficulties to get to this particular city, but we were greeted very warmly, helped with our possessions. They gave us a lot of humanitarian aid, and at the station they gave out hot food and helped with tickets» (R75, went to Germany with a transfer in Poland). This was the main motive for choosing a country for temporary stay.

According to one of the respondents, it is clear in what a difficult psychological and emotional state there were people who were forced to leave their home city: «...We just left and that's it, and then, well, maybe it would be the Czech Republic, or maybe Bulgaria, or maybe Andorra. Or maybe we'd go to France. Well, all this was also scary. But I did not care anymore, well, it would be better there than it was, we would go nice and easy. So my husband's brother called my sister. And he said that we were coming to Poland, to Lublin, and he would help us find a flat here, there would at least be housing. I absolutely did not want to go to Poland, because there were no payments in Poland, such standard and stable, as in, well, I do not know, Germany, Austria, France, the Czech Republic. At that time, there were still payments in the Czech Republic. That's why I absolutely did not want to go to Poland. But then I decided that I would go to Poland. All this happened on our way from Mariupol» (A38).

Older people left occupied Mariupol later to stay with their children who had already been abroad for some time. According to a 54-year-old woman: «My daughter was here, she left Mariupol earlier. I wanted to be beside her. The difficulty was that there was no means of transportation from Mariupol at all. Only after individual drivers started working did I have to pay money to leave. And for those who did not have money it was impossible at all» (R3, Germany). In general, people during the evacuation were in a very serious psychological and emotional state and at that moment it was the support of a familiar person that was important, which was crucial for many when choosing a country of temporary stay: «We ran wherever the road took us, our friends suggested. The road was hard morally, there was a terrible uncertainty. We didn't know what was ahead of us» (R38, Germany).

Those respondents who had little time to get acquainted with aid programs for Ukrainian forced migrants in different countries chose the country for temporary stay more consciously, taking into account their own needs and the opportunities that the country has: «Now I am in Germany, because there are good conditions for refugees. The organization I joined created emergency assistance committees for its members and their families, and my move was not difficult» (R99); «We found information on the internet that this city accepts many refugees, that there are still many available places to stay» (R102); «I knew German and decided to go here. Also, I came here with my nephews, they had to graduate from school. Germany is famous for its education, so this was also crucial when choosing a place of stay» (R103).

Another important motive for choosing a country was whether the entire family, taking into account men of service age, was able to go abroad. Those residents of Mariupol who were evacuated during active military operations and were forced to leave through the territory of the aggressor, the Russian Federation, and the temporarily occupied territories of Ukraine, had the opportunity to evacuate as the whole family. These respondents note that they have lost their homes in Mariupol and have nowhere to return, which is why they chose certain countries for integration and a longer stay, they are focused on learning the country's language and further assimilation. During the evacuation, there was an experience when several cars joined their efforts and left the city together as one

column. Further, they also decided to go to a certain country: «Everyone was coming here and we decided to go with them» (R31, Germany).

The next reason for choosing a country of residence was «choice without choice». This category of respondents did not choose either a country or a city for temporary stay. They received help from volunteers who helped them travel abroad through evacuation flights. «I didn't choose this place, the volunteers brought us here and settled us «(R29, Poland);» This city was chosen by volunteers and they helped me cover half of my journey» (R86).

In general, it should be noted that a very small percentage of Mariupol residents went abroad during the first and second waves of migration, that is, in February and March 2022. In March and May, a trip to the countries of temporary stay could last several weeks. «I didn't choose this city, I was re-sent here from the main refugee camp. We traveled to Germany for 10 days by different kinds of transport and first got to the camp where we stayed for 3 weeks, after which we were settled in an apartment» (R55)

In summer and autumn, private carriers special commercial routes were developed for refugees from Mariupol through the territory of the aggressor, the Russian Federation, and the temporarily occupied territories of Ukraine. The cost of such a trip is from USD 250 to 350 per person. The duration of such a trip is up to three or four days.

Another reason for choosing a country was past work experience in a particular country (for example, experience of seasonal labour migration): «A few years ago, I worked in Germany being engaged in seasonal labour. We like this country. So we decided to go straight to work, to the same employer. The employer helped to legalise the documents, we started working» (R4, Germany).

Life after evacuation from the city of Mariupol and forced migration abroad (based on interviews with Mariupol civilians residing in 17 countries). It is worth noting that this part of the research is exploratory in nature, the analysis was conducted on the basis of 70 in-depth interviews conducted by the author. A comparative analysis of the traumatic experience of evacuation, the date of departure from the city of Mariupol, and the success of the initial adaptation abroad was conducted. The information obtained became the basis for the development of tools for the next stage of the research. At the moment, the author is collecting empirical information. In general, Ukrainian forced migrants abroad received significant support from both the state and the local population. The main reason for choosing a country was the presence of relatives, friends, and neighbors, as well as the acquaintances who have already moved to this country and have been there for some time.

A significant number of Mariupol residents chose Germany as a country for forced migration due to the presence of a social support system for refugees as well as a housing program. «I am very grateful to Germany for helping the emigrants from Ukraine, because they provided good help to my family here. We were provided with housing - a three-room apartment, we receive social benefits every month, which is quite enough for us, we were given the opportunity to take integration courses for learning German with a certificate for free; also before August there had been free fares on all types of transport, there is also the opportunity to enter higher education educational institution and study there for free» (No. R-82, female, 21 y.o.).

Among the problems there is the difficulty of learning German and bureaucracy. «But there is a little lack of digital support for services, in Europe there is a habit of doing everything through postal letters. Postmen bring a lot of letters. Therefore, there is a little bit of bureaucracy, but a lot depends on the local authorities, the mayor's office» (P-8, 33 y.o., female). «Also, there are extremely many documents that are difficult to fill out, because the online translator does not provide an accurate translation. Many things are not clear, the legislation is completely different here, everything is done differently, not as we had it and everything is done for a very long time. If there is no person nearby who would translate, then it is very hard» - (P3, female, 54 y.o.).

A significant percentage of Mariupol residents are also in the Republic of Poland precisely because this country is located next to Ukraine, a similar mentality and language, openness and the desire of Polish citizens to support Ukrainians. Among the main problems faced by Ukrainian forced migrants is an apartment rent «... because a big city, with a large number of foreigners and students

from different parts of the country (and not only Poland), so there are a lot of people willing to rent an apartment here» (P1, same, 22 years).

There is also a significant number of Mariupol residents who are temporarily staying in Greece. Considering the multiculturalism of the population of Mariupol and the significant number of Mariupol residents of Greek nationality, this choice is understandable. The strategic document of the Mariupol City Council named «Strategy for the Development of Mariupol until 2030» states that the city is multinational, with about 100 nationalities living there. As of 2020, the largest ethnic communities who lived in the city were Ukrainians (48.7%), Russians (44.4%), Greeks (4.36%), Belarusians (0.76%), Armenians (0.24%) and others (Strategy for the Development of Mariupol until 2030, 2017). At the same time, residents of Mariupol talk about the lack of systematic support for forced migrants from Ukraine in Greece, about the lack of affordable housing and material support programs. «Most often I get help from my mother, because she has lived here for many years, knows Greek; therefore, she supports me in everything, helps me adapt to Greek society in various spheres of life (household, education, work)» (R2, female, 22 y.o.).

Mariupol residents living in Ireland, Norway, and the Netherlands highly appreciate the social assistance systems for Ukrainians operating in these countries. Almost all respondents said that the main problem is language barrier.

I would also like to draw attention to the changes that have taken place in the family relationships of Mariupol residents. It is worth noting that during active hostilities in the city of Mariupol, most families, even if before that they had lived separately from their parents, united and began to live together. Several families were united in order to have more chances to survive. Then, they evacuated together to a safer city. After the evacuation, difficulties and conflicts began to arise in a safer place. «Changes, of course, have occurred: it is difficult to live under one roof in a two-room apartment with such a large number of people, especially considering that my sister and grandmother used to live separately. Conflicts happen, sometimes they are big, but we all understand that now it is very important to support each other, so we also reconcile quite quickly.» (P14, 18 y.o., female).

Another problem that Mariupol residents call is the difficulties in relations with those relatives and friends who provided them shelter for a short period of time. «I live with my mother, father, aunt, uncle and their daughter. It is quite difficult for us to live together, because our relatives did not expect to help us for so long, after all, six months to live in the house of people with whom we cannot say that we are very close is quite a lot. Therefore, pretty soon we will have to find our new dwelling and move away from them. For this reason, we have repeatedly had quarrels with them, but my parents try not to go into conflict with my uncle and aunt, because it is thanks to them that we are here now. Therefore, although it is difficult for us, we try not to stay negative and look for ways to solve our difficult situation.» (P15, 18 y.o., female).

Someone did not have the opportunity to unite because part of the family was in different areas of the city, communication between the relatives was cut off at the end of February. After the evacuation, they got the opportunity to unite, but not for a long time. Now they live separately again. «At first, we were very worried about each other, we didn't see each other and didn't know whether they were alive or not for a long period of time, we really wanted to see each other, to talk. And when they got used to it, everything fell into place, as it had been before. Currently, I live in the same city with my daughter, but separately. She is giving me some support» (No. R-3, female, 54 y.o.).

But there is also some evidence that the experience of living together in the blockaded Mariupol brought their family together. «I live with three children, and my husband returned to us from a voyage in July. Nothing has changed in my family relationships; even they have become stronger, because my husband is very proud of me for saving our children. He is my support now. Sometimes I see my brother and his family. They live in another city, but such encounters also support me» (P8, 33 y.o., female). «So we began to appreciate each other even more» (R22, 19 years, female). «In my opinion, our relationship has become stronger, we have begun to appreciate the time spent together more. Because at the time of being in the occupation, I did not see my mother for 52 days» (P55, 20 years). «We became closer to each other, the relations between us have become stronger and better

than before. We have a lot of free time, which we spend together, walking around the city and in the forest» (P34, male, 47).

Regarding social protection and support. For example, refugees staying in Germany had the opportunity to receive regular monthly payments, housing, and integration services from the state. «I am staying in Berlin under paragraph 24 as a war refugee, so I am given regular monthly payments» (R75). «In order to receive the first payment, you had to track yourself by the serial number in the Primary camp, and apply to the main office. To continue receiving money, you had to go to the Labour Exchange, and wait for a letter to be invited to an interview, then within two weeks you receive your social payment» (R55). «The financial help here is quite good. Taking into account the fact that we do not need to pay for housing, this money is really sufficient to live on» (R15).

A significant problem faced by Mariupol residents was the language barrier, «after all, not all Germans know and understand English, so it is difficult to make friends, and this results in a lack of live communication» (R75). According to respondents, German is difficult to learn, but there are special integration courses in the country, during which refugees have the opportunity to go deeper and learn German for a certain time. Such courses are free, but the problem is the long wait in line to participate in these courses. «However, you also need to submit an application to the ministry, they must approve it (a month or two), and then wait until there is a place in the group» (R4).

Another problem was the bureaucratization of the country: «there are extremely many documents that are difficult to fill out, because the translator does not provide an accurate translation. Much is not clear, there is a completely different legislation here, everything is done differently, not as we had, and everything is processed for a very long time. If there is no person around to translate, it is very difficult» (R3); «In most cases, they send letters by mail that are difficult to translate due to poor-quality translation by internet translators.... The translator works only on specific days, it is very difficult» (R3); «But there is one problem and this problem is peculiar to Germany, namely the number of these very papers and the number of questions starting from the colour of your eyes and ending with where exactly you studied, etc. And the requirements that must be met. But this is a completely different country with completely different rules, which decided to accept me as a refugee, so I will not mind following their rules. And I'm more than happy» (R26); there is also a lack of quick response to requests: «But if one has an emergency situation, for example, they do not have money, then solve your own problems. The system will not respond quickly» (R4); «bank cards are not issued on the spot, rather by mail, which I also waited for for two months» (R75); «I only applied to the social service, they treated us well and with understanding, but due to the large influx of people, sometimes the nearest reception was only a few months ahead» (R75).

The next problem for respondents was the lack of familiarity with the country's rules and legislation and the difference in mindset: «There is also a very strong sense of difference between countries, i.e. new rules and other laws due to which misunderstandings and even problems occur» (R26). «The situation is complicated by the fact that this is a completely different country and a different mindset. A completely different culture and other customs» (R55).

At the same time, respondents are satisfied with the level of social security they received in the country. «We received all the main aid from the Labour Exchange, which is the main organization that provides aid in Germany. These include social payments, housing, language courses, and health insurance payments» (R61). «We applied to the employment centre (which is responsible for providing financial help to refugees) for assistance in purchasing clothes, we were allocated a certain amount of funds, which is meant to purchase clothes for two seasons (autumn-winter)» (R103).

Special attention should be paid to providing social housing, but after a certain period of stay in places of temporary accommodation for refugees: «....at first, we lived in a temporary refugee accommodation center..» (R71); «Immediately upon arrival, we were settled in a camp where we were provided with all the necessary hygiene products and fed. Now we have been provided with housing» (R55). At the same time, respondents note that there is now a shortage of free social housing in Germany due to the large number of Ukrainian forced migrants: «..but now there are problems with this, because Germany is quite crowded with Ukrainians who fled the war, there is no room for everyone anymore» (R15). «The only thing to pay attention to, I believe, is the insufficient number

of places to accommodate refugees. Many refugees live in «temporary» places of accommodation for a very long time (these are camps with tents or, for example, one large room with mattresses for a very large number of people). Of course, people are grateful for this, everything not to be under fire» (R102).

As for employment, Ukrainian forced migrants have gained access to the labour market and legal employment, but due to the lack of language competencies, they can only apply for certain vacancies: «You can find a job, of course, but due to ignorance of the language, the list of possible jobs is very limited» (R15). « You are also regularly offered a job if you are not a student and are over 25, but it is difficult to find one that you would like because of the language barrier, usually it is a job as a cleaner or handyman» (P75). At the same time, there is experience in integration courses that teach not only the language, but also certain professions (learning the German language together with mastering the profession).

In Germany, the main assistance to refugees is provided by the government of the country. At the same time, there are non-governmental humanitarian initiatives that can provide assistance. For example, there are special stores where you can buy cheap food. «I get the most help from the authorities. There is also a social store «Tafel», where you pay a symbolic amount in gratitude for help, and you are given food for a week. This is a volunteer organization «(R103).

Ukrainian forced migrants have access to medical and educational services: «*There are no problems with studying, except for the fact that it takes place in German: children and teenagers are immediately assigned to educational institutions. Someone to school, and someone to college*» (R15).

Psychological services are also provided for Ukrainian forced migrants: «*I have seen quite a lot of addresses on the Internet of Ukrainian psychologists who also came to Germany after the war (and some of them have been living here for many years) and are ready to help people cope with stress*» (R15).

As for the experience of communication with the local population, it is very different: from positive to sharply negative.

«*There are no problems, everyone is friendly and smiles at us. It seems to me that they are happy to help us, all humane and try not to cause us unnecessary emotions by talking about the war and the like*» (R88).

«*Sometimes people don't really like that Ukrainians live on their taxes. But I think the problem lies also in politics. It is simply not profitable for people to work and they need to learn a language, there is no way without it. But there is no open hostility*» (R4).

«*Local residents are OK, sometimes I heard, of course, mainly from the younger generation, that everyone is already tired of Ukrainians here and that there are too many of us, but mostly no one cares so much and people are sympathetic to our situation*» (P15).

In general, despite the existing problems, respondents are satisfied with the social support of refugees in Germany and are focused on language learning and faster integration into society: «we learn language and take care of our behavior so as not to cause discomfort to others» (R86). The level of employed respondents is not high, most of them are engaged in learning the language and performing temporary work.

Mariupol residents who are temporarily residing in other European countries have the same problems with adaptation and integration. But, for example, in Poland, the language barrier is not as strong as, for example, in Germany. According to respondents, the language barrier in Poland is felt only during the first months: «The only problem was the language, but now everything is clear» (R5); «Imperfect language proficiency of native speakers from time to time hinders full communication and understanding, but this can be solved» (R1).

The majority of respondents had no difficulty adapting to the rules and norms of Polish society due to the mindset closeness of the Polish and Ukrainian peoples. At the same time, it was this confidence in the similarity of the mindsets of the two peoples that caused the disappointment of Ukrainian forced migrants after a longer experience of communicating with the Poles.: «There are

ordinary things of the Poles that are incomprehensible to us, and there are our habits and views that are completely incomprehensible to them» (R1).

In general, Poland has a very developed non-governmental volunteer sector for providing assistance and support to Ukrainian forced migrants. There are a large number of different measures aimed at helping to integrate Ukrainians in Poland. At the same time, the most significant problem remains the problem of providing affordable housing. There is almost no social free housing left, and the cost of rent for apartments is very high due to the high demand. Given that in Poland there are mostly women with children, whose husbands stayed in Ukraine, this problem is very significant.

As for the attitude of the local population to Ukrainian forced migrants, in general, the situation is almost the same as in Germany. There is a positive experience of communicating with the Poles: «The majority of the population treats us well» (R27). There is a negative experience of communicating with Poles, for example, due to the fact that most Mariupol residents speak Russian.»... my husband already had a conflict at work, when they complained about him that he did not speak Ukrainian, and then they got personal and began to speak poorly about people from Donbass....» (A63).

Respondents also had negative experiences related to medical care due to the fact that they did not understand how the medical system works: «*it's hard to call an ambulance. My grandmother, she is a 71 y.o. elderly person. She was often ill and we had to call an ambulance. And the most important problem was that I call an ambulance, explain the situation in Polish, and they tell me that they are redirecting me to another line, that I need to wait, and I am redirected to another person to whom I have to tell everything again. I don't understand why (..)*» (A57).

As for polish language courses, there are many different offers, both online and offline courses, free and paid ones. However, respondents note the lack of systematic and in-depth language learning programs (only some programmes for the unemployed that are officially registered with the relevant state bodies). According to a 50-year-old woman who has been in Poland since March 2022: «I applied to the labour exchange. Now I attend free language courses. Stationary. I come and study every day until three o'clock in the afternoon. I'm learning. I was provided with books, pens, and a computer to learn the language. I also get a scholarship» (231).

Therefore, the analysis of the adaptation and integration problems of Mariupol civilians after leaving the occupied city of Mariupol showed that, in general, host countries are willing to help and support refugees and migrants. The main problems faced by the people of Mariupol are the language barrier, lack of affordable housing, difficulties in employment according to the level of education and qualifications, lack of understanding of the legal and medical systems of the host country. It is worth noting that these are common problems for migrants which are analyzed in numerous scientific publications on migration issues. At the same time, Mariupol civilians who have gone abroad face problems typical of forced migrants who have a traumatic experience of war and difficult and dangerous evacuation.

This is primarily due to the fact that the people of Mariupol were not prepared for emigration, did not plan to leave and build a new life abroad. Forced migrants were not familiar with the peculiarities, mentality, legislation and conditions of living in the country of temporary stay in advance. The majority of Mariupol residents lost almost everything, during the evacuation they did not have the opportunity to take things, sometimes – documents. They did not have savings that would allow them to live for a while, rent an apartment, etc. It is known that the psychological state of a person is also important for adaptation and integration. The people of Mariupol who were surrounded and occupied are in a state of severe stress, which greatly complicates the processes of adaptation to a new place of residence. Family problems and conflicts are also frequent, due to the forced residence of many people in limited areas: «It is quite difficult for us to live together, because our relatives did not expect to help us for so long, after all, six months to live in the house of people with whom you can not say that you are very close, this is quite a lot. So soon we will have to find our own place and leave them. For this reason, we have repeatedly had quarrels with them» (R15). «At first I lived with my daughter and her family, now I live separately in a separate flat. Changes in family relationships. At first, we were very worried about each other, did not see each other and did not know whether we were alive or not for a long period of time, we really wanted to see each other, to communicate.

And when we got used to it, everything fir together, as it was before. Now I live in the same city with my daughter, but separately. She supports me «(R3). «Our relationship is very complex, having different tempers and living in the same room without personal space. We fight very often. There is no person who will support you» (R23).

Another significant feature, which is characteristic for Mariupol residents abroad, is that most of them left with their entire families, together with men of draft age. Such families adapt to new conditions more quickly, are more active in finding work and arranging their own lives in their new place of residence. During the interview, the majority of Mariupol residents said that they are determined to work and provide their family with everything they need. With a reference to a Mariupol woman who left the city of Mariupol with her family in March 2022 and was in Poland at the time of the interview:

“(.) We did not go to the volunteer center.. to complain or asking.. We decided to rent a house and go to work. We are from Mariupol. We are not used to living at someone’s expense. We are used to working. We will work. Therefore, we decided not to ask for help. Let’s start life over from a scratch. And we will earn a living by our own work. I believe that women with small children should seek help. All others should work. We counted only on ourselves. (.) I translated all my diplomas into Polish. I turned to the labor exchange. Now I attend free language courses. Offline. I come and practice every day until three o’clock in the afternoon. I’m studying. I was given books, pens, and a computer to study the language. I also receive a scholarship. Next, I plan to enroll in a college to become a dentist’s or cosmetologist’s assistant. Next, I plan to learn the language and confirm my medical qualifications. My husband also found a job at a construction site. We have nowhere to return. We don’t have a home. Therefore, we decided to become worthy citizens, not a burden. Therefore, now we are doing everything for this. The youngest son goes to a Polish school. Not in the nearest one, unfortunately. We had to go through three schools before he was admitted. Online education did not continue in Mariupol. It was not possible to attend the Ukrainian school online. We found ourselves in such a situation. Therefore, they went to a Polish school and began to study. Yes, it was difficult. I don’t know the language. But we do not give up. We have no choice. Only forward we go “ (231, woman, 50 years old).

Of course, there are certain difficulties in employment associated with the need to learn the language of the country, and time to confirm qualifications, study the legislation or protocols inherent in the country for a particular profession. Besides, there are cases when refugees are resettled from temporary shelters to other places, and then people spend time looking for work again or putting their children in educational institutions.

All these problems are in many cases related to the fact that Ukrainian forced migrants are forced migrants, they did not prepare for moving in advance and did not study the history and traditions, culture and mentality of this people. Due to such lack of preparation, as well as the difficult psychological and emotional state of civilian residents of Mariupol who survived the siege and escaped from the occupation, there are difficulties in integrating and adapting to new cities of residence. At the same time, Mariupol residents, in most cases, do not have surviving housing in Ukraine, have experience of high-cost rental of flats in the western regions of Ukraine after the evacuation from Mariupol, which is why they try to adapt to new conditions, learn the language, obtain a new education and look for work.

Mainly, the people of Mariupol, who survived the war and evacuation from the war zone, are in a difficult emotional state and could not adapt in the first months after the evacuation: it was difficult to learn the language, communicate with other people, and think about the future. From the words of a Mariupol woman who had a traumatic experience of evacuation from the city of Mariupol in March 2022: «Unfortunately, now in the current conditions, no country can guarantee us any permanent shelter, and the situation here is much more complicated (for Mariupol residents) than for refugees from other cities. At least, they have a place to return, that is Kyiv, Lviv... they have their own housing, there are relatives, whereas a quarter of the population died in Mariupol. And to return to look at crosses, graves, destroyed houses - the psyche simply can not stand it. Therefore, personally, I feel that I also have mental health problems, and I don’t want anything to remind me of this terrible war,

at least during the next 5 years, this is for sure, and then we will see» (A63). They needed psychological help, care and support. Those Mariupol residents who received this help and support were later able to find strength in themselves and began actively looking for work and learning the language. Respondents spoke about the special attitude of the local population due to the fact that the refugees are from Mariupol, because they are aware of the situation that developed in the city during the blockade and occupation. «In general, we did everything quickly, even faster than it could have been, because an employee of an organization found out that we were from Mariupol and made the document as quickly as possible» (R27).

4. CONCLUSIONS

Thus, it is worth noting that the traumatic experience of war, evacuation from occupied territories and forced departure abroad for the safety of one's family are significant factors that negatively affect the process of adaptation and integration of migrants in the host country.

During the research, the following features of the evacuation of Mariupol civilians were established: Due to the encirclement of the city, the rapid deterioration of the security situation, constant shelling and humanitarian disaster, civilians found themselves in a state of crisis, were unprepared and did not understand how to act in order to survive. The information vacuum and life in constant danger led to the fact that many Mariupol civilians did not dare to leave the city. The longer the stay under the blockade was, the more difficult it was to make the decision to leave.

People did not have the opportunity to choose evacuation routes and used any opportunity to leave the surrounded city. Those who ended up in the Left Bank district of the city evacuated through the temporarily occupied territories and Crimea, they left through the territory of the Russian Federation and then went either to Ukraine or to other countries. Those who were in the Central and Primorsky districts of the city had the opportunity to leave through the temporarily occupied territories of Donetsk and Zaporizhzhia regions to the territory of Ukraine.

Evacuation was difficult and dangerous. People were forced to drive along mined parts of the road, under fire and through numerous enemy checkpoints.

An important condition for evacuation was the presence of an undamaged car and fuel. There was also mutual assistance through the people of Mariupol. They tried to save as many people as possible. The evacuation route was improved by the presence of an external coordinator, who could be contacted already after leaving the surrounded Mariupol and who further assisted and directed the further departure from the temporarily occupied territories. For those who were forced to travel through the territory of the Russian Federation, it was important to have financial opportunities to pay for their trip. In another case, there was a forced evacuation to remote regions.

On the way to the evacuation, the people of Mariupol felt the help and support of people.

The choice of a country for a temporary stay was generally spontaneous. Already during the evacuation, the people of Mariupol contacted their friends, read the news and made decisions about where exactly they would go and in which country they would receive temporary protection. Most often, Mariupol residents left without belongings, documents and money. The psychological condition of people who had been in an environment on the verge of survival for a long time was extremely difficult.

Social security of Ukrainian forced migrants abroad is carried out depending on the specifics of the social policy of each individual country. However, it is common that even when crossing the border, Ukrainians are informed where they can apply for registration, what documents are needed for this, the validity period of social protection and the conditions for its termination, where to get examined by doctors, which benefits and rights are available to Ukrainians.

Ukrainian forced migrants receive the following:

First, the right to legal stay, and in some cases, the right to free accommodation. There are examples when the state reimburses utility bills in various ways, and provides housing for free. These can be shelters only for Ukrainians in the form of dormitories, as well as separate apartments and houses. It all depends on the availability of unoccupied premises on a particular territory. However, living

under such conditions is limited in time and refugees who live in the host country for a long time are forced to rent housing. The cost of renting a housing is too high.

Secondly, the right to social care. This includes obtaining a residence permit and financial help. In each country, the amount of financial help depends on the average unemployment benefits in the country. But there are countries that do not provide monthly financial help to Ukrainian forced migrants.

Third, the right to medical care. Medical insurance is provided to Ukrainians in a simplified format. However, when going to private doctors and clinics, the displaced person pays for services independently.

Fourth, the right to education. Ukrainians under the age of 18 get the opportunity to study abroad for free on an equal basis with local children. Schools for Ukrainian children are also being opened (for example, in Poland).

Fifth, language learning and access to the labour market. There are countries where people over the age of 18 are required to attend language courses. For example, in Germany, such courses last about 9 months and are divided into several sub-courses. Each such lesson lasts 3 hours and is held 3 times a week. The aim of the courses is for displaced persons to quickly learn German and adapt to this environment. At the same time, Poland does not oblige Ukrainian forced migrants to attend the Polish language courses.

Also, in each of the countries there are centres for providing psychological assistance and support to forced migrants. In some countries, for example, in Poland, there were separate non-governmental programs on support of refugees from Mariupol.

Social support systems for Ukrainian forced migrants abroad are constantly changing and being modified in response to new realities and threats. It is indisputable that the support of Ukrainian forced migrants, both from the governments of European states and from the citizens of the respective countries, is high. In most countries, Ukrainian forced migrants have received almost the same rights as citizens of these countries. At the same time, there are certain problems with communication between Ukrainians and citizens of these countries, which is definitely worth paying attention to.

5.ACKNOWLEDGMENTS

This research was supported by IWM Institut für die Wissenschaften vom Menschen and the Polish Institute of Advanced Studies PIASt. Article based on results of research project: «Mariupol in Past, Present and Future» - funded by joint grant from the IWM Institut für die Wissenschaften vom Menschen and the Polish Institute of Advanced Studies PIASt .

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DIMENSIONS OF THE ANALYSIS OF THE ORGANIZATIONAL CULTURE OF MULTINATIONAL COMPANIES

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Received 16.03.2023.

| Send to review 28.03.2023.

| Accepted 02.06.2023.

[Original Article](#)



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JEL Classification:

E6, F5, J6

Doi: 10.61432/CPNE0101110V

UDK: 005.322:334.726

ABSTRACT

In the conditions of globalization processes in the world, the existing dimensions of the analysis of organizational culture contribute to the development of multinational companies (further down the text - MNC). Organizational culture refers to a variety of practical values that affect the company's activities both internally and externally. The study analyzed three different concepts of organizational culture: American, Asian, and European. It was concluded that for the development of MNC it is necessary to harmonize organizational cultures in international contracts. An analysis of the theoretical foundations of the concept of "organizational culture" was carried out, an attempt was made to provide its own definition, the scientific novelty of which consists in taking into account the paradigmatic principles. The TOP-10 best MNCs in the world were determined, which made it possible to characterize models of organizational culture concepts. Thus, the research confirms that MNC should develop internal communication and external communication for successful development. The author developed a system of organizational culture of multinational companies by implementing dimensions of corporate culture analysis. It is a complex and scalable system because the world is constantly changing. Its necessity lies in the ability to adapt to the requirements of the business environment of multinational companies. The system includes a development factor that manifests itself at two levels. Implementation of the system will enable development and increase of business results.

Keywords: culture, management risks, management tools, development, management methods, international contracts

1. INTRODUCTION

Today, under the conditions of globalization processes in the world, the existing tools for the organization of the cultural system continue to show significant differences. In the context of the development of multinational companies (hereinafter - MNC), this aspect is quite important and needs immediate improvement and resolution. The development and successful functioning of the MNC requires taking into account certain features. However, it is worth noting that it is the globalization conditions, the spread of management tools and the peculiarities of cultural differences that have weight among risk management in business life.

The US and China are the largest global markets that are constantly developing and dominating the foreign direct investment market. More than 3,000 European companies operate in China, but at the socio-cultural level, modern Chinese society represents a hybridization of three influences (traditional, communist and western), which leads to the appearance of numerous paradoxes between Chinese values and western ones. This example is an example of a local feature of the organizational

culture, which forces to reorient the activities of the MNC with its consideration. This is possible by changing management practices related to their corporate culture.

A modern solution to such a problem is co-evolution to create a predisposition to certain types of behavior. A space for dialogue between different cultures is created. It is worth noting that structural and organizational changes can have an impact on what is deeply rooted in the cultural values of individual states.

This observation points to the “processual” nature of culture: cultural values are neither static nor immutable. However, one of the risks in cross-cultural management is overestimating “the stability of cultures and identities and underestimating the enormous movement of mixing and transformations associated with globalization”.

MNCs are faced with a multiplicity of socio-cultural, organizational and national environments when operating in countries with certain features of organizational culture.

So, the research problem is the development of the organizational culture of multinational companies with the help of management tools. The hybrid cultural context at the organizational level is able to contribute to solving managerial tasks in MNC. The emergence of managerial risks associated with changes occurring in companies and their socio-economic and political environment determine the relevance of the current study.

The evolution and development of MNC is accompanied by the emergence of alternative management methods. This marked a change in management style, and more precisely, organizational and corporate culture. These aspects, indeed, are the result of traditions, worldview, religion and other external and internal factors.

Looking back, organizational culture is an important tool for managing economic relations and human capital, especially in MNC. Understanding organizational culture and its impact on managerial decision making makes it possible to contribute to globalization conditions and sustainable development.

Modern international economic relations have determined international contracts between different states, between states with different cultures. However, the harmonization of different “worlds” in business is a tool for the development of the global economy.

Modern business conditions marked a break with the traditional functioning of MNC, whose main concern was profit optimization and displacement of employee motivation. MNC is no longer considered exclusively as an operator in the labor market, which facilitates the circulation of capital and products. It acts and reacts to the environment, putting a person at the center of its problems. That is why there is a need for social responsibility. Thus, MNC is forced to develop an organizational and communication plan for better interaction with the environment, both internal and external. These transformations establish a balance between the goals of MNC and the needs of the society in which it is founded and with which it works.

Creation of interdependent elements and management tools to unite its employees, partners, investors to preserve its existence. It is at this stage that the organizational culture of MNC emerges, which is a product of the vision and intention of the founders. Organizational culture is based on traditions, but is constantly being improved in order to achieve the set goals.

Thus, initially, organizational culture is the result of two main parameters. The first is a set of strategic orientations and a configuration established by the founders. The second parameter is the accumulated experience of the company's first employees and the knowledge transfer system.

In this sense, organizational culture refers to various practical values that are shared in MNC and influence the behavior of employees.

Thus, to emphasize the importance of the chosen research topic, it is worth paying attention to three important points. First of all, people perceive culture through everyday practices in the organization. Second, organizational culture is a descriptive model that takes into account different perceptions without creating an evaluative judgment. Thirdly, it is necessary to harmonize individual cultural el-

ements in order to achieve the general goal of MNC. It was these aspects that determined the choice of the research topic and allowed to form its goal.

2. LITERATURE REVIEW

In the current study, the works of many scientists were analyzed, however, in the opinion of the author, it is appropriate to single out the work of such researchers as Cicea C., Țurlea C., Marinescu C., Pintilie N. (Cicea et al., 2022) the work reveals the organizational culture as a management system, the author also provides a thorough classification of types of organizational structures. But emphasizes the peculiarities of each. Also, it is worth mentioning the work of Assoratgoon W., Kantabutra S. (Assoratgoon, Kantabutra, 2023), it is fundamental for the current study, because it reveals the peculiarities of organizational culture in relation to corporate initiatives. Also, the authors touch on the process of sustainable development and the contribution of organizational culture to it. It can be said that the research of these authors contributes to the discovery of new knowledge about the organizational culture of sustainable development.

Bockius H., Gatzert N. (Bockius, Gatzert, 2023) devoted their research to the study of parameters and evaluation of organizational culture and reveal possible levers for its improvement. The work of Chatman J.A., Choi A. (Chatman, Choi, 2022) is dedicated to the measurement of organizational culture, it talks about an interdisciplinary construction - organizational culture and tools for its maintenance. The work is devoted to the problem of defining organizational culture, which helped to determine the theoretical basis of the topic in the current study.

Characterizing the state of organizational culture research is an appropriate question for the purpose of the current study, so the work of Chatman J.A., O'Reilly C.A. (Chatman, O'Reilly, 2019), which is devoted to the development of the theory of organizational culture, helped to build a system of organizational culture.

Table 1. Analysis of the studied scientific works devoted to the topic of this study

Sources	the organizational culture as a management system	the peculiarities of organizational culture in relation to corporate initiatives	the study of parameters and evaluation of organizational culture and reveal possible levers for its improvement	the development of the theory of organizational culture	an analysis of modern definitions of the concept of «organizational structure	the mechanism of organizational culture management due to its transformation
Cicea C., Țurlea C., Marinescu C., Pintilie N. (Cicea et al., 2022)	+			+		
Assoratgoon W., Kantabutra S. (Assoratgoon, Kantabutra, 2023)		+				
Bockius H., Gatzert N. (Bockius, Gatzert, 2023)			+	+		
Chatman J.A., Choi A. (Chatman, Choi, 2022)	+			+		
Chatman J.A., O'Reilly C.A. (Chatman, O'Reilly, 2019)				+		
Wong K. (Wong, 2020), Chalmers R., Brannan G. D. (Chalmers, Brannan, 2022),				+	+	
Akpa V. O., Asikhia O. U., Nneji N. E. (Akpa et al., 2021),				+	+	
Rasak B. (Rasak, 2022),				+	+	
Assens-Serra J., Boada-Cuerva M., Serrano-Fernández M.-J., Esteban A.-T (Assens-Serra et al., 2021),				+	+	
Kurniady D. A., Rubianty M., Riadini B. (Kurniady et al., 2020),				+	+	
Abane J. A., Adamtey R., Ayim V. O. (Abane et al., 2022),				+	+	
Mesfin D. , Woldie M., Adamu A., Bekele F. (Mesfin et al., 2020),				+	+	
Srimulyani V. A., Hermanto Y. B. (Srimulyani, Hermanto, 2022),				+	+	
Asma Siddiqua R. (Asma Siddiqua, 2022),				+	+	
Haiduchenko S. O. (Haiduchenko, 2020),				+	+	
Yuskevich A.I., Lehkiy O.A. (Yuskevich, Lehkiy, 2020),				+	+	
Brusientseva O. A., Sholokhova K. (Brusientseva, Sholokhova, 2019)				+	+	
Rynkevych N. S. (Rynkevych, 2020)	+			+		+

Source: systematized by summarizing the works

Works of authors who are dedicated to analysis of modern definitions of the concept of “organizational structure”, which is a significant contribution to the current study and allows to achieve the goal of the study and form its theoretical aspect.

The dissertation study of Rynkevych N. S. ([Rynkevych, 2020](#)) is also noteworthy, the work proposes the improvement of the mechanism of organizational culture management due to its transformation. Analysis of the studied scientific works devoted to the topic of this study systematized by the author on Table 1.

The proposed meaningful structure of organizational culture enabled the author of the current study to develop a system of organizational culture of multinational companies.

3. AIM OF THE RESEARCH

The purpose of the study is to develop a system of organizational culture of multinational companies by combining organizational culture tools and dimensions of analysis.

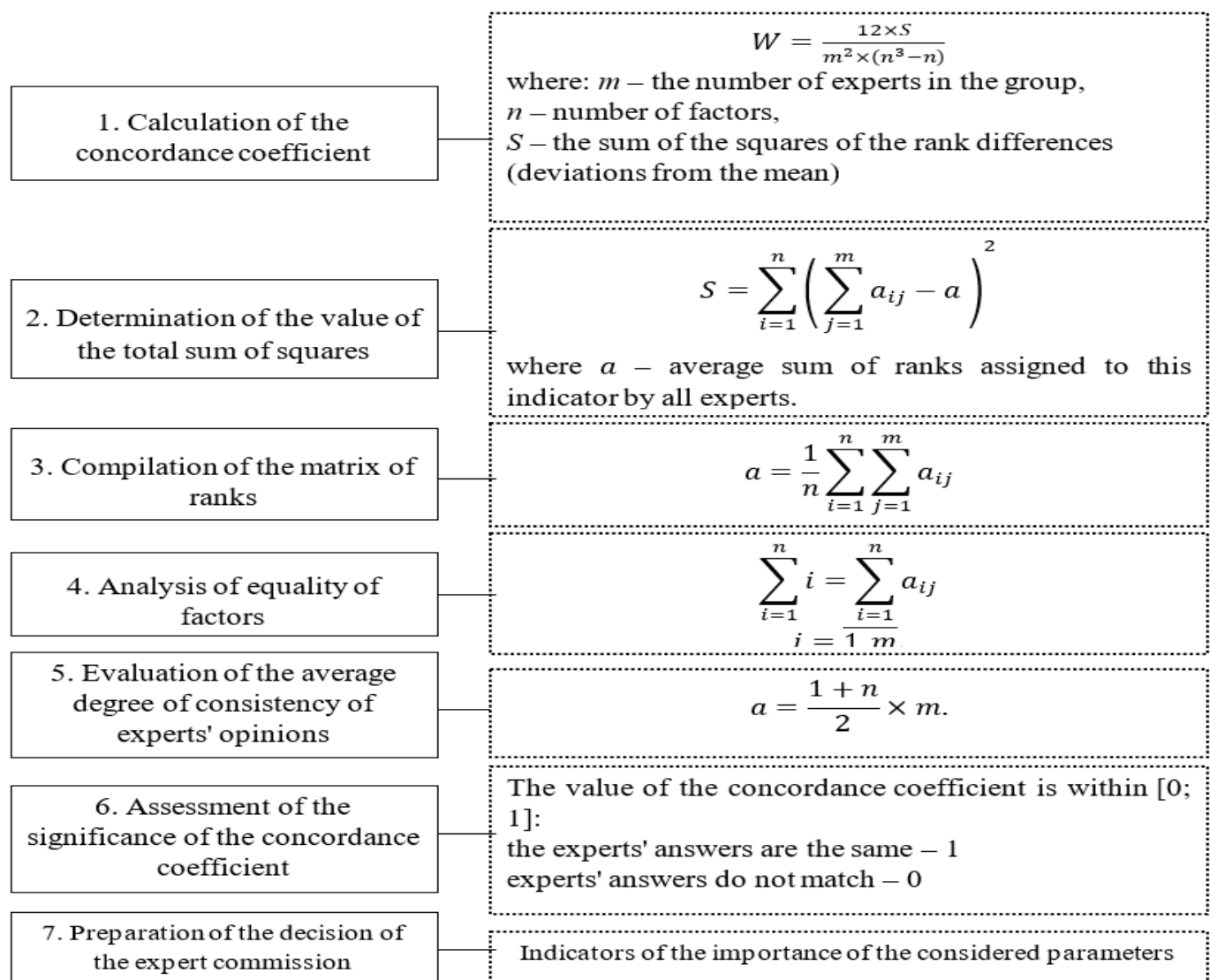
4. METHODS

The application of a competent and comprehensive research methodology made it possible to avoid deviations or revisions. Scientific methods as a set of tools and principles, which were selected by the author of the study, made it possible to build the further theoretical and practical part of the article. The main theoretical methods of the current scientific research in the work were: induction, namely obtaining probabilistic information about management tools that contribute to the development of the organizational culture of multinational companies. Deduction, as a method by means of which a chain of research conclusions regarding the organizational culture of multinational companies of the organizational culture of multinational companies was established. The axiomatic method was chosen at the beginning of the research process in order to select the basic provisions of the organizational culture of MNC. Using the analysis of literary sources, the relevance of the chosen research topic was established and the theoretical aspects of the research were followed. With the help of synthesis, the author combined the conclusions that were obtained as a result of the research analysis. The main empirical methods of this scientific research include observation, as the basis of a characteristic perception of management tools of the organizational culture of multinational companies. With the help of the comparison method, it was possible to establish the common features and differences of organizational culture in order to compare the characteristics of the cultures of certain countries, which made it possible to answer the main tasks of the research. Identifying the common characteristic of two objects is a way of learning regularities. With the help of abstraction by diverting from unimportant parameters of management tools of the organizational culture of multinational companies, the aspects of interest to the author of the study were recorded. As a result of abstraction, the author obtained information about the peculiarities of the organizational culture of multinational companies. The methods used in this study are interrelated and organically complementing each other and correspond to the set tasks. However, their use was necessary considering the specifics of each of the methods. In the author's opinion, special attention should be paid to the comparative-historical analysis, it made it possible to highlight the cause-and-effect relationships with the help of which the organizational culture of multinational companies was formed and made it possible to build a logical chain. One's own conclusions can be built taking into account objective information or obtained independently with the help of methods that are scientific and generally recognized. Acquaintance with the history enriched the research with additional facts and caused consideration of the problem from a new point of view. In the work, the authors used the concordance method to conduct an expert evaluation of the dimensions of the analysis of the organizational culture of multinational companies. The minimum required number of experts was determined by the formula:

$$N_{\min} = 0,5 \times \left(\frac{3}{\lambda} + 0,5 \right)$$

where λ – an error in the examination results is possible ($0 < \lambda < 1$).

Figure 1. The method of determining the concordance coefficient



Source: (Lawrence I-Kuei Lin, 1989)

The choice of these methods of scientific knowledge contributed to the successful completion of the research and the achievement of its goal.

5. CUSTOMER CHURN MODELING RESULTS

In modern globalization conditions, the problem of organizational culture is important and significant in an enterprise or organization. Promoting the development of organizational culture allows companies to reach a new level and promote international agreements and contracts, taking into account certain characteristics of the cultures of different countries. However, today one of the problems of the development of organizational culture is the theoretical ignorance regarding the definition of key concepts. That is why, in the opinion of the author, it is appropriate to analyze modern definitions of the concept of “organizational culture” (Table 2).

As can be seen from Table 2, quite different points of view were analyzed by the author of the study. It is worth paying attention to the geography of definitions, this is an important feature, because organizational culture, namely its theoretical aspect, takes into account not only the general definition, but also the specific characteristics of the culture of a certain region. As can be seen from the definition table, scientists from the Asian region define organizational culture somewhat differently than European researchers. This is a confirmation of the peculiarities of the diversity of cultures. That is why, in the opinion of the author, it is appropriate to offer his definition of the concept of “organizational culture” as a system of values that form the standards of behavior of employees in order to promote the international integration of the company and increase involvement in work, which contributes to the social and psychological environment of the organization.

Table 2. Modern definitions of the concept of “organizational culture”

Source	Definition of the concept	A meaningful characteristic
Wong K. (Wong, 2020)	Organizational culture is the collection of values, expectations, and practices that guide and inform the actions of all team members. A great culture exemplifies positive traits that lead to improved performance.	collection
Chalmers R., Brannan G. D. (Chalmers, Brannan, 2022)	Organizational culture is the collection of values, expectations, and practices that guide and inform the actions of all team members. A great culture exemplifies positive traits that lead to improved performance.	collection
Akpa V.O., Asikhia O. U., Nneji N. E. (Akpa et al, 2021)	Organizational culture is an essential component of an organization that has evoked various studies to determine and establish its' relationship with organizational performance and sustainability.	essential component
Rasak B. (Rasak, 2022)	Organizational culture is a framework of common assumptions, values, and beliefs that dictates how organizations treat individuals. Organizational culture involves values and attitudes that «contribute to an organization's unique social and psychological environment.»	a framework
Assens-Serra J., Boada-Cuerva M., Serrano-Fernández M.-J., Esteban A.-T. (Assens-Serra et al, 2021)	Organizational culture is a pattern of basic values and presuppositions that are shared and learned by a group while resolving the problems of external adaptation and internal integration.	is a pattern
Kurniady D. A., Rubianty M., Riadini B. (Kurniady et al, 2020)	Organizational culture is a major source of sustainable competitive advantage in the microfinance industry. organizational culture is conceived to determine better deployment of the firm's resources that lead to desirable performance outcome.	a major
Abane J. A., Adamtey R., Ayim V. O. (Abane et al, 2022)	Organizational culture, also referred by many as corporate or company culture, is explained to be a set of qualities that distinguishes one institution from others by establishing its distinctiveness. It is a set of common values and standards that employees and groups in an organization adhere to and express in their interactions. There is the consensus that organizational culture is a tool for regulating employee conduct.	corporate or company culture
Mesfin D., Woldie M., Adamu A., Bekele F. (Mesfin et al, 2020)	Organizational culture is the pattern of values, norms, beliefs, attitudes and assumptions that may not have been articulated in words but shape the ways in which people behave and things get done in the organization.	pattern
Srimulyani V. A., Hermanto Y. B. (Srimulyani, Hermanto, 2022)	Organizational culture is agreed upon as values and behaviors that contribute to the social and psychological environment of the organization. Complexity and a comprehensive understanding of organizational culture are essential and inevitable. Organizational culture is one of the main factors for increasing work engagement.	is agreed
Asma Siddiqua R. (Asma Siddiqua, 2022)	Organizational culture is a collection of certain values, principles, customs and traditions shared by all the members of the organization when communicating within framework of the organization. Organizational culture may be invisible and materialistic, but a well-founded component of the organization. Organizational culture is more than the behavioral practices that workers experience in their regular work. It refers to strongly ingrained ideals that are considered important not only to individual employees, but to the whole organization as a whole. It is culture that defines the connection between the interests and expectations of individuals, instilling in them a sense of attachment and rewarding them for it, and it also stresses the uniqueness of each organization.	a collection
Rynkevych N. S. (Rynkevych, 2020)	Organizational culture can be characterized as a certain system of connections, relations carried out within the framework of a specific activity, as well as ways of doing business. This term also refers to a strategic tool that allows you to orient all employees of the company to achieve common goals, increase their initiative and improve communication between them.	system
Haiduchenko S. O. (Haiduchenko, 2020)	Organizational culture is a social phenomenon that occurs in any organization and is a system of values, beliefs, as well as norms, roles, rules that guide the activities of the organization (enterprise), forms relationships and connections between employees and organizational units.	social phenomenon
Yuskevich A.I., Lehky O.A. (Yuskevich, Lehkiy, 2020)	Organizational culture is a totality of spiritual traditions, values, historical moments, a set of organizational symbols, norms of behavior and rules that are included in the work and appreciated by every employee of the enterprise.	totality
Brusientseva O. A., Sholokhova K. (Brusientseva, Sholokhova, 2019)	Organizational culture permeates the entire organization both vertically and horizontally, it is both a product of the company's vital activities and a factor that determines the parameters of the effectiveness of such activities. Organizational culture is a set of the most important assumptions accepted by the members of the organization and expressed in the values that the organization declares and determine for people the orientations of their behavior and actions.	product and factor

Source: systematized by summarizing the works

Geographically, mainland China and Japan (including Hong Kong and Taiwan) have the most companies on the list with 196 companies. United States 122 companies. From the countries of Europe, France is the 5th country represented with 26 companies, after Germany (27 companies) and ahead of the United Kingdom (22 companies). To achieve the goal of the research, the author proposes to consider the main multinational companies of Europe, the USA and Asia (Table 3).

Table 3. List of multinational companies of the USA, Europe and Asia TOP-10 (systematized by the author)

Europe		USA	Asia	
The company name	Country	The company name	The company name	Country
Shell	Netherlands, Great Britain	Microsoft	State Grid	China
BP	Great Britain	Apple	China National Petroleum Corporation	China
Volkswagen	Germany	Amazon	Sinopec	China
Glencore	Switzerland	Alphabet	Toyota Motor Corporation	Japan
Daimler	Germany	Facebook	NTT	Japan
TotalEnergies	France	Berkshire Hathaway	Honda Motor	Japan
Trafigura	Switzerland	Visa	Hitachi	Japan
Stellantis	France Italy	JPMorgan Chase	Nissan Motor	Japan
Exor	Italy	Johnson & Johnson	Samsung	Korea
AXA	France	Walmart	Matsushita	Japan

Source: ([Largest Companies in the World, 2023](#))

As can be seen from Table 1, European multinational companies are concentrated in Great Britain, France, Germany and Switzerland, it is worth noting that almost all the listed countries are part of the G8 countries. The analysis of US multinationals showed that the listed companies, which entered the TOP-10, are today the most famous companies in the world that implement their activities, products, and services all over the world. Multinational companies in Asia are mainly in the automotive industry and the electronics industry. Analysis of company turnover allowed the author to single out the TOP-10 multinational companies in the world (Table 4)

Table 4. Top 10 multinational companies by turnover in millions of dollars (systematized by the author)

The company name	Country	Turnover (million dollars)
Walmart	USA	523964
State Grid	China	383906
Amazon	USA	280522
China National Petroleum Corporation	China	379130
Sinopec	China	193346
Apple	USA	260174
CVS Health	USA	256776
United Health Group	USA	242155
Toyota Motor Corporation	Japan	275288
Volkswagen	Germany	282760

Source: ([Largest Companies in the World, 2023](#))

For the eighth year in a row, the American Walmart leads the list of the largest companies in the world and for the sixteenth time since 1995 with 524 million dollars.

This analysis allowed the author to make sure that multinational companies deal with radically different organizational cultures. For example, Asia is a continent where culture and rituals are very important every day. So important that they are also present at the very heart of the company. Asian management derives from this culture and these traditions to become the authoritarian management characteristic of Asians.

For a better understanding of the organizational culture of Asian countries, it is necessary to conduct an analysis of the behavior of the Asian population.

A behavior divided in two, between tradition and modernity, which can sometimes be paradoxical. Thus, constrained by the burden of tradition and significant ideological culture, Asian culture is often considered complex in itself, like their countries. Take just the example of Korea, a country that is perceived as mysterious and inaccessible, simply because of the country's handed down political ideology and power. Asian life is guided by very important and very important values: family, religion, spirituality, country and community. In contrast to Western countries, where society is perceived as individualistic, for Asia it is primarily a collective and collectivist perception, a real difference in social perception and the role of everyone.

Sharing, harmony and finding consensus in every moment of life are the pillars of traditional Asian society. No one should promote himself or assert himself by suppressing others. Under the guidance of currents of thought, the main one of which is Confucianism, Asians are immersed in the doctrine of loyalty and the importance of rituals in everyday life.

But Asia is also something completely different, a modernity and openness to other cultures, brought in particular by different communication channels and the many Western expatriates in Asia today. According to the study, almost 56,231 citizens of France, a European country, are registered on the Asian continent (including 15% in China). Modernity, which is revealed thanks to unprecedented technological progress and the approach of developing countries to Western economic models.

The organizational culture of the EU is based on three key factors: coordination, transformation and the purpose of pursued actions. However, organizational culture does not develop in an abstract way within the organization. It is formed and developed during the implementation of projects, sometimes with the involvement of external partners, and is often part of the historical trajectory of the establishment of the organization.

Coordination, characterized by community cooperation (organic solidarity), justified by the joint definition of project boundaries and goals. This first stage is based on social identification, which leads to regulation (pre-allocation of tasks, initial goals).

Hierarchical authority or formalization by contract is little used at this stage. This first phase culminates in the conclusion of external agreements with partners who are not part of the initial network, and formally mark the boundaries between the shared identity group and the external environment.

Transformation is dominated by complementary cooperation. The latter is thus characterized by a logic of task specialization by profession, leading to a hierarchy of knowledge between specialized professions and the support function, and a greater formalization of rules, the difficulties faced in the field forcing participants to revise their respective goals, as well as to invent collective work rules specific to the project. This second stage ends with the implementation of the project, before any adjustments (prototype).

The goal of pursued actions begins with a review of goals after the project is completed (prototype) or implemented (service). Cooperation is moving in the direction of reviewing the obligations of all partners and attracting new external partners. Incremental collaboration gives way to community collaboration as the group rethinks "its identity in the materialization of the project." It is moving towards a review of the commitments of all partners and the involvement of new external partners.

American organizational culture is as follows: feedback culture: evaluation and continuous improvement, time management: punctuality and efficiency, the art of meeting: quick decisions for action, result culture: success ideology and entrepreneurial spirit, initiative: innovation and competitive-

ness, relaxed management style: lack of hierarchical distance and team cohesion and positive spirit: interpersonal communication skills and use of opportunities.

One of the main documents regulating the organizational culture of multinational companies is an internal document that explains and supports the values, ethics and behavior of employees. Among these core values are three: respect, integrity and excellence, which correspond respectively to the dimensions: attention to detail, valuing partners, creativity and innovation.

The idea of integrating the organizational culture is not always unanimous among the staff, believing that it promotes the assimilation of employees rather than allowing them to flourish.

However, it is the focus on the study of the management methods of multinational companies in different countries that contributes to the successful harmonization of cultures.

The success of modern Asian industry is based on the transplantation of traditional values of solidarity and respect for order and hierarchy. Organizational culture has become an undeniable tool in the management of human resources and has enabled a large number of management processes, such as expression groups, quality circles, projects and corporate history.

It is through this notion of culture that Asian companies have focused their interest on the importance of human resources. Asian staff effectively and actively participate in company projects. This type of management advocates full integration of the individual, elimination of any conflict of interest between groups.

Based on the conducted research, the author proposes to compare three models of organizational culture concepts: American, Asian and European (Table 4).

Table 4. Concept models of organizational culture: American, Asian and European (author's vision)

Organization- al and cul- tural features	American model	Asian model	European model
Company loyalty	Short employment	Lifetime employment	Employment mobility
Evaluation of employees	Fast and quantitative	Slow and high-quality	Systematic and qualitative
Career	Specialized	A wide spectrum, not based on a specialty	A wide spectrum, not based on a specialty
Nature of control	Explicit and formal	Hidden and informal	Clear and permanent
Decision-making	Individual	Group and consensual	Group
The nature of responsibility	Individual responsibility	Collective responsibility	Individual responsibility
Interests	Narrow (individual)	Traditional (family)	A person is the center of a company

Source: based on the work of the authors (Akpa, V.O., Asikhia, O. U., Nneji, N. E. (2021), Qi, J. C., Lee, K. L. (2019), Redding, G., Harris Bond M., Witt, M. A. (2012))

All three models of the concept attach great importance to organizational culture. This allows American companies to become an attractive center for talent, thereby ensuring their normal functioning. They rely more on their individual productivity, which is the main principle of their way of organizing. It also guarantees a career plan for employees and obtaining a responsible position. Thus, the American model favors hierarchical separation and benefits from specialization. This model allows you to attract the most talented candidates. As a result, he advocates individualism and a more results-oriented vision. This makes it possible to deduce the main foundations of American management; accurate and clear definition of goals.

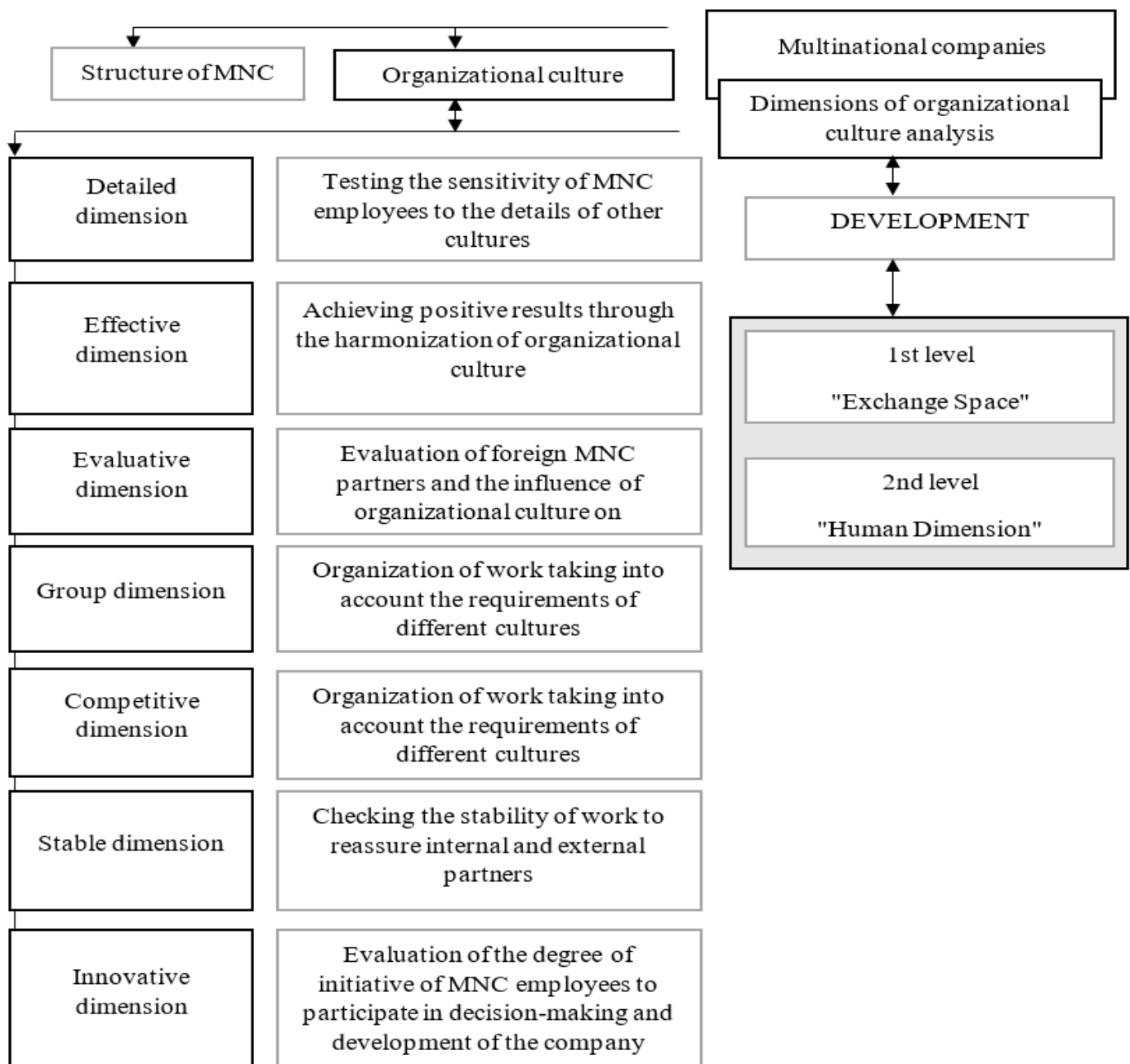
As for the Asian model, it is very different from the American and European ones. Asian companies are based on a great principle: lifelong employment is considered a major aspect of the relationship between the hierarchy and employees. It is a moral obligation to keep the job of a person who belongs to the company. An employee, through his dedication, must support his organization and be loyal under all circumstances. Contrary to the fashionable specialization among Americans,

Asians prefer versatility and multifunctionality. All employees, regardless of their hierarchical rank, are able to work in multiple positions and perform multiple tasks. Thus, the sense of security that the Asian organization provides to its employees increases their motivation and involvement in the company's projects. Unlike Americans, decision-making in Japanese firms is based on consensus, hence the feeling of systematic listening, as well as the efficient and constant circulation of information. This improves the company's response time.

The European concept is that the person is the center of the company with its own interests. The main aspect in the organizational culture is that European companies promote mobility in employment. Thus, the organizational culture is built in such a way that it educates the staff and teaches them various competencies that are able to develop professional skills taking into account the characteristics of each person.

The observed differences regarding the organizational culture developed over time can be explained by the cultural imprint that the multinational company imposes. This cultural factor will influence the forms of cooperation.

Figure 2. System of organizational culture of multinational companies



Source: (author's development)

Thus, a culture that is perceived as ambiguous by its members will generate either community or additional cooperation. If the introduced organizational culture allows the working group of MNC to develop a common idea about them (an organizational culture that corresponds to the integration paradigm), it can contribute to the development of community cooperation. In contrast, the embodiment of cultural traits that are not unanimous in the group (local cultures corresponding to the differentiation paradigm) will lead to complementary cooperation in anticipation of the development of a shared representation and mutual trust between people.

A multinational company must develop internal communication to consolidate its value system and spread them, as well as external communication to publicize its style, way of thinking, its skills and interpersonal skills. Culture would then be evolutionary; a widely recognized and relevant approach. It promotes diversity in the company's cultural system. It is a complex system because it is heterogeneous, but also scalable because it is constantly changing to adapt to the demands of the business environment (Figure 2).

According to Figure 2, the identity of a multinational company is based on two main aspects. The first aspect is the structure of the company, namely its sector of activity, type of technology, its size, applied strategies. The second aspect is organizational culture: a set of values, patterns, and standards established by groups within an organization. By extension, organizational culture has become an elusive concept that has a certain power over MNC, forcing it to constantly evolve. This manifests itself at the first level as not only a place of production and profit, but also a space of exchange where sociability is formed and where values are developed. At the second level, reassessment of the human dimension, which plays a key role in the development of the company's strategy. In this case, it is necessary to integrate culture into the managerial vision of business leaders. To ensure the organizational culture system of multinational companies, it is necessary to conduct measurements and analysis of organizational culture, and promote development on two levels, which will ultimately stabilize the personnel processes within the enterprise and increase the level of effectiveness of multinational companies.

To determine the importance of components in the analysis of organizational culture, an expert survey was proposed, which would allow identifying the most significant influences from the point of view of the managers and executives of the studied multinational companies, confirming the conclusions of the analysis results, and accordingly increasing the validity of recommendations for the implementation of the organizational culture system in multinational companies. The coefficient of concordance was used to determine the agreement of experts' opinions. The coefficient of concordance is a value that characterizes the agreement of experts' opinions and the reliability of the survey results obtained. An important stage of this block is the formation of a group of experts. Thus, if the maximum sampling error is 0.05, the calculated number of experts is 30 people. Thirty experts were surveyed, and their work was carried out through questionnaires and interviews. The methodology for determining the coefficient of concordance is presented in Figure 1. The calculated value of the concordance coefficient is in the range from 0 to 1. If the value of the coefficient is greater than 0.8, this allows us to assert the consistency of the experts' opinions and the reliability of the obtained research results. The obtained value of the concordance coefficient according to the survey data is equal to 0.77, that is, we have reliable results and consistency of experts' opinions. The analysis of the qualitative composition of experts allows us to confirm the following: highly qualified personnel were involved in the examination (81% of experts have a higher education, 19% have secondary special education) mainly with 15-20 years of work experience in their specialty (38% of experts have 15-20 years of work experience, 35% - 10-15 years; 18% - from one to ten years; 9% - more than 20 years of work experience). The results of the assessment of the importance of the dimensions of the analysis of organizational culture are presented in the Table 5.

Table 5. The matrix of ranks for measurements the importance of the dimensions of the analysis of organizational culture

Measurements	Experts																														$\sum_{j=1}^m a_{ij}$	Weight of measurements
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Detailed measurement	6	6	5	5	6	5	6	6	5	6	5	6	6	5	6	5	5	6	5	4	5	6	5	5	6	6	5	6	6	6	165	0,02381
Effective measurement	4	5	3	4	4	4	4	4	4	4	4	4	5	6	5	6	6	3	4	5	4	3	6	3	5	5	4	4	5	3	130	0,07937
Evaluative measurement	1	2	2	1	2	2	1	1	2	2	2	1	1	1	1	1	1	2	2	2	2	2	1	1	1	2	1	2	1	1	44	0,2159
Group measurement	3	3	4	3	3	3	2	3	3	3	3	2	2	3	3	3	3	4	3	3	3	4	3	2	3	3	3	3	3	4	90	0,1429
Competitive measurement	2	1	1	2	1	1	3	2	1	1	1	3	3	2	2	2	2	1	1	1	1	1	2	4	2	1	2	1	2	2	51	0,2048
Stable measurement	3	4	4	3	3	4	5	3	3	4	4	5	2	2	2	6	3	2	3	3	5	5	2	3	3	3	4	3	2	2	100	0,127
Innovative measurement	2	1	1	2	1	1	3	2	1	1	1	3	3	2	2	2	2	1	1	1	1	1	2	4	2	1	2	1	1	2	50	0,2063
$\sum_{i=1}^n \sum_{j=1}^m a_{ij} =$																														630	1	
																														S=	13112	
																														W=	0,77	

Source: calculated by the author

In the Table 5, the rows contain information on the analysis of organizational culture, and the columns contain information on the experts who perform the evaluation. The experts were asked to arrange the dimensions of organizational culture analysis by level of importance: 1 – the most important component, 6 – the least important.

Therefore, the results of the expert evaluation indicate the predominance of such dimensions of the analysis of organizational culture as: the competitive dimension and the innovative dimension.

According to the author, it is advisable to analyze the organizational culture of multinational companies along seven dimensions in order to determine the degree of its strength and weakness.

Thus, organizational culture is a dynamic construct consisting of several subcultures, which allows for the reconstruction of the company's history. The author of the study summarizes the extent to which, from a diachronic point of view, organizational culture can influence the development of a multinational company.

This change in the perception of organizational culture has made it easier for companies to cross the threshold of globalization. This has given managers the opportunity to apply methods that take into account the organizational cultural characteristics of the markets in which they operate. Employees work and collaborate in different ways that are specific but largely reflect the culture and politics of each country.

6.DISCUSSION

Finally, the concept of organizational culture is closely related to values, norms, traditions, and customary and shared practices that have a direct or indirect influence on how members of a company act. It can be analyzed, modified or enhanced according to the needs of the organization to enable the latter to have market share.

Organizational culture is the main driver of a company's identity, which is never equated with habits. Otherwise, stereotypes are born, and the process of change will not be easy. On the other hand, considering culture as a matrix of orientations, a way of producing and giving meaning, in this case every actor in the company will act intelligently.

7. CONCLUSIONS

Finally, the influence of organizational culture on the development of activities of multinational companies is quite significant. Research highlights the fact that understanding organizational culture can foster collaboration. Indeed, if you perceive organizational culture exclusively from the point of view of integration or differentiation, there is a risk of misinterpreting certain features of another culture.

The study made a theoretical generalization of approaches to the formation of organizational culture of multinational companies and proposed a system of organizational culture of multinational companies as a practical recommendation for its improvement in the context of sustainable development. A properly constructed organizational culture can mitigate some of the effects of national culture, but cannot eliminate or completely erase it. On the other hand, strengthening a very strong organizational culture can increase the productivity of foreign subsidiaries by adapting their management practices to the national culture of the host country.

Cultures travel and meet together with economic globalization. The development of MNC activities can integrate foreign culture into traditional local culture, but cannot eliminate it either at the national or administrative level. New management performance measures must support organizational knowledge that continues to develop strategies and create new business models. Asian BNCs must understand that traditional values still prevail today in industrialized and commercial organizations in China, Japan, and elsewhere.

However, research for the purpose of further research should be supplemented by work in other areas (commercial companies, associations of employers and managers), this will allow generalization of the entire scope of the influence of organizational culture.

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SOCIAL RESPONSIBILITY OF BUSINESS TOWARDS SUSTAINABLE DEVELOPMENT: CASE OF UKRAINE

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Received 15.02.2023.

| Send to review 27.02.2023.

| Accepted 26.05.2023.

Original Article



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JEL Classification:

M14, A13, M21, M31, F20

Doi: 10.61432/CPNE0101126k

UDK: 339.137.2:330.341.1(477)

ABSTRACT

Social responsibility is one of the priority tasks of corporate management and one of the urgent problems of the modern economy, in the context of determining the role of social responsibility in the sustainable development of a business organization and the contribution of social investments to sustainable development. The purpose of the article is to assess the current state of development of the institute of social responsibility, the implementation of the policy of social responsibility and transparency of economic activity by Ukrainian businesses, the study of factors that become obstacles to the introduction of the institute of social responsibility in Ukraine. This publication highlights the aspects of transformational changes, the globalization of economic relations, the role of sustainable organizational development, and their impact on the formation of socially responsible business standards. An attempt was made to give a systematic presentation of the main advantages of transparency in reporting on economic activity. The results of modern rating systems of enterprises in the context of social responsibility in Ukraine were analyzed. Problems hindering the development of social responsibility of business in Ukraine are identified and outlined. The scientific research concludes that the active implementation of the policy of social responsibility in the formation of the Ukrainian business strategy should become one of the tools for ensuring the prerequisites for competitive advantages, strengthening the image of companies by strengthening the loyalty of employees, the trust of regular and potential customers, partners, local communities and the opportunity to attract “green” financing.

Keywords: *sustainable development, sustainable development goals, social responsibility, ESG factors, transparency rating of companies, corporate sustainability*

1. INTRODUCTION

The economic activity of enterprises has a significant impact not only on the development of the national economy but also on the life and functioning conditions of the population. Not just in terms of the products and services they offer or the jobs and opportunities they create, but also in terms of working conditions, human rights, health, environment, innovation, education, and training. In the modern conditions of the development of economic relations, the success of the company, as a whole, or its project, largely depends on the culture of its behavior, the presence of common values, understanding and attention to social problems, as well as consumer trust.

Accordingly, the population rightly expects that modern enterprises understand their positive and negative impact on society and the environment and can prevent, manage and mitigate any negative consequences of their activities by the principles of sustainable development and social responsibility ([European Commission](#)).

The sustainable development of the economy and society in general, the implementation of the concept of well-being, and the construction of socially-oriented economic systems have long become the main vectors of the development of the world community. Petar Djukic write “Environmental culture and sustainability culture are only a part of a relatively new business culture and behaviour. In fact, ecological behaviour and “green intelligence” are typical human characteristics, and are a part of the universal human culture, as well as of a sustainable relationship with nature and with future generations” (Đukić, 2015). Today, the development of the concept of social responsibility in business is almost the most important factor in competitive positions and brand recognition. The concept of social responsibility is based on the principles according to which companies integrate social and environmental issues into their commercial activities and their interaction with interested parties voluntarily. Nowadays, socially responsible business activity is a generally accepted rule followed by a significant number of large, medium, and even small companies around the world.

Social responsibility of business has long been a basic requirement of society, an object of control and management by the state, and a guarantee of profitable activity for business entities themselves. There are many benefits that Ukraine, national businesses, and our society can get from implementing specific measures in this area. Among them are positive indicators of economic development, the formation of a good level of social well-being, where an appropriate level of consumer demand is possible, as well as an increase in the productivity of companies due to several competitive advantages and the creation of prospects (social, economic, technological and resource) for its further development (Krykun, Nanavov & Pryiatelchuk, 2017). An important, and most important, negative feature of the modern business environment is that companies work in conditions of worsening environmental conditions, increasing cases of inequality and violation of human rights, which affects their relations with society and social responsibility.

In previous years, social responsibility was part of the communication strategy of companies, but recently, especially in times of war, it has become an integral part of the development and viability of the business and the achievement of sustainable development goals. Modern social problems, in particular, Russia’s military actions in Ukraine, emphasized the fact that business and society are in the same boat. A business that thinks strategically understands that without the support it needs to provide now to partners and society in general, there will be no future.

The positive reputation of a commercial company is determined not only by its profit and high quality of products but also by the degree to which its activities correspond to “the current economic, legal, ethical expectations of society regarding this organization” (Carrol, 1999:288:289)

Daniel F. Runde, senior vice president and director of the Project for Prosperity and Development (PPD), noted as early as 2011 that there was a shift in the perception of social responsibility, in particular: companies began to realize that aligning projects with strategic business goals could improve their competitive advantage, improve the skills and engagement of their employees, improve their understanding of local markets and help them to be full and productive members of the communities they serve. People increasingly believe that companies are important actors in society with important means and influence; that responsible business has the power to foster a more cohesive society; and that they can contribute to a sustainable economic system. Businesses recognize the potential of responsible practices to deliver important benefits in terms of risk management, cost savings, access to capital, customer relations, employee satisfaction, operational stability, innovation, and profitability (Daniel, 2011).

“ COVID-19 has forever changed the way companies communicate with their employees, stakeholders, and communities. COVID-19 has prompted people to rethink their priorities, raising concepts such as community service, equity, and sustainability. Ten years ago, these values were not top operating priorities for many consumer goods companies. But today’s consumer doesn’t just want savings and convenience, they also want to feel good when a company that aligns with their values gets their money” (Bounfantino, 2022). Today, businesses around the world need to get used to living in a new reality. According to expert research, the world is completely changing after the quarantine due to COVID-19, namely: work and operational activities are changing, as well as consumer demand.

The “research tells us that 82% of shoppers want a consumer brand’s values to align with their own, and they’ll vote with their wallet if they don’t feel a match. Three-quarters of shoppers reported parting ways with a brand over a conflict in values. Even with their favorite consumer goods prod-

ucts, a majority of shoppers will not compromise on principles. If there's a value mismatch, 39% of shoppers said they'd permanently boycott their favorite brand, and 24% would break ties at least temporarily. Most won't be quiet about their concerns either: 28% of consumers that found their values at odds with a brand shared their concerns with friends and family, and another 15% shared their qualms on social media" (Bounfantino, 2022). Companies should focus on how their values align with the values of consumers and what impact they have on society.

Sustainable thinking is not only about reducing a negative impact but also the ability to adapt to new challenges and realities. When it comes to sustainability, businesses need to understand what needs to be done right now. Companies can act responsibly in many ways, such as encouraging volunteerism, making environmental changes, following ethical labor practices, and participating in philanthropy. At the same time, it is important to remember that profit is important for a company, but a company that does not pay attention to social responsibility will eventually be abandoned by society. During the quarantine, some companies started investing in healthcare, even though it was not their priority before. Ukrainian and global companies demonstrate positive examples of how to act in crisis conditions.

Luxury brands have moved into the development of sanitizers and the tailoring of protective medical suits, and some companies are making investments at the local level. For example, the "Tarantino Family" restaurant chain provided doctors with free food during the quarantine, and the Lifecell company provided doctors with 15,000 free calls throughout Ukraine (Belyaeva, 2020).

Since its inception, Starbucks has been committed to social responsibility, including sustainability and community well-being. It procures Fair Trade-certified ingredients for its production and actively supports sustainable agriculture in the regions where the ingredients come from (Starbucks).

Lego, the toy manufacturer, is committed to reducing carbon (CO₂) emissions from the manufacture and sale of LEGO® bricks in its factories, offices, and stores, as well as in its supply chain. In 2020, Lego was the first major toy company to announce a science-based emissions reduction target (Lego).

During the opening of Salesforce, which has been the world leader in CRM platforms for more than a year, co-founder Marc Benioff expressed his theory that profitability and charity as the main pillars of the company's DNA are two ideas that, in his opinion, should not be mutually exclusive. Based on this theory, the company developed the so-called 1-1-1 model, according to which 1% of the company's equity capital, 1% of its product and 1% of the employees' time are dedicated to society (Salesforce).

According to Maryna Saprykina, head of the board of the Center for CSR Development, today even the smallest investments are an example of companies' sustainable thinking. However, in the context of making sustainable decisions, companies should think globally about how their actions affect three main areas: economic, social, and environmental. The world still suffers from global challenges that need to be addressed. More than 800 million people depend on climate change. In recent years, biodiversity has decreased by 60%, some species are threatened with extinction, and due to forest fires in Australia, some species of animals have disappeared forever. Rainforests are shrinking at a rate of 300 football fields per minute, and the problem of plastic is still a major threat to the environment. Every year, 8 million tons of plastic are found in the oceans. The amount of plastic in the seas and oceans could triple over the next decade unless decisive action is taken. Another global problem is poverty. More than 700 million people live on less than \$2 a day, and 25 million people are enslaved by global supply chains (Saprykina, 2020).

The concept of social responsibility in the context of business means that a firm/company operates to achieve its financial goals and in addition helps society. The idea is that businesses should combine profitable activities with activities that benefit society. That is, a socially responsible company should not work exclusively for profit maximization, but should make decisions and perform actions that are acceptable from the point of view of society's goals and values (Gozora & Resler, 2021).

Therefore, corporate social responsibility (CSR) is a management concept in which companies integrate social and environmental issues into their business operations and interact with their stake-

holders (UNIDO). In today's socially conscious environment, employees and customers value work and spend money on businesses that prioritize corporate social responsibility.

Companies that are known for their corporate responsibility can gain an advantage in attracting investors, business partners, and new employees, as well as in establishing customer preferences. Many company community programs can help develop employee skills. Volunteering and other forms of employee involvement help develop various competencies, including teamwork, planning and implementation, communication, project management, listening skills, and customer orientation. Active participation in public activities creates a positive reputation among stakeholders in the company (Gozora & Resler, 2021).

Ukraine's transition to sustainable economic development, its integration into the European and world community, and the modern practice of conducting business, both on the national and global markets, increasingly indicate that corporate social responsibility is a factor in increasing profitability, the company's image, and reducing costs, increasing employee morale and customer loyalty, as well as other benefits. In addition, for companies pursuing a multinational business strategy, community involvement can be useful in supporting efforts to enter new markets, attract potential employees, and build or strengthen the reputation of the company, its brand, and its products. Given the traditions of Ukrainian charity, the issue of corporate social responsibility is now extremely relevant for any region of Ukraine.

2. LITERATURE REVIEW

Even though today there are many interpretations of social responsibility, which mainly provide an opportunity to expand and (or) deepen its essence, it can be confidently stated that most interpretations are concentrated around the very first, formulated by H. Bowen, interpretation of the social responsibility of businessmen. The author noted: "This refers to the obligations of businessmen to carry out such policies, make those decisions or follow those courses of action that are desirable from the point of view of the goals and values of our society." (Bowen, 1953).

A significant contribution to the formation of the basic concept of CSR was made by the American scientist K. Davis, who for many years held the position of president of the Academy of Management. He considers a comprehensive approach to the analysis of external forces that determine the social activity of companies. K. Davis believed that the social responsibility of businessmen should be commensurate with their social power, that is, he considered the idea of social responsibility in the managerial context (Davis, 1960, p.71). K. Davis views the business entity as a joint enterprise that unites responsible citizens such as managers, investors, employees, representatives of the local community, etc., and their groups. This "joint enterprise" is responsible for meeting not only economic but also social, psychological, political, and other expectations of society (Davis, 1967, p.46-47). It is worth noting that in the mid-1960s, K. Davis formulated the so-called "iron law of responsibility": those who do not take responsibility adequate to their power will eventually lose this power (Davis, 1967, p.47).

P. Drucker emphasized the need to turn social problems into economic opportunities, that is, he focused on the idea of business responsibility (Drucker, 1984). A. Carroll had a different approach to understanding social responsibility; in particular, he considered it from different points of view. In particular, the initial model of A. Carroll covers four types of social responsibility of the organization: economic, legal, ethical, and so-called discretionary. A. Carroll associates discretionary responsibility with the sphere in which society has not yet formed clear expectations, and it is such in content that it involves the individual voluntary choice of the manager (Carroll, 1979). In the early 1990s, the model proposed by A. Carroll gets further development in his theoretical and applied developments, and it can already be presented in the form of a pyramid of four types of social responsibility: economic, legal, ethical, and philanthropic (Carroll, 1991). "Today, CSR is a global concept that has progressed from the interplay of thought and practice. CSR represents a language and a perspective that is known the world over and has become increasingly vital as stakeholders have communicated that modern businesses are expected to do more than make money and obey the law. Today, ethics and philanthropy help to round out the socially responsible expectations placed on modern organizations

striving to be sustainable in a competitive, dynamic, global marketplace. Socially responsible firms make a special effort to integrate a concern for other stakeholders in their policies, decisions and operations” (Carroll, 2015).

In the 1980s and 1990s, a central theme of corporate social responsibility was the creation and development of stakeholder theory, which describes methods by which management can give due consideration to the interests of these groups, by economists such as R. Edward Freeman (Freeman, 1984), R. Ackoff (Ackoff, 1999) i A. Mendelow (Mendelow, 1981).

The theory of interested parties is supported by M. Clarkson, who notes “The corporation is a system of primary stakeholder groups. The survival and continuing profitability of the corporation depend upon its ability to fulfill its economic and social purpose, which is to create and distribute wealth or value sufficient to ensure that each primary stakeholder group continues as part of the corporation’s stakeholder system. Failure to retain the participation of a primary stakeholder group will result in the failure of that corporate system and its inability to continue as a going concern” (Max, B.E., Clarkson, 1995: 110). Крім того, на його думку “Wealth and value are not defined adequately only in terms of increased share price, dividends, or profits.” (Max, B.E., Clarkson, 1995: 112). That is, a business can be effective only under the condition of fairness and balance in the distribution between the main groups of interested parties. Social responsibility in this case is manifested in the measures taken by enterprises to form and expand a fair relationship between business and stakeholders, while not favoring one group at the expense of others.

Larry Fink’s, CEO of Black Rock, one of the world’s largest asset managers, expressed in a letter to shareholders that the purpose of business is to have a positive impact on society. In his opinion, responsible business should benefit society and address the negative consequences it can have on society, people and the planet. “The world is still in crisis and will be for some time. We face a great challenge ahead. The companies that embrace this challenge – that seek to build long-term value for their stakeholders – will help deliver long-term returns to shareholders and build a brighter and more prosperous future for the world.” (Fink’s, L. 2021). That is, the external vectors of the corporate culture system are decisive.

CSR has become popular in the last decades with companies of all sizes engaging in this field with different objectives. From stakeholder and shareholder relationships to consumer marketing up to the Dow Jones Sustainability Index listing, CSR is proving to be a relevant field for businesses of any sector to invest in. On top of this, previous studies indicate a positive correlation between CSR communication and business returns; in other words, the more a business invests in CSR and communicates in a proper manner the actions undertaken by the firm to different publics (i.e., stakeholders, shareholders, and consumers) the more likely there could be an impact on returns at different levels (Inversini & Derchi, 2023).

Corporate social responsibility is a form of self-regulation of business with the aim of social responsibility and positive impact on society. Some of the ways in which a company can adopt CSR include environmental friendliness and environmental awareness; promoting equality, diversity and inclusion in the workplace; respectful attitude towards employees; giving back to the community; as well as ensuring ethical business decisions (Reckmann, 2023). Passion Lilie’s founder and lead designer notes that what the public thinks of a company is critical to its success, and that by creating a positive image that a company believes in, it can build a name for itself as a socially conscious company (Advance ESG, 2021).

Not everyone believes that business should be based on the principles of social responsibility. Milton Friedman noted that “social responsibilities of business are notable for their analytical looseness and lack of rigor”. According to Friedman, due to circumstances, enterprises cannot have a sense of social responsibility, such a trait can be inherent only to a person. M. Friedman determined the maximization of shareholders’ income as the purpose of the company’s activity and argued that business does not bear social responsibility to the public or society, only to its shareholders (Friedman, 1970; Friedman, 2007). Other experts also agree with him, and from the point of view of shareholders costs for CSR, they believe that social responsibility does not correspond to the essence of business. In their opinion, profit is above all else, and investing in CSR is an inefficient allocation

of resources. Accordingly, capital and labor should be invested in the activities and development of the company that increase its value (Pagano & Volpin, 2005; Surroca & Tribó, 2008; Cronqvist, Heyman, Nilsson, Svaleryd, & Vlachos, 2009). Also, the issue of social responsibility was considered through the prism of the influence of the Washington Consensus on the development of economic relations, in particular the social responsibility of business (Kasumović, 2016), social justice of business, in the context of pay inequality (Trpeski, 2015).

More than 2,000 studies have been conducted indicating the relationship between ESG (environmental, social, governance) factors and financial performance since the 1970s (Friede, Busch, & Bassen, 2015). Most of them confirm the existence of a clear positive correlation between sustainable commercial success, financial performance and the company's efforts in the field of sustainable development (Khan, Serafeim, & Yoon., 2016). Most investors consider CSR as a sign of ethical corporate behavior that minimizes risk (Chastity, 2020). CSR can increase business profits by creating value, increasing innovation, improving customer and employee relations and expanding opportunities for growth (Im, liu, & Song 2022).

3. AIM OF THE RESEARCH

The purpose of the article is to assess the current state of development of the Institute of social responsibility in Ukraine, the implementation of the policy of social responsibility and transparency of economic activity by Ukrainian businesses, the study of factors that become obstacles to the introduction of the institute of social responsibility in Ukraine.

4. METHODS

The research methodology is based on a literature review, a survey, and a qualitative case study. In the process of writing, the following methods of scientific research were used: analysis and synthesis (to study and research the peculiarities and current state of development of the institute of social responsibility, the implementation of the policy of social responsibility and transparency of economic activity by Ukrainian business, the study of factors that become obstacles on the way to the introduction of the institute of social responsibility in in Ukraine, developmental-constructive (when developing proposals for the development of social responsibility), dialectical and abstract-logical (for theoretical generalization and formulation of conclusions).

The authors analyzed more than 200 domestic and international works and studies on global trends in social responsibility, from which 72 sources were selected, which were used in writing the publication. The sources that formed the basis of the publication include scientific works, studies of international organizations, conclusions and reports from global conferences, articles of leading publications and expert opinions, materials of international experts, social (non-financial) reports of Ukrainian corporations, results of Kantar Purpose 2020 research, PwC Global Consumer Insights Pulse Survey 2021, S&P 500 Index, information from Corporate Register Ltd, ESG Transparency Index 2020, rating of corporate sustainability of Ukrainian companies Sustainable Ukraine.

Research topics related to the essence of corporate responsibility, Principles of Responsible Investments - PRI, Sustainable Development Goals (SDG), the integration of Sustainable Development Goals into the company's strategy, the practice of implementing social responsibility, the rating of corporate sustainability and transparency of Ukrainian companies in the field of sustainable development.

To assess the state and readiness of Ukrainian businesses to move in the direction of social responsibility to achieve the goals of sustainable development, the Report "View of business leaders 2021" and "View of business leaders 2022" was used. It demonstrates the mood and views of Ukrainian business leaders and their readiness to accept global challenges in times of global crisis and geopolitical instability. The report's data provides a unique look at how leaders thinking is changing as a result of geopolitical challenges, including the full-scale war in Ukraine. 43 managers working in various sectors of the economy took part in the survey. The survey was conducted in Ukraine from July to October 2022. Its structure is based on 32 questions adapted from the global KPMG 2022 CEO Outlook survey.

To compare the state of social responsibility in Ukraine and the world, the KPMG CEO Outlook report was used. The 8th edition of the KPMG CEO Outlook report, based on the results of a survey of 1,325 company leaders between July 12 and August 24, 2022, provides a unique insight into thinking, strategy, and tactics CEO planning not only compared to the pre-pandemic period to today, but also compares to the results of the KPMG CEO Pulse survey of 500 CEOs, conducted between January 12 and February 9, 2022, before the full-scale Russian invasion to Ukraine. CEOs of companies whose annual revenue exceeds USD 500 million took part in the survey, and a third of the surveyed companies' annual revenue exceeded USD 10 billion. The survey covered leaders from eleven leading markets (Australia, Canada, China, France, Germany, India, Italy, Japan, Spain, the UK, and the US) and eleven leading industries (asset management, automotive, banking, consumer goods, and retail, energy, infrastructure, insurance, the field of medical and biological sciences, processing industry, technologies, and telecommunications).

To assess the corporate sustainability and transparency of Ukrainian companies, their social (not financial) reports were evaluated, and the corporate sustainability rating of Ukrainian companies Sustainable Ukraine, developed by Premier Business Consulting & Communications, was also used. The evaluation was carried out on the basis of a questionnaire filled out by the participants of the rating, which contains more than 100 indicators, as well as monitoring of the mass media and the study of other available public information about the companies participating in the rating.

Results

The basis for the development of the standard of socially responsible business was the recognition of the role of sustainable organizational development at the UN Conference on Environment and Development in Rio de Janeiro (1992) and refined in the UN report "On Human Development" in 1994 into a universal concept of sustainable development (Kuzmak, Kuzmak, & Pohrishchuk, 2021). The essence of the concept of sustainable development in its modern understanding is the balance of social development in social, ecological and economic aspects. Sustainable development is a development that satisfies all areas of society without compromising the opportunities of future generations (UN, 1992).

In 2015, in New York, as part of the agenda of the summit "Transforming our World: an agenda for sustainable development until 2030", the UN General Assembly approved 17 sustainable development goals aimed at fighting poverty, protecting the planet, and improving the lives and prospects of everyone, around the world and called on states, the public sector and business to unite for their implementation (UN, 2015).

That is, at the end of the 20th century - at the beginning. XXI century Friedman's doctrine, which we discussed above, that the costs of ethically responsible behavior outweigh the benefits, began to be increasingly criticized, and the environmental and social aspects of companies activities attracted public attention. At this time, the idea of responsible investing was developed, which involves taking into account in the process of investment analysis and decision-making not only financial but also environmental, social, and managerial aspects of companies activities (ESG factors (Environmental - care for the environment; Social - social projects; Governance - ensuring transparency of management)).

Business is more than just making a profit. Climate change, economic inequality, and other global challenges affecting communities around the world have forced companies to be purposeful and contribute to the common good (Gavin, 2019). The world community substantiated the principles of social responsibility in the UN Global Compact and the International Standards SA 8000 and ISO 26000. The UN Global Compact (2000) is the world's largest initiative created to promote the principles of corporate, social, and environmental responsibility among businesses. The World Network of the UN Global Compact counts more than 22,000 signatories from 163 countries of the world.

The Ukrainian local network is part of the UN Global Compact and began its work in our country in 2006 and has 118 Ukrainian signatories (as of 2023). (UN Global Compact, 2023). The Global

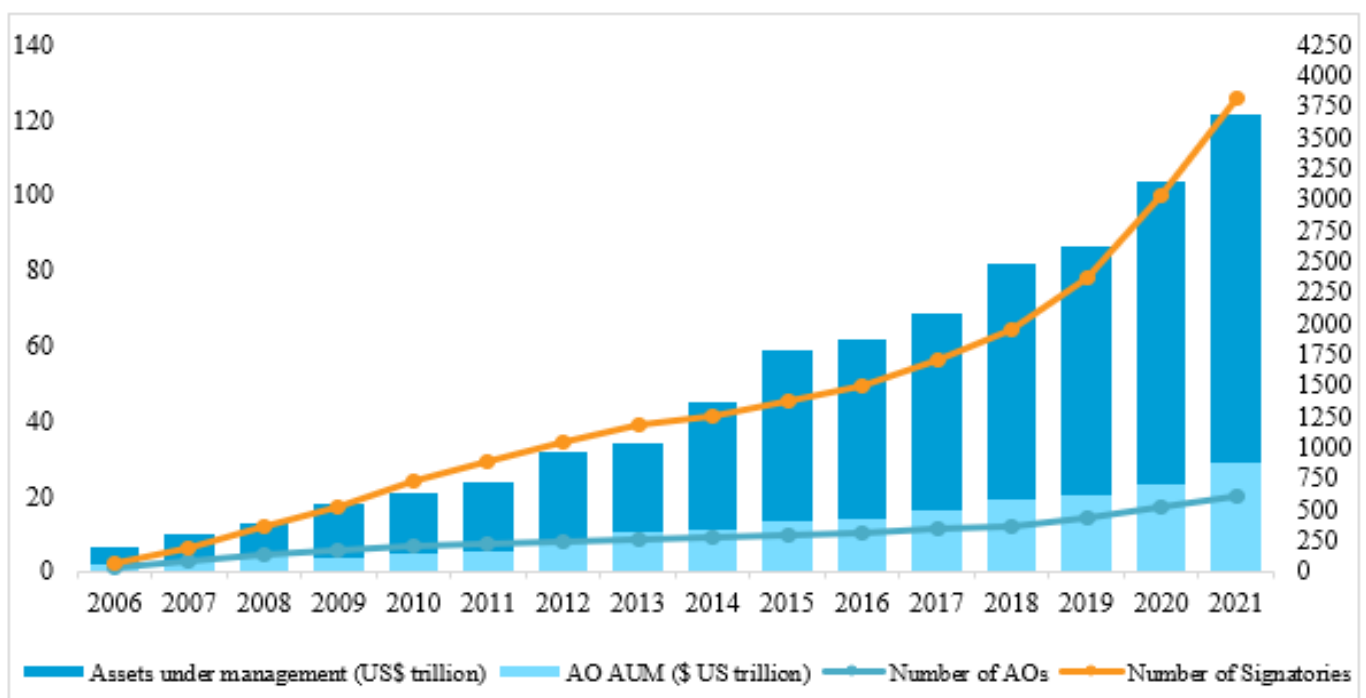
Compact establishes «Ten principles of social responsibility» in the field of human rights protection, employment, ecology, and anti-corruption.

At the beginning of 2005, the then UN Secretary-General Kofi Annan initiated the creation of a group of the world's largest institutional investors who joined the process of developing the Principles of Responsible Investments (Principles of Responsible Investments - PRI). At that time, a group of 20 investors and institutions from 12 countries was supported by a group of 70 experts from the investment industry, intergovernmental organizations, and civil society. In addition, the principles of responsible investment were developed with the support of the United Nations and were first introduced on the New York Stock Exchange in 2006. Investors from different countries of the world quickly joined these principles and by 2023 the number of organizations that signed the PRI increased from 100 to 3,826, and the total volume of assets under their management exceeded 120 trillion US dollars (Fig. 1) (PRI, 2023).

Demands from clients and other beneficiaries, who increasingly demanded more transparency about how and where their money was invested, as well as public pressure, were an important factor behind the widespread adoption of responsible investment practices. This can be explained by the growing awareness that ESG factors affect a company's value, profit, and reputation, as well as by increasing attention to the environmental and social impacts of investee companies. Today, most of the world's major banks have divisions dealing with responsible investments in their structure. Companies specializing in ESG investment consulting are actively developing.

Global statistics show that investors take into account the ESG factors of the organization they are considering as an investment target. According to the recent CFA Institute Earning Investors' Trust study 76% of institutional investors and 69% of retail investors have interest in investment design and products that incorporate environmental, social, and governance (ESG) factors, with a growing number of investors prioritizing racial diversity and justice to create a more inclusive society (CFA Institute, 2023). According to Bloomberg, global ESG assets could exceed \$53 trillion by 2025. This represents more than a third of the \$140.5 trillion in projected total assets under management (Makarenko, 2022).

Figure 1. PRI Signatory growth 2006-2021



Source: Constructed by authors on the basis (PRI, 2023)

The Kantar Purpose 2020 research demonstrated a direct relationship between positive perception and its impact on the growth of brand value. Companies perceived by the public to be highly influential have seen a 175% increase in brand value over 12 years, while businesses with low positive influence

have only seen a 70% increase (Kantar, 2020). The PwC Global Consumer Insights Pulse Survey 2021 found that 53% chose to support companies “very often or often” (PwC Global, 2021), that have strong corporate values and demonstrate a commitment to doing right. 77% of US consumers were motivated to do the same, while 74% of UK consumers also consider brand values before making a purchase, and 57% indicate that companies should be socially and environmentally responsible (Feefo, 2021). Consumers are not the only ones who are attracted to socially responsible companies, and sustainability strategy is an important factor when choosing an employment company.

Today's society values culture, diversity, and high impact over financial gain. Approximately 44% of Millennials and 49% of Gen Zs rely on their ethics when choosing the type of work and companies they will join (Deloitte, 2021). 70% of 1,004 US adults surveyed about the corporate purpose and social justice believe they would not work for a company without a strong purpose (Porter Novelli, 2020).

Governments and international organizations support sustainable business development. In the European Union, for example, a whole architecture of sustainable development has been built: a multi-vector strategy of climate neutrality until 2050, the European Green Course, a taxonomy of «green» finance, which classifies activities that meet sustainability criteria, has been implemented, and a system of financial sustainability has been implemented. In 2019, the Management Accountability Institute (G&A) announced that 90 percent of large companies (S&P 500 Index) published sustainability and responsibility reports – compared to 86 percent in 2018, 75 percent in 2014, and just 20 percent in 2011. This push for sustainability and accountability reporting is a response to growing stakeholder expectations. For example, 73% of investors are looking for environmental and social responsibility and sustainability in business. In addition, 77% of consumers are more likely to use brands that strive to make the world a better place (G&A, 2020).

Historically, Ukraine's path to sustainable development began at the same conference in Rio de Janeiro, when the Rio de Janeiro Declaration and Agenda for the Program of Action in the 21st Century were signed. Then Ukraine confirmed its desire to follow this path and, as a result, in 1997, the National Commission for Sustainable Development was created under the Cabinet of Ministers of Ukraine.

To understand the importance of social responsibility in business in Ukraine, there is already some progress. Ukrainian business sees in this not only social responsibility, but also a way to increase the loyalty of employees, customers, and local communities and an opportunity to attract “green” financing. Although, it is worth understanding that the implementation of sustainable business practices is not just a process that can be implemented in a month or a year. This requires a complex transformation of the business model and additional investments, sometimes quite large.

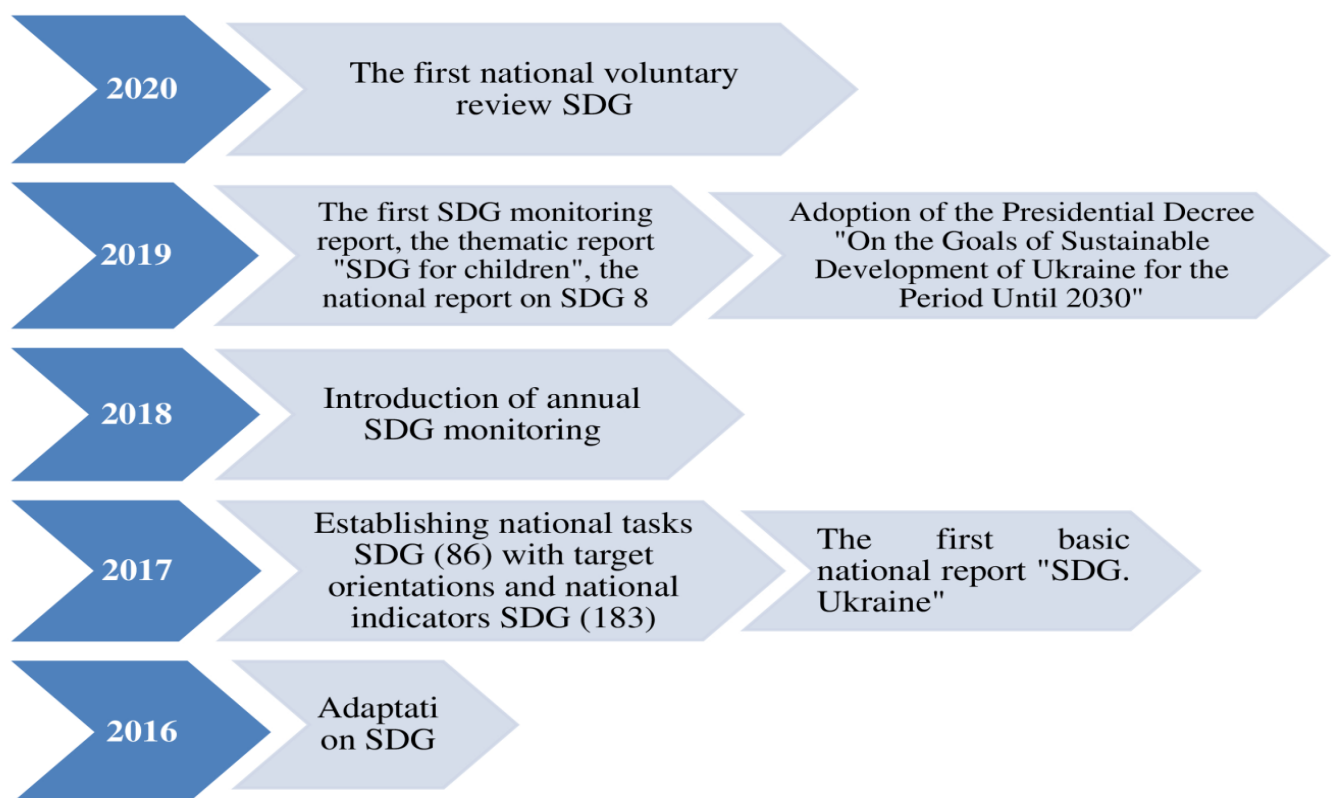
Since 2015, several reforms have been launched in Ukraine (Fig. 2), aimed at implementing socioeconomic transformations and strengthening the democratic system. The Sustainable Development Goals (SDGs) are integrated into a public policy based on “leaving no one behind”. The result of the inclusive SDG adaptation process for Ukraine, taking into account the specifics of national development, was the SDG system, which consists of 86 tasks with 183 indicators for monitoring. The government has established an Interdepartmental Working Group on SDGs to coordinate efforts to achieve the goals. So far, the responsibility of the ministries for SDG tasks has been established, the President of Ukraine has adopted a Decree that establishes the Goals as a reference point for the development of program and forecast documents, and an SDG monitoring system has been developed. In 2019, an analysis of the degree of SDG incorporation (at the level of SDG tasks) was carried out. In total, 17 goals and 86 national tasks of the SDG are incorporated into 162 regulatory and legal acts of the Government, 1,394 goals, and 4,296 measures established in these acts are aimed at the implementation of goals and tasks. But, despite a significant number of state strategic documents and a large volume of tasks and measures, not all tasks of the 17 goals are taken into account (KMU, 2017).

Regarding social responsibility, in particular, the policy of Ukraine and national business in the direction of achieving the goals of sustainable development in this context, then: in February 2010, the first meeting of the Advisory Council on the development of the National Concept for the Development of Social Responsibility of Business in Ukraine was held; the following are currently

operating in Ukraine: the Center for the Development of Corporate Social Responsibility and the Community of Socially Responsible Business; The Confederation of Employers of Ukraine has developed a project of the ISO 26,000 “Management on social responsibility” standard. At the same time, there are 118 signatories-participants of the UN Global Compact (The Global Compact) in Ukraine (UN Global Compact, 2023) – an initiative aimed at spreading responsible corporate citizenship and for commercial companies to participate in solving the problems that arise in connection with globalization. As part of the harmonization of Ukrainian legislation with European legislation, in 2019, for the first time, large Ukrainian companies had to prepare a management report for 2018; the new Code of Corporate Governance already starting in March 2020 recommends that Ukrainian companies disclose information regarding the development of ESG projects (National Securities and Stock Market Commission, 2020).

Also, in November 2021, the NBU presented a vision of the future development of the sustainable financial sector in Ukraine - the Policy of the NBU on the Development of Sustainable Financing for the Period Until 2025. The document contains a detailed description of the tasks of Ukrainian financial institutions to integrate ESG into financial services from the beginning of 2022. In particular, financial institutions will disclose information on the extent to which their activities are sustainable and report on their environmental impact, and when selecting projects for financing, they will assess their impact on the environment, sustainability of economic activity, and energy efficiency.

Figure 2. Statistics of actions related to the adaptation of sustainable development goals in Ukraine, 2016-2020



Source: Constructed by authors on the basis ([KMU, 2017](#); [KMU, 2021](#); [Office of the President of Ukraine](#))

Although, when analyzing the disclosure of information about non-financial aspects of the activity from a macroeconomic perspective, only 13% of companies in Ukraine from the 100 largest in terms of net income based on the results of 2018 prepared non-financial reports. According to Corporate Register Ltd. From 2016 to 2020, 136 non-financial reports were officially submitted in Ukraine - this is slightly more than 24 enterprises. For comparison, during the same period, in France almost 5000 reports - 800 enterprises, in Germany more than 7000 reports - 280 enterprises, in Italy almost 5 thousand reports - 700 enterprises, in Poland more than 480 reports - 500 enterprises, in the

USA 12 thousand reports - 2000 enterprises ([Corporate Register, 2020](#)). Ukrainian enterprises are moving to more conscious reporting, including state and private companies, every year the number of companies ready to form and publish non-financial reports increases, because this increases the trust of consumers, stakeholders, and investors. Companies are increasingly aligning their core business strategies and social goals with Sustainable Development Goals by adopting their own ESG (environment, social, and governance) strategies. According to the ESG Transparency Index 2020 ([CSR Ukraine, 2020](#)), an evaluation of the transparency of public information for 2020 was conducted by ESG criteria on the websites of Ukrainian companies that were among the 50 largest taxpayers and companies that voluntarily joined the evaluation.

Increasingly, companies are beginning to align their core business strategies and social goals with Sustainable Development Goals by adopting their own ESG (environment, social, and governance) strategies. In 2020, the Professional Association of Corporate Governance (PACU) and the Center for CSR Development, with the support of the Center for International Private Entrepreneurship (CIPE), conducted an assessment of Ukrainian companies based on indicators of transparency in the system of corporate governance and corporate social responsibility. On the basis of the conducted research, the ESG Transparency Index of Ukrainian companies in 2020 was presented. According to the ESG Transparency Index 2020 ([CSR Ukraine, 2020](#)), the transparency of public information for 2020 was assessed by ESG criteria on the websites of Ukrainian companies that were among the 50 largest taxpayers, and 10 companies that voluntarily joined the evaluation, and companies from among the TOP-10 Transparency Index 2019.

The index shows the level of information openness of the largest domestic companies. When evaluating companies, the results of their activities were taken into account and analyzed in such areas as corporate governance, human rights, relations with employees, the environment, relations with consumers, fair operating practices, work with communities, company reporting, site navigation, and accessibility. Five state-owned and five private companies from among the largest taxpayers of Ukraine made it to the top ten most transparent: VF Ukraine (mobile operator Vodafone), First Ukrainian International Bank, DTEK Group, Ukrgasbank, "Coca-Cola Beverages Ukraine Limited", NAEC "Energoatom", Mironivsky Hliboproduct, NEC "Ukrhydroenergo", "Ukrzaliznytsia" and JSC "Naftogaz of Ukraine".

The level of transparency of Ukrainian companies is gradually increasing. Thus, the average level of information disclosure of Ukrainian companies according to ESG indicators is 32% (23 out of 56 evaluated companies have a higher than average level of information disclosure). In particular, in social aspects (human rights, labor relations, supply chain, responsible consumption, community development, management, and company leadership), 26.4%, in environmental aspects - 36.6%, in corporate governance - 27.7%. The level of information disclosure compared to 2019 for all evaluation criteria increased by 6.5% (from 25.5% to 32%), most notably for the "Human Rights" and "Management and Company Leadership" criteria. According to the ESG Transparency Index 2020, non-financial reports for 2020 were prepared by only 16 companies out of all 50 analyzed, of which only 2 reports were integrated (JSC "Ukrainian Railways" and DTEK) and 8 reports on sustainable development (PJSC "VF Ukraine", "Nova Poshta" LLC, etc.), and all of them were guided by GRI standards.

Most often, companies disclose information on relations with communities (disclosure level - 40%), environmental protection practices (disclosure level - 36.6%), and general data about the company (mission, values, company strategy, and CSR strategy) (disclosure level - 36.6%). Compared to 2019, the share of companies that publish their CSR strategies or CSR goals has increased (from 23% to 44.4%), and information on the integration of Sustainable Development Goals into CSR strategies (from 8% to 17.8 %) (Table 1), disclose information on human rights issues (from 27% to 50%), inform about policies of work with suppliers (from 25.5% to 33%) and provide information on management leadership (from 11.6% to 21.4%).

The Environmental and Social Responsibility Policy of Ukrgasbank, which was adopted in 2018 ([Ukrgasbank, 2020](#)), also deserves attention. The policy is based on three components: "green" financing, reduction of the negative impact of the bank's activities, and assessment and monitoring

of environmental and social risks of borrowers. In October 2019, Ukrgasbank joined the UN Environmental Financial Initiative (UNEP FI - an international partnership between the UN and the financial sector, the purpose of which is to improve people's quality of life, and finance, and promote sustainable development). In the report on sustainable development, Ukrgasbank singles out the following goals in the context of the implementation of the Sustainable Development Goals: Goal 1: Reduce CO₂ emissions into the atmosphere by 70,000 tons in 2021, 80,000 tons in 2022, and 100,000 tons in 2023 due to the implementation of Bank-financed energy efficiency, alternative energy, and sustainable development projects; Goal 2: Reduce electricity consumption by 480 thousand kWh by 2024 (in 2021-2023) and reduce the use of paper in the Bank's work by 3.2 tons by 2024 (in 2021-2023); Goal 3: Refuse to finance the coal industry from 2021.

Table 1. The level of information disclosure under the component «General information about the company and CSR policy» in 2019-2020

Component	Maximum number of points	2019		2020	
		The average score of companies participating in the evaluation	Share of companies that posted relevant information, %	The average score of companies participating in the evaluation	Share of companies that posted relevant information, %
Mission and vision, values	2	0,7	43	1,1	65,2
Company strategy	2	0,4	30	0,6	34
CSR strategy or CSR goals	2	0,3	23	0,6	44,4
Integration of the Sustainable Development Goals into the CSR strategy/company goals (obligations)	1	0,05	8	0,18	17,8
Code of Ethics	2	0,8	46,5	1,2	59

Source: (CSR Ukraine, 2020)

Only 17.8% of companies (11 out of 56) demonstrated the integration of Sustainable Development Goals into the company's strategy. Nine companies (Ukrgazvydobuvannya, Nova Poshta, Carlsberg Ukraine, Administration of Sea Ports of Ukraine, Intellias, Kyivstar, First Ukrainian International Bank, Coca-Cola Beverages Ukraine Limited and DTEK Group) integrated the UN Sustainable Development Goals into the company's CSR strategy/goals (commitments) and posted relevant information on the website (CSR Ukraine, 2020).

Since 2017, Carlsberg Ukraine has been implementing the "GOAL 4: Together for the Future" program - the strategy of sustainable development of the global company Carlsberg Group, which includes four strategic goals: ZERO carbon footprint, ZERO water loss, ZERO irresponsible beer consumption, and ZERO accidents. The program has clear goals until 2022 and 2030. Every year in our sustainability reports, we show what has been achieved." (Carlsberg Ukraine, 2021).

The commitment of the Coca-Cola System of Companies in Ukraine focuses on the following key areas of the value chain: emissions reduction; reduction of water use; a world without waste; purchases; food; our people and communities. An example of the integration of the UN Sustainable Development Goals into the company's strategy is the ESG strategy until 2030. (Coca-Cola, 2020)

DTEK Group, which integrates 12 targets. The priorities of the strategy are: 1) to fulfill obligations on air protection and climate protection, investing in the development of renewable energy and reducing the carbon footprint of heat generation; 2) follow the principles of the circular economy, in particular, the use industrial waste; 3) protect biodiversity and promote the preservation of ecosystems; 4) follow high social standards and be a responsible "corporate citizen"; 5) to ensure safe working

conditions and a comprehensive health care system for employees; 6) follow the best practices of corporate governance, risk management, and compliance (DTEK, 2020a; & DTEK, 2020b).

The highest level of information disclosure under the components “General information about the company and CSR policy” is observed in Seaports Administration of Ukraine (9 out of 9 possible points), Carlsberg Ukraine (9 out of 9 points), Coca-Cola Beverages Ukraine Limited (8 out of 9 points) and DTEK Group (8 out of 9 points) (CSR Ukraine, 2020).

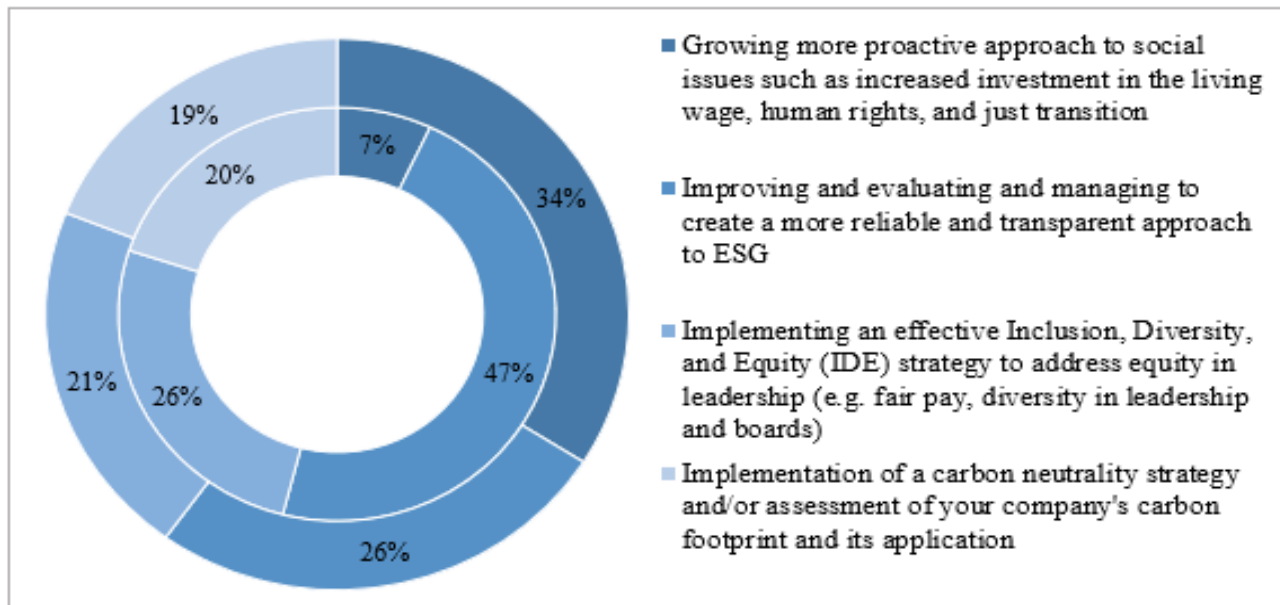
The practices of implementing the principles of social responsibility of the company Mironivsky Hliboproduct deserve attention, especially in the conditions of the current times. Thus, in the first month of the war, established production and stability of production processes made it possible to provide food products as charitable aid to citizens in more than 11 regions of Ukraine. In particular, 12.8 thousand tons of charitable products produced by Mironivsky Hliboproduct for the amount of about UAH 700 million were handed over. The company also dealt with security issues. In particular, the company's efforts were directed at the relocation of employees and their families, helping to find shelter for those citizens who lost their homes. The Mironivsky Hliboproduct Company and the “MHP-Gromadi” Charitable Foundation provided food to more than 300,000 displaced people and baby food to more than 10,000 children. On the eve of the beginning of the educational period, shelters were arranged in almost 70 educational institutions in 13 regions of Ukraine. У 2022 р. The “MHP-Gromadi” charity fund organized the “Do it yourself” business ideas competition, within which 62 projects were supported for a total amount of UAH 6 million, among the winners of the competition more than 20 were residents of Vinnytsia. The “MHP-Gromadi” Charitable Foundation provided UAH 20 million to support the healthcare sector within the framework of the global initiative of the President of Ukraine United24. Back in 2020, Mironivsky Hliboproduct was included in the list of companies that, according to the rating of the magazine “The Power of Money”, implemented the 25 best programs of corporate social responsibility (News of Vinnytsia, 2022).

The influence of business on the development of the national economy and society, in particular, is extremely important. These are CO₂ emissions, the transition to renewable energy sources, and the improvement of education, health, and poverty alleviation. The fact that Ukraine has declared an ambitious goal to increase the share of energy from renewable sources to 17.1% by 2030 is important. Without the intervention of business and its financing of expensive objects, it is impossible to achieve the set goal. For this, today, modern companies are building the latest filters capable of capturing dust and gases, using renewable energy sources, and ensuring the principles of a circular economy.

Thus, Prydniprovsk TPP launched the latest electric filter capable of reducing dust emissions by 20 times and approaching European standards. “Carlsberg Ukraine” company built and launched a biogas plant, which is the answer to the company's stated ambitious goal of “Zero carbon footprint”. Making progress in achieving this goal in 2017, the company reduced its total carbon consumption by 5.35% compared to 2016 and saved a total of 2% of electricity. For comparison, this amount of electricity would be enough to provide the annual needs of 250 two-room apartments in the sleeping area of Kyiv. The newest filter also works at the Ukrplastik factory in Kyiv, demonstrating the possibilities of a zero-waste business for several years. Ukrainian companies are trying to teach children about conscious consumption. For example, DTEK has developed a program and platform for energy efficiency, in which more than 1,000 schools participate. Children compete for better energy efficiency results in their schools, and at home, they teach parents, and grandparents to save energy (Global Compact, 2019).

We would like to note that in Ukraine, compliance with ESG principles remains relevant even during the crisis, but 28% of Ukrainian business leaders say that currently, other economic issues force them to shift the focus of attention from the ESG topic. In addition, 47% of Ukrainian business leaders (26% - in the world) believe that improving assessment and management for a more reliable and transparent approach to ESG are key factors in accelerating the ESG strategy. In the world, 34% and in Ukraine only 7% of business leaders consider it appropriate to apply a more active approach to social issues, such as a living wage or human rights, and to increase their funding (Fig. 3) (KPMG, 2021; KPMG, 2022a; KPMG, 2022b).

Figure 3. Key Factors for Accelerating the ESG Strategy, 2022



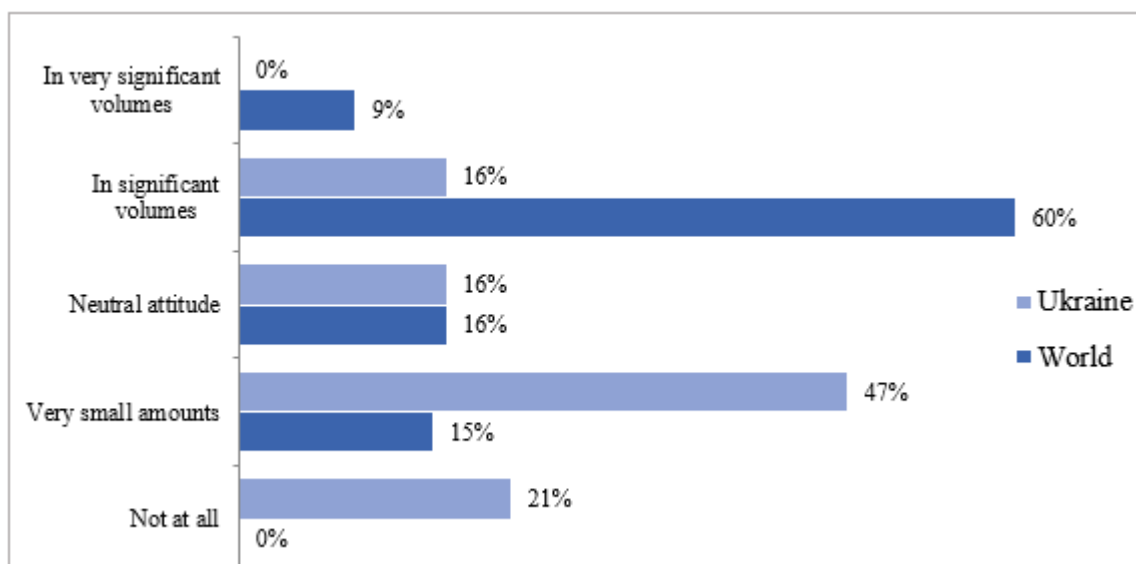
Source: Constructed by authors on the basis (KPMG, 2021; KPMG, 2022a; KPMG, 2022b)

Also, 47% of Ukrainian business leaders, when asked about the growing demands of interested parties, for example, investors, regulators, and customers, to provide more detailed and transparent reporting on ESG issues, note that they have noticed such a trend in very small volumes or it is absent at all (21%) (Fig. 4).

This year's indicators are significantly different from the results of the 2021 study. In 2021, almost half of the executives in Ukraine (47%) spoke of a significant demand from investors, regulators, and customers for increased reporting and transparency on ESG (environmental, social, and corporate governance) issues. Globally, 69% of business leaders report a significant increase in stakeholder demand for reporting and transparency on ESG issues (compared to 58% in August 2021) (KPMG, 2021; KPMG, 2022a; KPMG, 2022b).

However, in Ukraine, the degree of importance of the social issue increased after the start of the full-scale war in Ukraine. Ukrainian business leaders increasingly understand that companies that implement ESG principles are best able to ensure the availability of appropriate personnel, strengthen the employer's value proposition for employees, and attract loyal customers and capital.

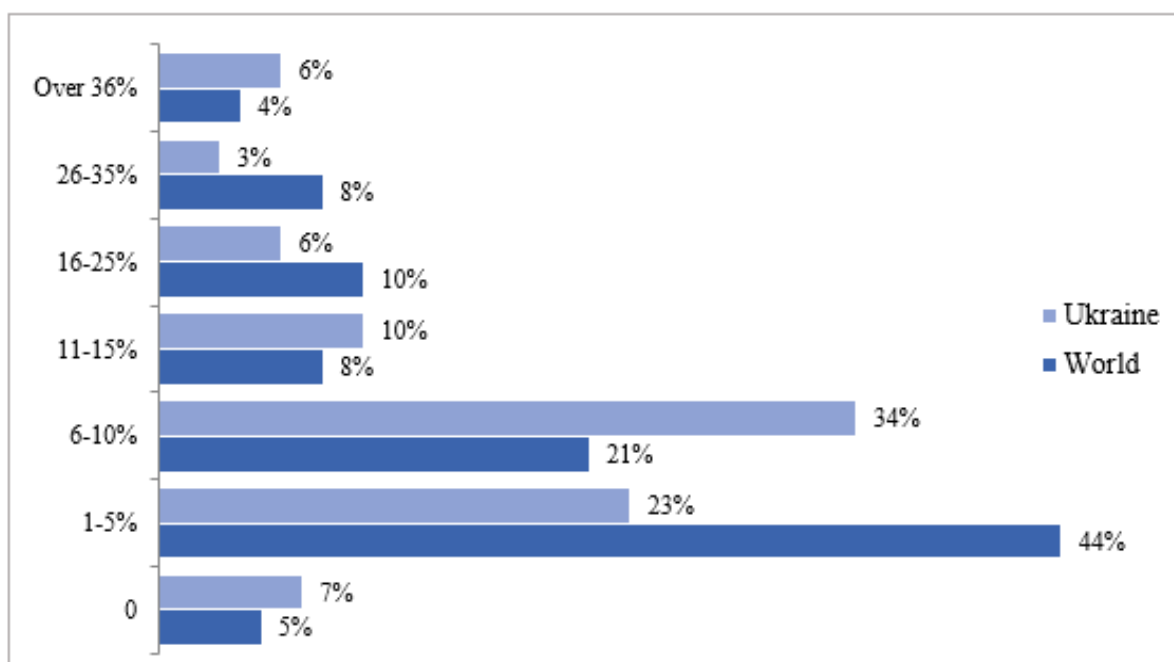
Figure 4. Investor interest in ESG reporting, 2022



Source: Constructed by authors on the basis (KPMG, 2022b)

To make progress in addressing sustainability issues, including climate change and decarbonizing the economy, CEOs plan to invest heavily in sustainability, with 24% of Ukrainian and 30% of CEOs globally planning to invest more than 10% of their income in the sustainable development of their companies (Fig. 5).

Figure 5. The percentage of income that company managers plan to invest in sustainable development programs, 2021



Source: Constructed by authors on the basis (KPMG, 2021)

We would like to note that, unfortunately, in Ukraine, individual companies participate in international ESG systems, ratings, and indices. These are mostly companies that want to attract international investments and whose shares, for example, are listed on international exchanges or have Eurobonds. However, to create an effective and efficient tool for the annual assessment of the sustainable development of Ukrainian companies based on leading international practices, in 2019 in Ukraine, Premier Business Consulting & Communications developed the first professional rating of corporate sustainability of Ukrainian companies, Sustainable Ukraine. Based on the rating, in particular, the quality of corporate governance in the field of sustainable development is analyzed; corporate sustainability; transparency of activity and its social accountability; the ability to identify and manage one's non-financial risks and opportunities; level of positive/negative impact on Ukrainian society and ecology (Sustainable Ukraine, 2019a).

The Sustainable Ukraine rating provides a scale from AAA to D. It covers three assessment clusters: 1) the corporate sustainability rating of companies, which provides for their assessment of compliance with leading international management standards in the field of sustainable development, corporate social responsibility and reporting; 2) transparency rating of companies in the field of sustainable development, which is formed based on an analysis of the completeness of disclosure of indicators; 3) the vector of sustainable development of the Ukrainian business environment and the country, which is calculated as an integral indicator of changes in quantitative indicators of companies that have passed the rating.

An important feature of this rating is that, along with environmental, social, and management, it also includes an analysis of the financial and economic sphere of the companies' activities. Companies that are among the 250 largest taxpayers of Ukraine participated in the rating for 2019 (Sustainable Ukraine, 2019b). According to the results of the analysis, the results of the rating of corporate sustainability and transparency of companies in the field of sustainable development can be seen, the highest level of corporate sustainability "AAA" was awarded to Energoatom. The companies Ukrhydroenergo, Kernel, and Coca-Cola Ukraine achieved a very

high level of corporate sustainability “AA”. High level of corporate sustainability “A” - at Carlsberg Ukraine, Metinvest Group, DTEK, and Ukrenergo (Table 2).

Table 2. Rating of corporate sustainability of Ukrainian business, 2019.

Rating	Rating scale range, %	Name of the company (enterprise)
AAA	AAA≥673	Energoatom
AA	673>AA≥598	Ukrhydroenergo, Kernel, Coca-Cola Ukraine
A	598>A≥523	Carlsberg Ukraine, Metinvest Group, DTEK, Ukrenergo
BBB	523>BBB≥448	Ukrzaliznytsia
BB	448>BB≥373	Mironivsky Hliboproduct
CCC	298>CCC≥223	Naftogaz of Ukraine, Oschadbank
CC	223>CC≥148	PrivatBank, Kyivstar, OKKO, ArcelorMittal Kryvyi Rih, Nibulon, JTI Ukraine
C	148>C≥73	METRO, Ukrnafta, Philip Morris Ukraine, Nikopol Ferroalloy Plant, Nova Poshta, Ferrexpo Poltava Mining
D	73>D	ADM Trading, Naftotrade Resource, Ukraine International Airlines, Status-Trade, Optima-Farm LTD, Suntrade, Dneprovskiy Metallurgical Plant, Silpo-Food, BADM, ATB-Market, TEDIS Ukraine, Epicenter K, BNK-Ukraine, Eridon

Source: built by the authors based on ([Sustainable Ukraine, 2019b](#))

As for the level of transparency of companies, the analysis of the rating indicates that the first place is occupied by almost the same companies with a certain redistribution. In particular, the highest level of transparency “AAA” was assigned to Energoatom, Ukrhydroenergo. The companies Ukrzaliznytsia, Coca-Cola Ukraine, DTEK and Kernel, Metinvest Group achieved a very high level of “AA” transparency. High level of transparency “A” - at Carlsberg Ukraine and Ukrenergo (Table 3).

It is important that the rating present the widest possible regional geography of companies and at the same time a wide industry spectrum. Mobile communication companies, beverage companies, and banking institutions remain unchanged in the rating structure. Ukrzaliznytsia, Nova Poshta, computer and home appliance stores, such as Eldorado, and large construction hypermarkets - Epicenter, became new participants in this type of rating. Most of the new participants joined due to the desire to take part in the fight against the consequences of the Covid-19 pandemic and help Ukrainian hospitals. Based on the analysis of the Sustainable Ukraine rating methodology, in our opinion, it is worth agreeing with its developers that it can become one of the factors in stimulating positive changes in the business environment, providing new opportunities and means of encouraging sustainable development, responsible business practices of domestic enterprises.

Even though the policy of forming the principles of social responsibility and their integration into the strategy of the activities of modern corporations is gaining significant relevance, nevertheless, world and Ukrainian practice indicate that some many obstacles and factors stand in the way of their observance and implementation. The problems and obstacles of social responsibility of business should include its limited promotion and practical application, in particular: employers violate international norms of human and labor rights; non-compliance with social-legal and labor rights; low wages; salary arrears; little investment in occupational health and safety, employee health and professional development ([Stern, 2022](#)). In addition, there is a lack of a sufficient number of interested and competent managers, because the policy of social responsibility of business must be implemented at the level of strategic management in the activities of marketing, production, and sales departments, as well as in the understanding of the strategy and the readiness to implement it in the workplace. In addition, there are such problems as low product quality, non-fulfillment of technical production requirements, environmental pollution, and unfair competition. In addition, lack of financial resources, inconsistency of criteria for assessing corporate social responsibility; low level of corporate culture; legal nihilism; and lobbying interests ([Kurland, Baucus & Steckler, 2022](#)).

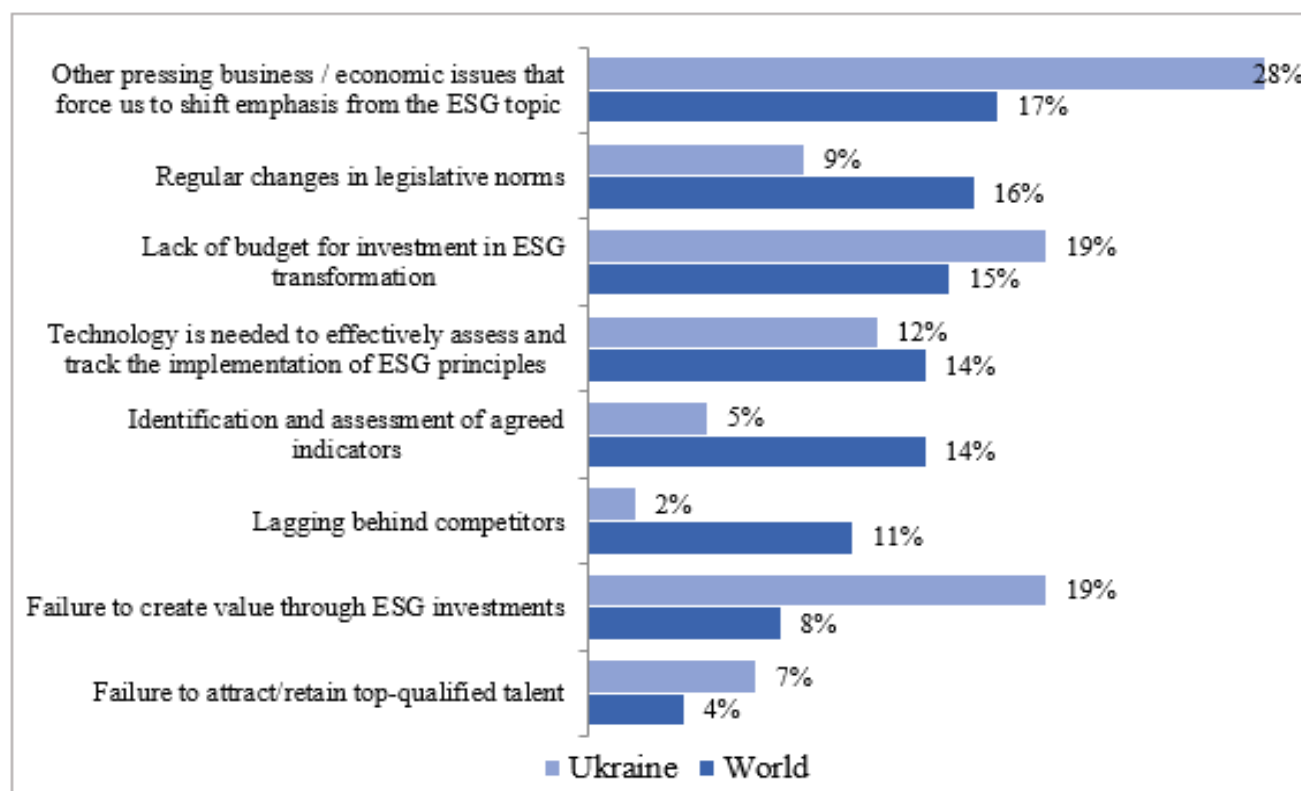
Table 3. Transparency rating of the company in the field of sustainable development, 2019.

Rating	Rating scale range, %	Name of the company (enterprise)
AAA	AAA $\geq$ 95,4	Energoatom, Ukrhydroenergo
AA	95,4>AA $\geq$ 84,8	Ukrzaliznytsia, Coca-Cola Ukraine, DTEK, Kernel, Metinvest Group
A	84,8>A $\geq$ 74,2	Carlsberg Ukraine, Ukrenergo
BBB	74,2>BBB $\geq$ 63,6	Mironivsky Hliboproduct
B	53,0>B $\geq$ 42,4	Naftogaz of Ukraine, Oschadbank, PrivatBank, OKKO, Ukrnafta, Philip Morris Ukraine
CCC	42,4>CCC $\geq$ 31,8	METRO, Kyivstar, Nikopol Ferroalloy Plant, ArcelorMittal Kryvyi Rih, Nibulon, JTI Ukraine
CC	31,8>CC $\geq$ 21,2	Nova Poshta, Ukraine International Airlines, Ferrexpo Poltava Mining
C	21,2>C $\geq$ 10,6	TEDIS Ukraine, ATB-Market, Dneprovskiy Metallurgical Plant
D	10,6>D	Silpo-Food, Eridon, Optima-Farm LTD, ADM Trading, Status-Trade, Epicenter K, Suntrade, BNK-Ukraine, Naftotrade Resource, BADM

Source: built by the authors based on ([Sustainable Ukraine, 2019b](#))

The way to implement the ESG strategy for companies is complex and not always clear for both representatives of Ukrainian and global companies. The biggest challenges for both Ukrainian and global leaders when implementing ESG strategies are other pressing global economic issues. Against the background of a long-term crisis after the pandemic and during a full-scale war in Ukraine, 19% of Ukrainian leaders note the lack of budget for investment in ESG transformation. Another 19% recognized that the failure to create value through ESG investments is an obstacle to successfully implementing an ESG strategy. For global leaders, regular changes in legislation (16%) and lack of technology to assess and track the implementation of ESG principles (14%) remain significant factors holding back progress in the field of ESG (Fig. 6).

Figure 6. The biggest challenges for Ukrainian and global businesses during the implementation of the ESG strategy



Source: Constructed by authors on the basis ([KPMG, 2021](#))

That is, we can highlight the factors that restrain the development of social responsibility of business in Ukraine: an imperfect regulatory and legal framework; does not have an independent public examination of socio-cultural projects and programs; imperfect tax legislation; there are legal restrictions on the scope and methods of providing potential assistance to those who need it; does not have a regional law on charitable activities, a large number of appeals against the background of limited charitable resources; lack of a socially responsible business system; lack of a system for informing the public about social and charity projects, about investors of social programs and a system for evaluating the results of the implementation of social programs by business entities; insufficient cultural level of organizational management; reluctance of some company managers to adhere to the principles of social responsibility and participate in the formation of a positive image of the company.

5. DISCUSSION

Scientific Research on the formation of the Institute of Corporate Social Responsibility in Urain, as well as the principles of forming the mission and strategy of the economic activity of modern Ukrainian business, give reasons to claim that it is incorrect to equate the number of signatories of the UN Global Compact with the state of social responsibility of business in Ukraine. The presence of companies among the signatories of the Global Compact can have a purely declarative nature, which has been discussed at the international level for a long time. A much better indicator can be considered the presence of information on business social responsibility (CSR) on company pages (also a declarative indicator) and professionally prepared reports on social responsibility (with specific quantitative and qualitative indicators), which, unfortunately, are still too few in Ukraine. Today, the key question should be - how and what needs to be done so that in Ukraine, issues of social responsibility of business are included in the strategy of activities and development, and are not only declarative but are implemented.

6. CONCLUSIONS

In the process of research, the concept of social responsibility of business was developed, which confirms that in modern realities, social responsibility contributes not only to improving the image of the enterprise but also ensures its economic growth and competitive advantage in the long term. Active implementation of corporate social responsibility of business by Ukrainian companies can contribute to the creation of new markets in Ukraine and beyond, contribute to solving social and environmental problems, and improve the access of companies with Ukrainian capital to international ones. In addition, these are huge advantages to which we must strive to develop and implement Ukrainian standards of the social responsibility management system. The social orientation of the business will be most effective if the social responsibility of the business is included in the company's management strategy.

The assessment of the establishment and formation of the institution of corporate social responsibility in Ukraine indicates that despite difficult crisis times, Ukrainian business improves their indicators in the context of corporate social responsibility and transforms business through the prism of ESG (especially export-oriented companies). Examples of social entrepreneurship are already working in Ukraine, although at the current stage, the state support for such enterprises is not sufficient, it is also possible to note the low level of consciousness and awareness of managers on the issue of social entrepreneurship.

In recent years, a trend has been observed in Ukraine when large companies prepare non-financial annual reports according to GRI STANDARDS and/or by the requirements of the UN Global Compact. In general, reporting on ESG as a phenomenon in Ukraine is still being formed.

Companies that have taken a course to achieve the goals of sustainable development understand what needs to be done and what efforts need to be made for it. Companies that are still thinking about the path to CSR and sustainable development need to make maximum efforts and take the following steps: discuss the vision of sustainable development with the participation of management and find their concept in the context of the Sustainable Development Goals; rebuild the organizational structure and processes – given the maturity, scope, and strategy of the sustainable development agenda

– that ensure continuous progress, and appoint a person to take care of this; measure results and communicate in a non-financial report; conduct an honest and transparent dialogue with its stakeholders, including youth, regulators, and investors. Of course, it is not easy, and many companies will start talking about the lack of funds. However, the main thing is not money, but the desires and values of the people who lead the business or are its owners. That is why the understanding and acceptance of social responsibility by Ukrainian companies, through the promotion and development of sustainable development education, should become a priority task in Ukrainian society.

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INSTITUTIONAL SUPPORT FOR INVESTING IN CRITICAL INFRASTRUCTURE OBJECTS IN UKRAINE

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Received 21.03.2023.

| Send to review 31.03.2023.

| Accepted 15.07.2023.

Original Article



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JEL Classification:

E 62, F 21, H 54

Doi: 10.61432/CPNE0101149Z

UDK: 339.545(477):[338.14+355.4

ABSTRACT

Investment in critical infrastructure objects in conditions of military conflict and against the backdrop of the destruction of such infrastructure is associated not so much with economic growth as it is with the survival of the country today. Due to the need to restore critical infrastructure objects through foreign investments, the foundation is laid for unhindered investment in conditions of a state of war, as well as further post-war reconstruction of the country. The purpose of the article is to analyze the state and prospects of institutional support for investment in critical infrastructure objects. It is established that the system of regulation of investment relations in Ukraine is practically formed; it includes various norms contained in different sources and differing in their legal nature. However, this system was formed in peacetime and is mostly aimed at ensuring investors' subjective rights and fulfilling their legal obligations during that period. The conducted analysis indicates the need for the adoption of new legislative acts that will transmit the national approach to investment in ensuring the stability and restoration of critical infrastructure. State institutions and regulatory acts should not only carry out control measures regarding the management of investment processes but also create favorable conditions for stimulating investment inflows. The main focus should be shifted towards reducing investment risks and creating attractive conditions for investment.

Keywords: *investment, foreign direct investment, critical infrastructure, critical infrastructure facilities, investment in critical infrastructure, state investment policy.*

1. INTRODUCTION

Disruptions caused by accidents, disasters, natural calamities, anthropogenic crises, military actions or other security risks demonstrate that failures in key systems and basic services, such as water supply, power supply, transportation or information and telecommunications systems, result in significant material damage. The problem of vulnerability of critical infrastructure only worsens, as vulnerability directly depends on the interconnection that exists between critical infrastructure objects, which often leads to negative consequences not for one sector, but for several, generating global resonance.

Recognizing the importance of critical infrastructure, in the 21st century, governments of many countries began to pay special attention to it, which was reflected in the development of state policy aimed at the development and investment in critical infrastructure, and its protection. Typically, such measures include efforts to identify the most important sectors with critical infrastructure, develop a list of key objects of critical infrastructure, adopt regulatory acts, national programs or mechanisms of incentives to increase the resilience of these assets. At the same time, the common

problem for all countries with attracting foreign investments into various infrastructure objects is exacerbated by common negative global economic crises.

The problem of investment is one of the urgent issues for our country. Ensuring investment in critical infrastructure objects in conditions of hostilities and against the background of the destruction of this infrastructure is related not so much to economic growth as to the survival of the country today.

2. LITERATURE REVIEW

A significant number of Ukrainian scientists have researched the institutionalization of investment processes taking place in Ukraine and around the world, in particular, O. Laiko studied the conceptual principles of ensuring a favorable institutional environment for investment activity (Laiko, 2016) and investigated institutional factors for stimulating investment activity in national economy (Laiko, Chabarov, Araftenii, 2017). D. Nikytenko, in his work (Nikytenko, 2018), investigated the institutionalization of ensuring investment security, and V. Kudriavtseva researched the problems of creating a legislative framework for the formation and state support of a legal investment order, proposed directions for improving the investment legislation of Ukraine to increase national investment security (Kudriavtseva, 2019). K. Gumenna considered the issues related to investment activity and its legal regulation and in her work (Gumenna, 2013) tried to systematize the investment legislation of Ukraine. A. V. Kudriavtseva, M. Ovchinnikova and M. Chernukha, in their works (Kudriavtseva, 2017; Ovchinnikova, 2012; Chernukha, 2013), analyzed the problems of investment legislation of Ukraine and provided recommendations for its improvement. The study of investment needs and the determination of the features of the financing of certain objects of critical infrastructure of Ukraine were and continue to be a topic of discussion for many authors. In particular, A. Buyak in his work (Buyak, 2016) considered the conceptual principles of investment management in the energy sector of Ukraine, L. Sotnychenko and A. Sivan researched the investment security of the transport infrastructure of the regions of Ukraine, in particular, the financing of the port infrastructure (Sotnychenko, 2015; Sotnychenko and Sivan, 2021). As a foreign experience, it is important to consider the works of foreign scientists regarding the specifics of financing critical infrastructure objects. In particular, in his work Fosu (2021) proves the importance of investing in railway lines and the positive impact of such investments on economic growth in the USA. Sénquiz-Díaz (2021), in his work, notes that the quality of transport infrastructure affects the development of the economy, in particular, the quality of roads and ports makes a significant contribution to increasing exports in developing economies. Attention to this area is explained by its significant practical importance. Critical infrastructure represents the main strategic object and lever of the country's economic development; therefore, these issues will always be in the focus of attention. For instance, Voitko and Demishev (2022), while studying the problems and prospects of attracting foreign direct investment in the economy, provide recommendations on forming investment attractiveness of strategic sectors of Ukraine in the conditions of economic recovery after the war, taking into account priorities of its economic development. L. Pankova and O. Kamalova-Kutynets, while analyzing trends and prospects of attracting foreign investments in the conditions of the war economy, argue that potential investors choose a waiting strategy and observe changes that occur in the reform of the Ukrainian investment system, considering both wartime factors and pre-war drawbacks (Pankova and Kamalova-Kutynets, 2022). Scientists agree that full-scale war has become a new factor affecting the level of business activity and investment environment in Ukraine. In this case, it is necessary to agree with the position of Palinchak and Marchuk (2022) that the main way to solve the problem of foreign investment in critical infrastructure objects should be: improving the investment environment by improving state and private legislation that regulates investment relations in accordance with European standards; implementation of investment projects on the principle of "one-stop-shop"; creating economic mechanisms for protection against risks of foreign investments by providing state guarantees to investors and reflecting them at the legislative level, and so on. However, despite significant scientific achievements in this area, not all issues of institutional support for investment in critical infrastructure objects have been resolved, which determines the relevance of this research direction. The use of an institutional approach in research dedicated to investing in critical infrastructure will explain its current state and forecast further development.

3. AIM AND OBJECTIVES

The aim of the article is to analyze the state and prospects of institutional support for investment in critical infrastructure objects.

The following tasks were identified to achieve this goal:

- analyze the institutional support for investment in critical infrastructure objects in Ukraine;
- study the foreign experience of regulating investment in critical infrastructure objects;
- propose directions for improving the institutional and regulatory framework for investment in critical infrastructure restoration.

4. METHODS

The methodological basis of the research consists of a set of methods of scientific cognition, the systematic and comprehensive use of which allowed for the justification of theoretical and methodological principles and the development of scientific and practical recommendations for institutional support of investment in critical infrastructure objects. In particular, in order to substantiate the conceptual foundations of investment in critical infrastructure objects, a logical-dialectical approach and such methods of scientific cognition as observation, comparison, abstraction, methods of decomposition, analysis, and synthesis were applied. In order to form the methodological basis for institutional support of investment in critical infrastructure objects, a systemic approach was applied. Systemic and comprehensive approaches were applied to analyze the mechanism of legal regulation of investment relations, study the prospects for its further development. Indicative and integral approaches were used to assess the prospects of inflows of foreign direct investment into critical infrastructure objects. Statistical method, comparative, quantitative, and qualitative approaches were applied to analyze the state of attracting foreign direct investment in Ukraine and its critical infrastructure. The aforementioned methods, in conjunction with general logical methods and techniques, allowed for a comprehensive and effective study of the specifics of institutional support for investment in critical infrastructure objects.

5. RESULTS

Starting our research, it is worth noting that not only Ukraine's economy but the world economy as a whole is experiencing crises. As soon as economic growth began to recover after the COVID-19 pandemic, the intensification of Russian aggression against Ukraine and the resulting economic sanctions had a negative impact on the economy of many countries, including the aggressor country's economy. The combined effect of these negative factors has led to a significant deterioration in the conditions for financing large infrastructure development projects. States that previously invested in large infrastructure projects have faced significant financial difficulties after the events in Ukraine. For example, Germany's national debt has risen to a record level. By the end of 2022, the debt of federal, state, and municipal budgets, and even social insurance funds, had significantly increased and amounted to about 237 billion euros. This is 2% higher than the debt in 2021 (Nynko, 2023). As of today, Germany's national debt is 70% of its gross domestic product (GDP). Regarding France, its level of national debt exceeded 3 trillion euros by 2023 and stands at 113% of GDP. In the work (Đukić, Štaka, Drašković, 2021) presents the results of a study of the impact of the COVID-19 pandemic on the main macroeconomic indicators of the EU, in particular such as GDP, unemployment, public debt. The debt indicators in developing countries continue to rise: by the end of 2021, the external debt of such countries amounted to \$9 trillion, more than twice the amount of a decade ago, with 60% of the poorest countries in a debt crisis or at high risk of it. Meanwhile, currency depreciation and tightening monetary policy make servicing external debt increasingly expensive. As we can see, the COVID-19 pandemic and subsequent events have undermined the financial stability not only of low-income countries but also of countries with medium and high income levels, which will only contribute to the increase in the cost of further borrowing.

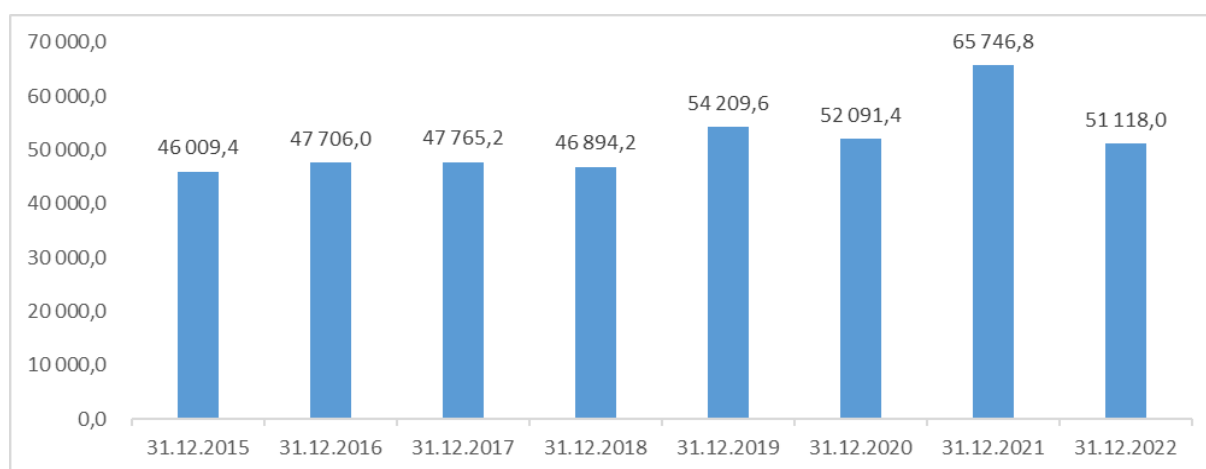
Considering the current situation, governments will focus on attracting private investments in critical infrastructure projects to continue investing in them. In this case, those critical infrastructure projects that can offer attractive commercial returns to private investors will be financed to a greater extent.

In Ukraine, in addition to traditional areas for private investment such as energy, agriculture, and information technology, investment opportunities are also proposed in critical infrastructure objects such as airports, roads, ports, bridges, railways, and others due to the destruction caused to these objects. The Ukrainian government is actively working with others on creating an infrastructure for attracting private capital, including BlackRock, Morgan Stanley, Citi, to move away from relying solely on state capital for the country's recovery ("[Ukraine is ready](#)", 2022). An analysis of global investment flows shows that, in fact, from 2000 to the COVID-19 global pandemic, the private sector annually supported infrastructure projects in developing markets by an average of about \$90 billion in real terms. Between 2000 and 2020, 50% of all constructed generating capacities in low- and middle-income countries were financed through private investments.

However, the current global macroeconomic situation reduces the opportunities for the private sector and its ability to finance infrastructure projects in developing markets. Global financial conditions have significantly tightened, reflecting higher monetary policy rates, greater volatility, and reduced investor risk appetite. At the same time, the heightened perception of risk also increases the cost of new borrowing: in 2020, about 30 emerging market countries experienced multiple sovereign risk premium reductions. This has harmed foreign direct investment (FDI) inflows into transitioning market economies, which decreased by 14% in 2020 and reached the lowest level in the last decade ("[Global](#)", 2022). Almost every major global crisis has led to significant reductions in private capital inflows to infrastructure projects in low- and middle-income countries. Whether it was the Asian financial crisis of 1998, the SARS outbreak of 2003, the global financial crisis of 2008-2009, or the European debt crisis of 2012, such periods caused a decline in private investment inflows of between 20-60%. After the crisis periods, a period of recovery followed that lasted several years, and it was only after this period that countries received pre-crisis levels of private capital investment.

The COVID-19 pandemic has harmed the economies of countries around the world, and Ukraine was no exception. In 2020, the volume of foreign direct investment in Ukraine decreased by 2.1 billion USD, or 96.1% of the level in 2019 (Figure 1). However, in the following year, with the gradual reduction of the pandemic's impact and the recovery of the country's economy, the situation with attracting foreign direct investment significantly improved. In 2021, they increased by 13.7 billion USD to reach 65.7 billion USD. The growth in investment was 26.2% compared to the previous year. However, the full-scale invasion of the Russian Federation into Ukraine in early 2022 negated the previous gains. In 2022, there was a significant outflow of foreign direct investment from the country, with a decrease of 22.3%, reaching 51.1 billion USD.

Figure 1. Foreign direct investments in Ukraine at the end of the year, USD million



Source: created by authors based on data of the National Bank of Ukraine (<https://bank.gov.ua/ua/statistic/sector-external#5>)

Analyzing the direct foreign investments by types of economic activity, it is possible to identify the volumes of such investments in certain critical infrastructure sectors (Table 1). As can be seen, during the period of 2015-2021, there has been a slow growth in direct foreign investments in the supply of electricity, gas, steam and air conditioning from 1.8 billion USD in 2015 to 4.4 billion USD in 2021. The share of such investments in the total volume of direct foreign investments increased from 3.8% in 2015 to 6.6% in 2021. Similar trends are observed in the following sectors: transportation, warehousing, postal and courier activities (an increase from 1.6 billion USD in 2015 to 2.2 billion USD in 2021) and information and telecommunications (an increase from 2.5 billion USD in 2015 to 2.9 billion USD in 2021). However, their shares in the total volume of investments decreased over this period. The share of direct foreign investments in the sector of water supply, sewerage, waste management is negligible and on average amounted to 0.1%.

Table 1. Foreign direct investments in Ukraine at the end of the year by types of economic activity

	31.12.2015		31.12.2016		31.12.2017		31.12.2018		31.12.2019		31.12.2020		31.12.2021	
	USD million	% of the total	USD million	% of the total	USD million	% of the total	USD million	% of the total	USD million	% of the total	USD million	% of the total	USD million	% of the total
Electricity, gas, steam and air conditioning supply	1 766,0	3,8	1 172,4	2,5	1 638,5	3,4	1 836,8	3,9	3 441,1	6,3	3 640,7	7,0	4 359,3	6,6
Water supply; sewerage, waste management and remediation activities	59,4	0,1	61,5	0,1	73,9	0,2	50,8	0,1	51,0	0,1	50,6	0,1	68,8	0,1
Transportation and storage	1 553,2	3,4	1 651,7	3,5	1 781,7	3,7	1 642,5	3,5	2 151,4	4,0	1 902,9	3,7	2 171,7	3,3
Information and communication	2 534,6	5,5	2 906,4	6,1	3 015,3	6,3	2 662,6	5,7	2 954,1	5,4	2 955,4	5,7	2 910,4	4,4

Source: constructed by authors based on data of the National Bank of Ukraine (<https://bank.gov.ua/ua/statistic/sector-external#5>)

Due to the COVID-19 pandemic, 10% of projects involving direct foreign investments in Europe were canceled, and another 25% were put on hold. Half of the investors partially reduced their planned investment volumes for 2020, while 15% significantly reduced them. In 2020, there was a sharp decline in investments, which began to recover in 2022. Private infrastructure investments in the first half of 2022 amounted to \$42.3 billion USD for 120 projects, which is 24% higher than in the first half of 2021. The transportation sector once again outpaced other sectors in terms of private capital inflows to infrastructure projects, with \$28.4 billion USD for 41 projects (Imad and Fatouma, 2023). After travel restrictions were lifted, private investments also increased in logistics infrastructure projects, such as logistics centers, cargo terminals, distribution warehouses, etc. However, investments in the energy sector in the first half of 2022 decreased by 12% compared to the level in the first half of 2021, reaching the lowest level in the last 10 years. It is noteworthy that almost 90% of the 55 new energy production projects were aimed at renewable energy sources. As for the volume of investments, almost 44% of new investments in electricity production are related to renewable energy sources. Ukraine is of significant interest to investors in this regard, thanks to its developed networks and potential for building solar and wind power plants. In this field, Ukraine hopes to attract from \$100 to \$150 billion USD in direct foreign investments. In our opinion, urgent measures need to be taken to attract private capital flows to Ukraine in order to finance the resilience and restoration of critical infrastructure. This will not only improve people's lives today but also prepare the country's economy for the post-war period. To change the current situation, there is a need for coordinated efforts by the Ukrainian government with the governments of other countries, as well as with international financial organizations, aimed at covering investment risks. For example, Japan has become the first country to allocate \$23 million to cover military risks for investments in Ukraine. The Japanese government is contributing to the Multilateral Investment Guarantee Agency (MIGA), which belongs to the World Bank Group. In addition, on April 14, 2023, the Ministry of Community Development, Territories, and Infrastructure of Ukraine and the Japan International Cooperation Agency signed a grant agreement for the allocation of \$400 million. The funds will be used to restore critical infrastructure in Ukraine damaged by the war ("Japan became", 2023). We believe that every dollar, euro, pound, etc., of public or private investment, should be

directed towards supporting high-quality, resilient critical infrastructure that maximizes its value to the economy of Ukraine, its citizens, and the environment.

In addition to private funds, state funds are also involved in the development of critical infrastructure in Ukraine (Table 2). In particular, support for the fuel and energy complex gradually increased from \$126.6 million USD to \$521.6 million USD between 2018 and 2022. It should be noted that there has been significant support for the development of road infrastructure during 2020-2021. Expenditures on this sector in the mentioned period increased by 3-4 times compared to previous years (from \$1.0 billion USD in 2018 to \$4.8 billion USD in 2021), which is related to the implementation of the program «Development of the network and maintenance of public roads of national importance.» However, in 2022, due to the full-scale invasion of the Russian Federation into Ukraine, the volume of such expenditures was significantly reduced to the level of 2018-2019. The main focus of the state was concentrated on supporting the defense sector. Thus, the volume of expenditures on defense in 2022 increased almost 10 times compared to 2018 (from \$3.6 billion USD to \$35.3 billion USD) and amounted to 42.2% of the total amount of Ukraine's state budget expenditures. Among defense expenditures, the largest share is spent on military defense. In 2022, such expenditures accounted for 96.3% of all defense expenditures. In addition, the share of expenditures on civil defense has significantly increased from 0.16% in 2018 to 0.88% in 2022 of Ukraine's total state budget expenditures. In terms of volume, such expenditures increased from \$57.7 million USD in 2018 to \$733.6 million USD in 2022.

Table 2. Expenditures of the state budget of Ukraine

	2018		2019		2020		2021		2022	
	USD	% of the total	USD	% of the total	USD	% of the total	USD	% of the total	USD	% of the total
Defense	3 567 058 174,29	9,84	4 124 862 457,16	9,94	4 465 326 223,90	9,35	4 673 692 329,52	8,56	35 336 767 005,53	42,24
Military defense	3 218 481 445,07	8,88	3 952 794 870,28	9,52	4 269 771 135,39	8,94	4 449 888 641,04	8,15	34 017 440 459,63	40,67
Civil defense	57 719 243,62	0,16	56 276 340,75	0,14	62 190 906,05	0,13	69 199 606,77	0,13	733 625 288,24	0,88
Other defense activities	290 857 485,60	0,80	115 791 246,14	0,28	133 364 182,46	0,28	154 604 081,70	0,28	585 701 257,67	0,70
Fire protection and rescue	406 193 087,27	1,12	566 052 484,59	1,36	676 729 730,48	1,42	627 918 486,52	1,15	1 647 132 685,76	1,97
Fuel and energy complex	126 606 464,26	0,35	164 871 510,43	0,40	221 942 936,76	0,46	220 663 815,85	0,40	521 568 027,91	0,62
Transport	1 027 663 704,78	2,84	1 422 312 444,27	3,43	3 503 829 219,10	7,33	5 015 637 249,71	9,18	1 300 260 196,63	1,55
Pipeline and other transport	4 394 426,80	0,01	5 274 032,67	0,01	4 978 173,01	0,01	8 019 432,37	0,01	15 104 593,60	0,02
Road management	1 006 120 513,89	2,78	1 388 487 602,31	3,35	3 482 457 460,79	7,29	4 829 693 815,92	8,84	1 251 591 144,06	1,50
Communication, telecommunications and informatics	9 984 284,27	0,03	11 196 693,83	0,03	11 425 233,07	0,02	11 891 308,49	0,02	20 456 179,54	0,02
Communal economy	10 916 529,17	0,03	4 176 772,77	0,01	3 284 610,79	0,01	6 012 320,62	0,01	16 345 366,45	0,02

Source: constructed by authors based on data of the National Bank of Ukraine (<https://bank.gov.ua/ua/statistic/sector-external#5>) and Open budget (<https://openbudget.gov.ua/national-budget/expenses?class=functional&view=table>)

Diversity and complexity of shocks, increasing interdependence and interconnectedness of various critical infrastructure objects, as well as physical destruction of infrastructure, are the realities that Ukraine has faced, providing not only development but also survival of critical infrastructure. Domestic policymakers, as well as researchers of critical infrastructure problems, conclude that it is necessary today to focus on investing in increasing the resilience of remaining critical infrastructure objects and restoring destroyed ones. This approach contributes to the leveling of existing uncertainty in modern Ukraine through the integration of such concepts as adaptability, flexibility, and reliability into the structure of critical infrastructure and the corresponding regulatory framework.

To find out what critical infrastructure is and what objects can be invested in, the following legal acts can be consulted: the Law of Ukraine «On Critical Infrastructure» dated November 16, 2021, No. 1882-IX ([“On critical infrastructure”, 2021](#)), the Law of Ukraine «On Amendments to Certain Laws of Ukraine regarding the Powers of the Authorized Body in the Field of Protection of Critical Infrastructure of Ukraine» dated October 18, 2022, No. 2684-IX ([“On amendments”, 2022](#)), the Resolution of the Cabinet of Ministers of Ukraine «On Certain Issues of Critical Infrastructure Objects» dated October 9, 2020, No. 1109 (as amended by the Resolution of the Cabinet of Ministers of Ukraine

dated December 16, 2022, No. 1384) ("[Some issues](#)", 2020), the Order of the Ministry of Community and Territorial Development of Ukraine «On Approval of the Sectoral List of Critical Infrastructure Objects by Type of Main Service» dated September 7, 2022, No. 167 ("[On approval](#)", 2022), and others. According to the Law of Ukraine «On Critical Infrastructure,» critical infrastructure is a set of critical infrastructure objects. Many people associate the concept of critical infrastructure only with defense objects and other strategically important sectors, which is quite logical in connection with military actions that take place in the country. However, in reality, the sphere of critical infrastructure defined by law is significantly broader. As such, objects of critical infrastructure are objects of infrastructure, systems, their parts and their combination, which are important for the economy, national security and defense, the disruption of which can harm vital national interests (paragraph 13, part 1, article 1). Among the vital functions and/or services, the disruption of which leads to negative consequences for the national security of Ukraine, are, in particular: 1) governance and provision of the most important public (administrative) services; 2) energy supply (including heat supply); 3) water supply and water disposal; 4) food supply; 5) healthcare; 6) pharmaceutical industry; 7) production of vaccines, stable functioning of biolaboratories; 8) information services; 9) electronic communications; 10) financial services; 11) transportation; 12) defense, national security; 13) law and order, administration of justice, detention; 14) civil protection of the population and territories, rescue services; 15) space activities, space technologies and services; 16) chemical industry; 17) research activities (part 4 of article 9) ("[On critical infrastructure](#)", 2021). Thus, the enterprises of the defense complex are just one of the areas that fall under the legislation on critical infrastructure.

The Ukrainian government and interested foreign investors face a number of key problems when it comes to investing in the resilience and recovery of critical infrastructure. A significant portion of these problems are derived from issues related to the organization of critical infrastructure functioning. It should be emphasized that most of the norms and mechanisms aimed at addressing issues related to critical infrastructure objects are not currently working. The existence of such a state of affairs is explained by the following reasons: 1. Armed aggression by the Russian Federation, during which the Government has more pressing tasks to ensure the functioning of the state, as a result of which some organizational issues related to critical infrastructure functioning have not been resolved. 2. The authorized body in the field of critical infrastructure protection does not carry out proactive activities to implement certain investment projects. 3. Separate regulations have not been approved, which relate, in particular, to the Registry and passportization of critical infrastructure objects ([Tomashuk, 2022](#)). Taking into account the current situation in the country and the circumstances mentioned, investors have nothing else to do but wait for the resolution of the above-mentioned problems in order not to lose their investments.

Increasing investment in critical infrastructure worldwide, digitalization, and changing risks present opportunities for rethinking state policies on critical infrastructure objects based on progressive foreign experience. Foreign investment is one of the key factors in competitiveness and economic development. Thus, the US, EU, and China are among the top countries and regions in the world in terms of the volume of foreign investment (both attracted and invested) in critical infrastructure objects. The impact that foreign investment can have necessitates a special legislative approach to regulating issues related to investment in critical infrastructure objects. The regime of regulating direct foreign investment varies significantly in different countries, but a heightened regime of control over investments in critical infrastructure objects remains unchanged.

For example, in the EU, control over FDIs that are crucial for the continuous economic growth, competition, and innovation in the EU has led to the adoption of Regulation (EU) 2019/452 of the European Parliament and of the Council of 19 March 2019 establishing a framework for the screening of foreign direct investments into the Union ("[Regulation \(EU\)](#)", 2019). The aim of the Regulation is to increase trust and ensure the possibility of intervention in case of threats to the security of European countries, which may be an integral part of foreign investments. Overall, the Regulation is not aimed at fully harmonizing the mechanisms for controlling FDIs in the EU and does not replace national regulation and control over FDIs with a screening mechanism at the EU

level. Instead, it promotes cooperation, information exchange, and a minimum level of transparency regarding FDIs between the European Commission and the Member States.

Most EU countries pay special attention to investing in critical infrastructure objects. For example, in France, the government fully controls investments in such areas as energy, water supply, transportation, electronic communications, health care, as well as enterprises, infrastructure, or objects that are «vital» for France. In Germany, the Law on Foreign Trade of 17.07.2020 (Außenwirtschaftsgesetz, AWG) and the Resolution on Foreign Trade of 29.10.2020 (Außenwirtschaftsverordnung, AWW) establish a regime for checking foreign investments that are made in German companies related to critical infrastructure objects for public safety reasons. In Germany, the Regulation on the determination of critical infrastructure was adopted and is in force in accordance with the BSI Act of 22.04.2016 (BSI-KritisV) ([“Verordnung”, 2016](#)). Currently, critical infrastructure in Germany includes objects and their parts that are necessary for providing critical services in a certain sector and that exceed certain threshold values that reflect their importance for ensuring the supply of the population from the point of view of society as a whole. The list of critical infrastructure operators in Germany is constantly growing as their threshold qualification values gradually decrease.

In recent years, Spain has strengthened its mechanism for screening foreign investments in critical infrastructure. For foreign investors to acquire a stake in a Spanish company operating in a strategic sector, approval from the Ministry of Industry, Trade, and Tourism or the Council of Ministers is required. Recent changes in legislation have granted these authorities the power to impose significant sanctions in the event of any detected violations, including declaring the transaction null and void and imposing fines that can be equivalent to the value of the investment made.

The countries that shape their state policy based on national security interests through the implementation of strict policies on regulating foreign investment include Anglo-Saxon countries such as the United States, United Kingdom, Canada, Australia, and others. In the UK, the Department for International Trade (DIT) is the main supervisory body responsible for regulating foreign investment. The aim of establishing the DIT in 2016 was to stimulate exports and implement measures to attract foreign investment to the country. Overall, the DIT's activities involve assisting companies in expanding and realizing exports abroad and encouraging foreign investors. In December 2019, the «National Security and Investment Act» was passed, which establishes a regime for reviewing direct foreign investments. The merger control regime was also reformed, giving the UK Secretary of State broad powers to intervene in deals on behalf of the government and investigate operations that could affect national security and public interests. Australia carries out control through the Foreign Investment Review Board (FIRB), while Canada applies the «Investment Canada Act» (ICA) to review foreign investments. Unlike European countries, the United States was one of the first countries to be concerned about controlling foreign investments in critical infrastructure. The Committee on Foreign Investment in the United States (CFIUS) studies the impact of foreign investors on American national interests. Special attention is paid to the origin of venture capital and acquisitions in high-tech areas. Investors who wish to invest in companies operating in Silicon Valley are also under control. CFIUS is empowered to block suspicious investments, particularly in the fields of artificial intelligence and machine learning.

Regarding Ukraine, the system of legal regulation of investment relations currently includes various norms contained in Ukrainian laws, multilateral and bilateral international agreements, documents of international organizations, and so on. National law remains the main regulator of such relations, based on the Constitution of Ukraine. Sectoral codification and other legislative acts of a general nature, primarily the Civil Code of Ukraine, as well as special laws directly regulating investment relations, are in force. Thus, the Law of Ukraine «On Investment Activity» of September 18, 1991, No. 1560-XII, is aimed at ensuring equal protection of the rights, interests, and property of investment entities regardless of ownership forms, as well as at effective investment in the Ukrainian economy, development of international economic cooperation, and integration. A separate Law of Ukraine «On the Regime of Foreign Investment» of March 19, 1996, No. 93/96-VR, was adopted ([“On the foreign”, 1996](#)). It defines the peculiarities of the regime of foreign investment in Ukraine, the main guarantees of the rights of foreign investors in investments and the income and profits received

from them, and the conditions of entrepreneurial activity of foreign investors in Ukraine. This legal act became a logical continuation of the Law of Ukraine «On Protection of Foreign Investments in Ukraine» of September 10, 1991, No. 1540a-XII ([“On the protection”, 1991](#)), which initiated measures to protect the rights and legitimate interests of foreign investors. Investment agreements concluded with investors in the fields of subsoil use, infrastructure, and urban planning are regulated by the Law of Ukraine «On Production Sharing Agreements» dated September 14, 1999 No. 1039-XIV ([“On production”, 1999](#)), the Law of Ukraine «On Regulation of Urban Planning Activities» dated February 17, 2011 No. 3038-VI ([“On regulation”, 2011](#)), the Law of Ukraine «On Concession» dated October 3, 2019 No. 155-IX ([“On concession”, 2019](#)), and other legal acts. The legal regulation of investment activities in special economic zones (SEZ) is carried out by the Law of Ukraine «On the Special Economic Zone «Zakarpattia»» dated March 22, 2001 No. 2322-III ([“On the special economic”, 2001](#)), the Law of Ukraine «On the Special Tourist-Recreational Economic Zone «Kurortopolis Truskavets»» dated March 18, 1999 No. 514-XIV ([“On the special”, 1999](#)), the Law of Ukraine «On the Special Economic Zone «Mykolaiv»» dated July 13, 2000 No. 1909-III ([“On the Mykolaiv”, 2000](#)), the Law of Ukraine «On the Special (Free) Economic Zone «Porto-Franco» on the territory of the Odessa seaport» dated March 23, 2000 No. 1607-III ([“On the special \(free\)”, 2000](#)), the Law of Ukraine «On the Special Economic Zone «Reni»» dated March 23, 2000 No. 1605-III ([“On the special economic”, 2000](#)), the Law of Ukraine «On the Special Economic Zone «Slavutych»» dated June 3, 1999 No. 721-XIV ([“On the special economic”, 1999](#)), the Law of Ukraine «On the Special Economic Zone «Yavoriv»» dated January 15, 1999 No. 402-XIV ([“On the Yavoriv”, 1999](#)), and other legal acts. Despite the fact that these legislative acts were adopted more than 20 years ago and reflect the views on the role and place of SEZ in the country’s economy that existed at that time, they all pursue common goals of creating and have the same mechanism of interaction between persons involved in the implementation of investment projects. In this regard, the question arises about the need to work on the systematization of such laws by consolidating the provisions contained in them in one legislative act, as was done with the legislation regulating the functioning and special regime of investment activities in territories of priority development (TPD).

It is important to emphasize that foreign investors who wish to invest in critical infrastructure require clear and stable «rules of the game,» and domestic laws and regulations may not be sufficient to provide such rules. The provisions of these laws can be unilaterally changed by the state, often ignoring the rights and interests of foreign investors. Therefore, foreign investors prefer to invest their finances in states that are signatories or parties to intergovernmental and international legal documents that promise to respect their rights at a higher level. Currently, the norms regulating the order of investment relations are expressed in numerous and diverse legal acts, among which the following multilateral international treaties should be distinguished:

1. The Convention on the Settlement of Investment Disputes between States and Nationals of Other States of May 18, 1965 ([Convention, 1965](#)) (ratified by Ukraine on March 16, 2000) established an international framework for the settlement of investment disputes between states and physical or legal persons of other states through conciliation and arbitration procedures at the International Centre for Settlement of Investment Disputes.
2. The Seoul Convention on the Establishment of a Multilateral Investment Guarantee Agency of 11.10.1985 ([Seoul Convention, 1985](#)) (signed by the Ukrainian SSR on October 11, 1985) established the Multilateral Investment Guarantee Agency, which provides guarantees to foreign investors for their investments in developing countries against non-commercial risks such as currency conversion, expropriation, breach of contract by the host state, war and civil disturbances. Due to the ongoing hostilities and temporary loss of territories in our country, the guarantees provided by the Seoul Convention for foreign investors play a special role, as both Ukraine and the Russian Federation are parties to the Convention.
3. The Energy Charter Treaty of 17.12.1994 ([Agreement, 1994](#)) (ratified by Ukraine on February 6, 1998) contains provisions related to the promotion and protection of investments in the energy sector. These provisions include granting foreign investments the most-favored-nation treatment or national treatment, payment of prompt, adequate, and effective compensation for any expropriated assets, permission for the foreign investor to freely transfer invest-

ed capital and any related income in freely convertible currency out of the country, and more. The peculiar feature of this legal act is that it is entirely aimed at protecting the rights of foreign investors and obliges the states that accede to it to surrender part of their sovereign rights. Most of the international agreements regulating foreign investment are bilateral agreements «on encouragement and mutual protection of investments.» Such agreements guarantee fair status to investments and protect them in the territory of another country. Ukraine has signed almost eighty bilateral investment agreements with countries such as Austria (as of November 8, 1996), Belgium (as of May 20, 1996), Bulgaria (as of December 8, 1994), the United Kingdom (as of February 10, 1993), Greece (as of September 1, 1994), Denmark (as of October 23, 1992), Estonia (as of February 15, 1995), Israel (as of November 24, 2010), Iran (as of May 22, 1996), Ireland (as of February 10, 1993), Spain (as of February 26, 1998), Italy (as of May 2, 1995), Canada (as of October 24, 1994), Qatar (as of March 20, 2018), Latvia (as of July 24, 1997), Lithuania (as of February 8, 1994), Luxembourg (as of May 20, 1996), the Netherlands (as of July 14, 1994), Germany (as of February 15, 1993), Poland (as of January 12, 1993), Portugal (as of October 25, 2000), Slovakia (as of February 26, 2007), Slovenia (as of March 30, 1999), the United States of America (as of March 4, 1994), Hungary (as of October 11, 1994), Finland (as of October 7, 2004), France (as of May 3, 1994), Croatia (as of December 15, 1997), the Czech Republic (as of March 17, 1994), Sweden (as of August 15, 1995), Switzerland (as of April 20, 1995), Japan (as of February 5, 2015), and others. It is worth agreeing with [Shemshuchenko \(2012, p. 460\)](#) regarding the fact that although the structure of bilateral investment agreements is quite typical, the substantive content of these agreements, as well as the formulation of their provisions, may differ significantly. In particular, this concerns provisions on the treatment of investments, where the exclusion of a certain standard of treatment or its characteristic formulation may have a direct impact on the determination of the scope of investor rights, and as a result, on their ability to protect their rights in case of a dispute based on the agreement.

More and more importance is being played by green law for our country. In legal science, it usually refers to acts that do not contain strict and clearly defined obligations for states. Green law typically includes United Nations General Assembly resolutions, codes of conduct, and other acts, including international agreements that aim to unite state efforts in a particular area, which do not entail any specific obligations for them ([Fatouros, 1996, p. 527](#)). In the field of international investment law, these are: UN General Assembly Resolution «On the right to freely exploit natural wealth and resources» of December 21, 1952, No. 626; UN General Assembly Resolution «Permanent sovereignty over natural resources» of December 14, 1962, No. 1803; UN General Assembly Resolution «On the permanent sovereignty of states over natural resources» of December 17, 1973, No. 3171; UN General Assembly Resolution «Declaration on the Establishment of a New International Economic Order» of May 1, 1974, No. 3201; UN General Assembly Resolution «Charter of Economic Rights and Duties of States» of December 12, 1974, No. 3281; UNCITRAL Legislative Guide on Public-Private Partnerships for Infrastructure from 2001; OECD Declaration on International Investment and Multinational Enterprises of 1976; OECD Code of Liberalisation of Capital Movements of 1961, etc. In specialized literature, there are different views on the legal force of documents, from recognizing them as mandatory (since they are customary in international law) to their recommendatory nature. One cannot disagree with the statement by I.F.I. Shihata that «soft law» becomes customary law and is recognized as mandatory for parties if it is a common practice of states that consider themselves legally bound by this practice ([Shihata, 1993, p.42](#)). If states intended to give «soft law» acts mandatory legal force, they would give them the form of an international treaty. It is also undeniable that such acts significantly affect legal reality, as they express a coordinated position of states in the field of investment activity.

Thus, the legal regulation of investment relations in Ukraine is carried out within the framework of the national legal system, taking into account the norms of international law. The domestic legal system allows for the application of laws other than national laws with the consent of the state. Overall, the necessary legal basis for investment activity in Ukraine has been practically formed. However, it was formed during peacetime and is therefore largely aimed at ensuring the subjective rights and fulfillment of legal obligations of investors during such a period. The analysis conducted indicates

the need for the adoption of new legislative acts that will reflect the nationwide approach to investment in ensuring the stability and restoration of critical infrastructure. It should be noted that the OECD Concept on Infrastructure Governance considers infrastructure stability as one of the ten key problems of infrastructure object functioning.

Existing normative-legal acts do not take into account the current realities that Ukraine has faced since the resumption of active hostilities on its territory. First and foremost, the Law of Ukraine «On Critical Infrastructure» needs to be updated, and the Law of Ukraine «On Foreign Investment in Infrastructure Objects that Have Strategic Importance for National Security of Ukraine» should be adopted. The draft Law of Ukraine «On Foreign Investment in Business Entities that Have Strategic Importance for National Security of Ukraine» can be used as a basis for regulating foreign investment in business entities that have strategic importance for national security of Ukraine and defining the procedure for assessing the impact of such investments on the national security of Ukraine. It is worth emphasizing that the state plays a key role in ensuring the mechanism of investment in critical infrastructure. This circumstance is due to the fact that it is not only a regulator of infrastructure but also an owner, operator, and user of many objects that are part of this infrastructure. The continuity of operation of state institutions depends on the state of critical infrastructure. In addition, investments in large infrastructure projects often depend on large state funds and the overall direction of the country's development, which is determined by the government. Finally, it is the state that bears direct responsibility for its citizens, who may suffer from the consequences of damage to infrastructure facilities. This puts the state in the position of having to take into account numerous dangers and threats that may threaten critical infrastructure facilities, as well as its role in the most important sectors in which critical infrastructure facilities operate, which ensure the livelihood of the population. Gradual legal, institutional, financial, and other transformations are being carried out that are directly related to the functioning of critical infrastructure and investment in it. Special legal regimes are introduced for foreign investors, tax and customs benefits are provided, and so on. For example, the Law of Ukraine «On Amendments to the Tax Code of Ukraine and Other Laws of Ukraine to Stimulate the Development of the Digital Economy in Ukraine» dated December 14, 2021, No. 1946-IX ([“On amendments”, 2021](#)) introduced a special legal and tax regime for the IT industry. The «Diia City» regime is aimed at stimulating the development of the digital economy by creating favorable conditions for conducting innovative business, developing digital infrastructure facilities, attracting investments, and talented specialists. IT companies can join «Diia City» by becoming its residents. Residency is voluntary, and residents are eligible for the system of state guarantees for investment protection and tax incentives. One of the forms of tax benefits in Ukraine is a tax discount, which a taxpayer has the right to credit for the expenses incurred during the reporting tax year for paying interest on a mortgage loan, charitable activities, in favor of educational and healthcare institutions, for purchasing shares (other corporate rights) issued by a legal entity that has acquired the status of a resident of «Diia City».

6.DISCUSSION

During the conducted research, we have come to the conclusion that it would be beneficial for Ukraine to adopt foreign experience related to attracting and state control over foreign investments in critical infrastructure objects. In addition, the experiences of countries that have recently experienced damage to their critical infrastructure due to military conflicts are becoming relevant. Recommendations based on factual data and exchange of best practices between countries can be useful in addressing complex questions such as: What is the government's proper role in enhancing the resilience and restoration of critical infrastructure? How can the government effectively engage infrastructure operators - both state-owned and private - in improving the resilience and restoration of critical infrastructure? What are the most suitable mechanisms for exchanging information about risks, vulnerabilities, and measures to ensure the resilience and restoration of critical infrastructure between the government and relevant operators? How to allocate costs and benefits from investments in the resilience and restoration of critical infrastructure among the government, operators, and end-users? Our further scientific research will be devoted to finding answers to these questions, taking into account foreign experience.

7. CONCLUSIONS

As research has shown, the system of regulation of investment relations in Ukraine includes various norms contained in various sources (multilateral and bilateral international treaties, regulatory legal acts, documents of international organizations, etc.) and differ from each other in their legal nature. The domestic legal system allows the use of norms of law other than national ones with the consent of the state. We have established that, in general, the necessary legal basis for investment activity in Ukraine has been practically formed. However, it was formed during peacetime and, accordingly, is mostly aimed at ensuring the subjective rights and fulfilling the legal obligations of investors in such a period. The analysis conducted indicates the need for the adoption of new legislative acts (for example, the Law of Ukraine «On Foreign Investment in Infrastructure Objects of Strategic Importance for National Security of Ukraine»), which will transmit a nationwide approach to investing in ensuring the stability and restoration of critical infrastructure. Legislation should be aimed not only at controlling the attraction of foreign investments but also at stimulating an increase in investment flows (both state and private). Finding a balance between state financial support and private investments should be based on a cost-benefit analysis method to determine priorities for the most effective ways of distributing costs for joint collective efforts to achieve common investment goals. In addition, it is necessary to provide preferential conditions for investing in damaged objects, restoring destroyed objects of critical infrastructure, compensatory mechanisms for investors who have invested in critical infrastructure objects and suffered losses due to hostilities, and so on.

As the intensity of damage and destruction of critical infrastructure objects in Ukraine increases, despite increased demands from investors, the role of foreign investments, especially private (non-state), will only grow. Special attention should be paid to reducing investment risks. It is worth noting that purposeful work is being carried out in this direction, which is aimed at achieving financial stability and providing guarantees for covering risks (mostly related to the war), which contribute to attracting foreign investments to Ukraine. Due to the need to restore critical infrastructure objects through foreign investments, the foundation is laid for unhindered investment in conditions of martial law, as well as further post-crisis recovery of the country. Currently, the risk assessment for attracting foreign investments in critical infrastructure objects is significantly complicated. The risk itself is extremely high, but at the same time, the existing situation for investors who do decide to invest in critical infrastructure may potentially turn into a high profit.

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THE ASSOCIATION BETWEEN NATURAL DISASTERS - TRADE: LITERATURE REVIEW

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Received 17.01.2023.

| Send to review 27.01.2023.

| Accepted 28.04.2023.

Original Article



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JEL Classification:

Q54, Q56, Y30, D71

Doi: 10.61432/CPNE0101164s

UDK: 517.52:551.515.9

ABSTRACT

In this study, a literature review has been conducted to understand the association between natural disasters and trade. The hypothesis of the study is that although natural disasters have a significant impact on trade, they have not been extensively examined in academic literature. The purpose of the study is to determine the accuracy of the claim presented in the hypothesis. Various publications published in the last 12 years, containing pre-defined related keywords, have been analyzed. Studies have been grouped according to the years of publication, sources of disaster data used, level of analysis, methods/models employed, and the results they reached. As a result of this review, the aim is to find the gap in the literature regarding the association between natural disasters and trade, and consequently recommend a road map for future studies. The findings of this review indicate that most studies concluded that natural disasters negatively affect international trade. However, divergent results emerged in studies using different econometric models or focusing on specific contexts. The review highlights the need for diversifying studies in the literature at a micro-level and with different models. To achieve more specific and clear results, future research should examine the factors determining the impact of natural disasters on international trade data separately and increase the diversity in the econometric approaches used. Increasing research on regional and national levels is important for policymakers in high-risk areas. Raising the number of studies is extremely crucial for reducing the impact of natural disasters and developing effective strategies.

Keywords: Literature Review, Natural Disasters, Trade

1. INTRODUCTION

It is well known that natural disasters cause significant loss of life and extensive property damage worldwide. This alarming situation not only results in devastating human losses but also causes substantial structural damages economically. According to EM-DAT, the comprehensive database created by the Centre for Research on the Epidemiology of Disasters (CRED) affiliated with Louvain University, more than 22,000 mass disasters have occurred worldwide since 1900. The impact of natural disasters on trade activities is also at a significant level, undeniably creating an impact area on the global economy. In this context, the intricate association between natural disasters and trade has become a research area that has been of considerable interest and carefully examined in academic studies. The effect of natural disasters on trade can be thoroughly examined in various aspects of economic activities, such as potential problems and difficulties that may arise in the supply chain, inevitable production losses, and fluctuations in trade flows. The primary aim of this study is to conduct a systematic literature review of studies focusing on the association between natural disasters and trade. Although there are many comprehensive systematic literature review studies on the association between natural disasters and the economy, there is a noticeable lack of clarity

in literature review studies examining the specific association between natural disasters and trade. This study examined prominent studies in the existing literature in a general scope, taking into account parameters such as the publication years of the studies, the level of analysis of the study, the journals in which they were published, the methodologies employed, the years examined in the study, and the findings of the study. For this literature review, studies were picked based on such criteria as how closely they related to topic, how detailed their research method was, whether their data sources were reliable, and the currency of the information. After reviewing various studies, it has been observed that interest in the subject matter has increased in the literature since 2010. Therefore, time period for review range has been set between the years 2010-2022. During this period, 19 studies related to the topic have been analyzed. The study aims to determine the scope and content of the topics addressed in the literature, and to create a guide for future research in the field. The study consists of three informative parts in total. The second section includes research methods, findings, and general summaries of the studies. The conclusion part is thoughtfully included in the third section.

2. RESEARCH AND FINDINGS

2.1. RESEARCH METHOD

The literature review was conducted by searching the Google Scholar database using keywords including “natural disasters and trade,” “natural disasters and exports,” and “natural disasters and imports.” The search criteria were deliberately limited to studies published between 2010 and 2022 that focused on the impact of natural disasters on international and local trade. Specifically, studies concentrating on natural disasters and international trade were closely examined. Within this scope, 19 studies that thoroughly examine the impact of natural disasters on trade and stand out were identified. The studies conducted were analyzed by grouping them according to the years of the study, level of analysis, journals in which they were published, methodologies employed, years examined in the study, and findings of the study.

Table 1. Studies Examined According to the Determined Groupings

Title of the Study	Year	Journal	Data Sources for Natural Disasters	Level of Analysis	Method/Model	The years examined	Findings
Climatic natural disasters, political risk, and international trade	2010	Global Environmental Change	Emergency Events Database (EM-DAT)	Global	Gravity	1985-2003	Natural Disasters have Negative Effect on trade
Shaken, Not Stirred: The Impact of Disasters on International Trade	2010	International Economics	Emergency Events Database (EM-DAT)	Global	Gravity	1962-2004	The impact of natural disasters on trade is dependent on political and geographical conditions
Climate Shocks and Exports	2010	American Economic Review	Terrestrial Air Temperature and Precipitation	Global	Panel Data Analysis	1990-2006	The negative impact on trade is present in poor countries, not affecting the rich countries
Coping with loss: the impact of natural disasters on developing countries' trade flows	2012	European Commission Chief Economist Note	Emergency Events Database (EM-DAT)	Global	Gravity	1988-2010	Natural Disasters have Negative Effect on trade
The Economic Impact of Hurricanes in History: Evidence from Sugar Exports in the Caribbean from	2013	Weather, Climate, and Society journal	Hurricane Databases (HUR-DAT)	Regional (Caribbean Countries)	Panel Data Analysis	1700-1960	Natural Disasters have Negative Effect on trade
Global supply chains and natural disasters: implications for international trade	2014	Asia and Global Production Networks	Emergency Events Database (EM-DAT)	Global	Panel Data Analysis	1995-2010	Natural Disasters have Negative Effect on trade
Disasters and Trade: Did Hurricane Katrina Affect US Imports?	2014	International Economics and Economic Policy	Not Specified	National (United States of America)	Cointegration	1983-2008	Natural disasters do not structurally affect trade

Title of the Study	Year	Journal	Data Sources for Natural Disasters	Level of Analysis	Method/Model	The years examined	Findings
How do natural and man-made disasters affect international trade? A country-level and industry-level analysis	2015	Journal of Risk Research	Emergency Events Database (EM-DAT)	Global	Gravity	1984-1998	Natural Disasters have Negative Effect on trade
The asymmetric impact of natural disasters on China's bilateral trade	2015	Earth System Sciences	Emergency Events Database (EM-DAT)	National (China)	Gravity	1980-2012	Disasters in China increase exports, but do not have a significant impact on imports
Climate shocks and international trade: Evidence from China	2015	Economics Letters	China Statistical Yearbook	National (China)	Panel Data Analysis	2000-2011	Natural Disasters have Negative Effect on trade
Do Natural Disasters Stimulate International Trade?	2016	International Institute of Social Studies	Emergency Events Database (EM-DAT)	Global	Import demand and export supply	1970-2014	Natural Disasters have Positive Effect on trade
Weather Variations and International Trade	2018	Environmental and Resource Economics	East Anglia's Climate Research Unit	Global	Panel Data Analysis	1992-2014	Natural Disasters have Negative Effect on trade
Floods and Exports: An Empirical Study on Natural Disaster Shocks in Southeast Asia	2018	Economics of Disasters and Climate Change	Emergency Events Database (EM-DAT)	Regional (Southeast Asian Countries)	Gravity	1990-2016	Natural Disasters have Negative Effect on trade
Natural Disasters and Countries' Exports: New Insights from a New (and an Old) Database	2018	The World Economy	EM-DAT, Geophysical and Meteorological Database (GeoMet)	Global	Panel Data Analysis	1979-2000	The type of natural disaster determines the impact on trade
How do natural disasters affect services trade?	2019	WTO Staff Working Paper	EM-DAT, Geological and Meteorological Events (GAME)	Global	Gravity	1979-2010	Natural Disasters have Negative Effect on trade
Natural disasters and trade: the mitigating impact of port substitution	2019	Journal of Economic Geography	US Geological Survey	National (Japan)	Gravity	2011	Natural Disasters have Negative Effect on trade
Natural Disasters and the Reshaping of Global Value Chains	2022	IMF Economic Review	Bündnis Entwicklung Hilft- World Risk Index	National (Japan)	Panel Data Analysis	2011	Natural Disasters have Negative Effect on trade
The nexus between natural disasters, supply chains and trade—Revisiting the role of preferential trade agreements in disaster risk reduction	2022	The World Economy	Emergency Events Database (EM-DAT)	Global	Gravity	2000-2014	It is uncertain whether natural disasters affect trade
Natural disasters, climate change, and structural transformation: A new perspective from international trade	2022	The World Economy	Emergency Events Database (EM-DAT)	Global	Difference-in-differences	1997-2018	Natural disasters do not structurally affect trade

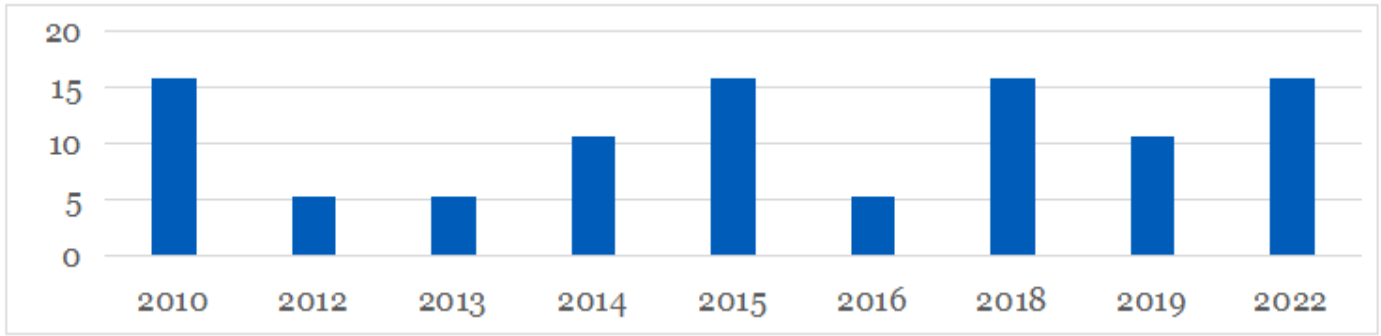
Source: Created by the Author

2.2. RESULTS AND DISCUSSION

Among the published studies, approximately 53% rigorously investigated natural disasters on a global scale, while the remaining 47% focused on a regional/national level. While there are a multitude of studies examining the correlation between natural disasters and the economy, it is the research specifically analyzing the connection between natural disasters and trade that has started gaining prominence in literature since 2010.

In a detailed examination of 19 studies regarding the level of data analysis on natural disasters, it was found that about 63% of them utilized the Emergency Events Database (EM-DAT) as their primary source of information. In about 83% of these EM-DAT-inclusive studies, EM-DAT was the sole data source, while in approximately 17%, data from additional sources was also incorporated.

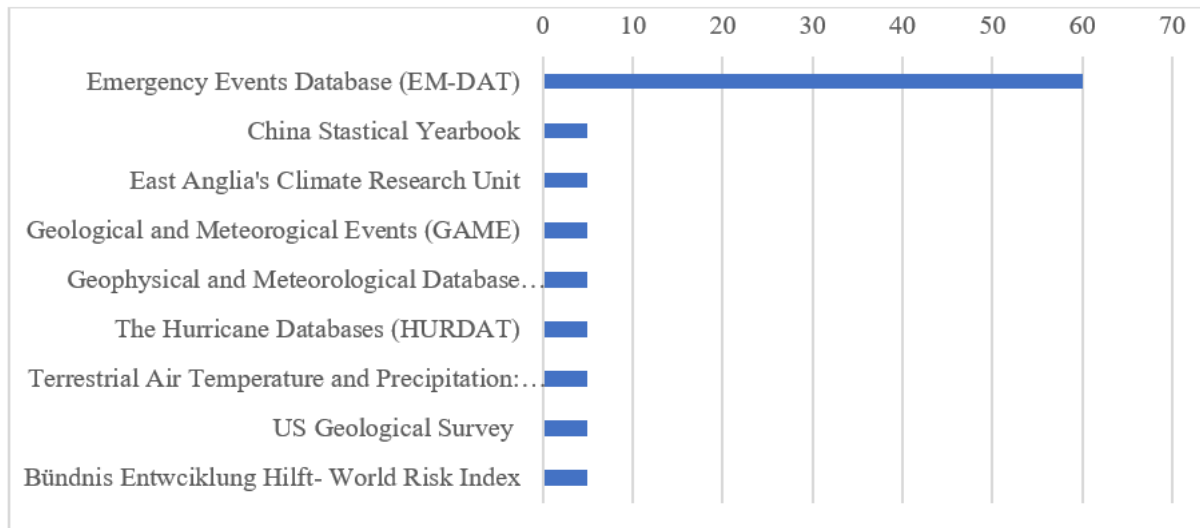
Figure 1. Studies conducted by year (%)



Source: Created by the Author

The remaining studies, comprising about 37%, employed other sources for data, which included Geological and Meteorological Events (GAME), Geophysical and Meteorological Database (GeoMet), Terrestrial Air Temperature and Precipitation, Bündnis Entwicklung Hilft- World Risk Index, US Geological Survey, China Statistical Yearbook, University of East Anglia's Climate Research Unit (CRU), and the Hurricane Research Division (HUR-DAT).

Figure 2. Distribution of sources used for natural disasters in studies (%)

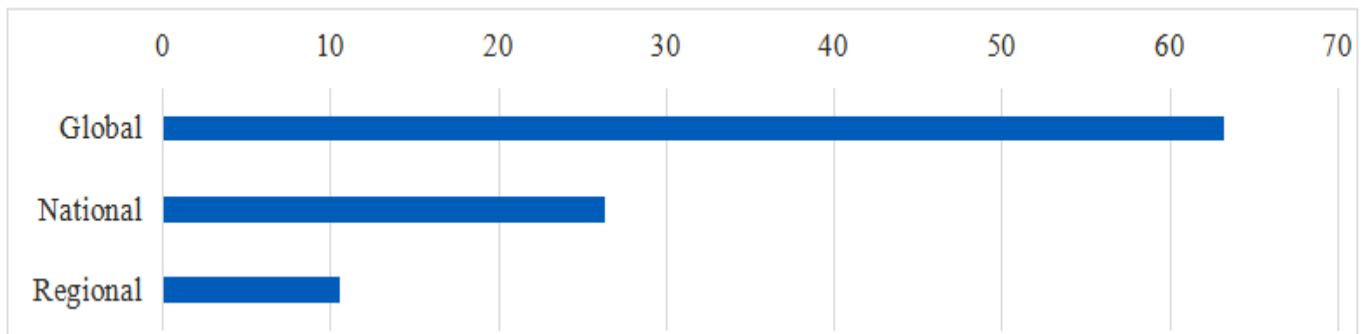


Source: Created by the Author

When analyzing the studies examining the association between international trade and natural disasters in terms of their level of analysis, it was observed that approximately 63% of these studies were conducted at a global scale. These studies aimed to examine the effects of natural disasters on trade worldwide by analyzing data on a broader scale. On the other hand, about 11% of the studies were conducted at a regional level. One of these studies focused on Caribbean countries, while the other examined the impact of natural disasters on trade in Southeast Asian countries (Indonesia, Malaysia, the Philippines, and Thailand). Additionally, around 26% of the studies were conducted at a national level, with 40% of them focusing on China, another 40% on Japan, and the remaining 20% examining the United States. These studies examined the impact of natural disasters on trade in narrower areas and obtained more specific results.

Upon grouping the data used in the studies identified during the literature review according to the adopted method or model, it became apparent that various techniques were employed for data analysis. The most prevalent method was the gravity model, which was utilized in approximately 47% of the studies. Panel data analysis was a technique tested in around 37% of the studies. The "Import demand and export supply" model, the "Difference-in-differences model", and the "Cointegration model" were tested in around 16% of the studies. These methods offer different approaches in analyzing data and obtaining results, thus providing diverse insights.

Figure 3. Studies Based on The Level of Analysis (%)



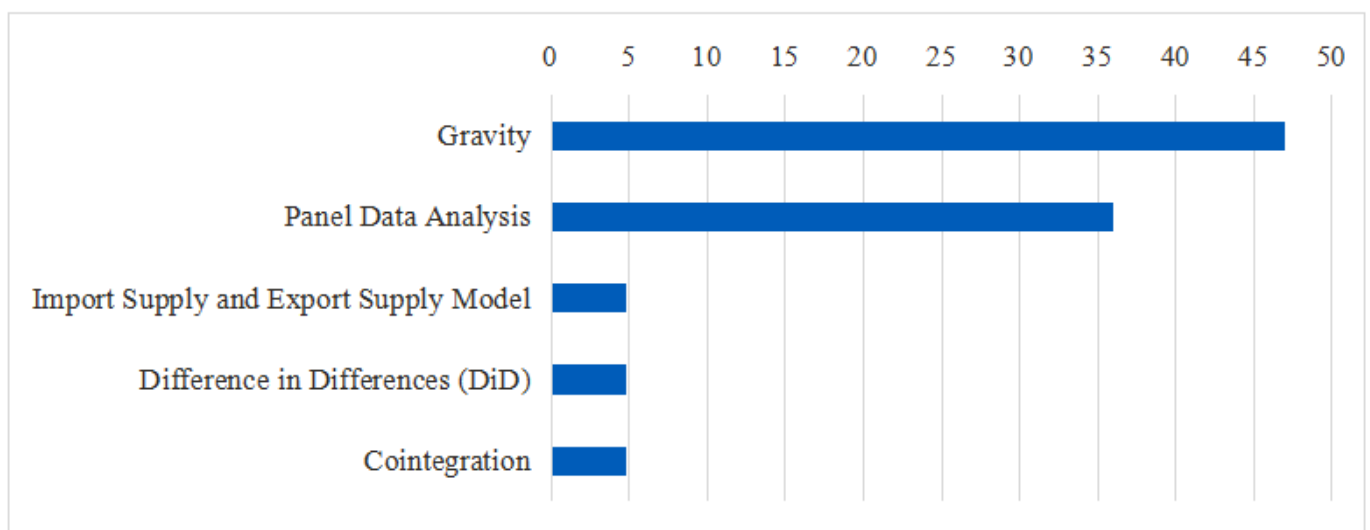
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When examining the models used in the studies, it is observed that five models were used. The most commonly used one among them is the gravity model. This model, used to quantify the trade volume between two countries, incorporates factors such as the countries' economic sizes (typically GDPs) and the geographical distance between them, serving as a proxy for transportation costs. While these are the main variables used in the gravity model, it is observed that different variables are used to strengthen the model depending on the content of the study. In the studies examined, the variables are as follows: Imports, Exports, Climate Disasters, Political Risk, Population, Common Border, Language, Colonialism, Monetary Union and Regional Trade Agreement Status, Natural Disasters, Man-made Disasters, Terrorist Attacks, Trade Costs. It offers a straightforward and easily understandable approach and aligns well with actual trade statistics in many cases.

Panel Data Analysis considers the variability in data over time as well as across different individuals or groups. It is especially suitable for studies involving data collection from varied individuals or groups over different time periods. This robust tool is capable of handling both time-related and individual variation, making it excellent for studying complex economic situations. However, challenges may arise related to the accessibility of appropriate data, the ability to generalize findings, and the often-intricate process of dealing with panel data.

Import Supply and Export Supply Model aims to comprehend the factors affecting a country's decision to import or export a specific commodity. That model can predict a country's trade tendencies under specific economic circumstances, yet it often relies on a range of assumptions which may not always reflect real-world scenarios.

Figure 4. Methods/Models Used in the Studies (%)



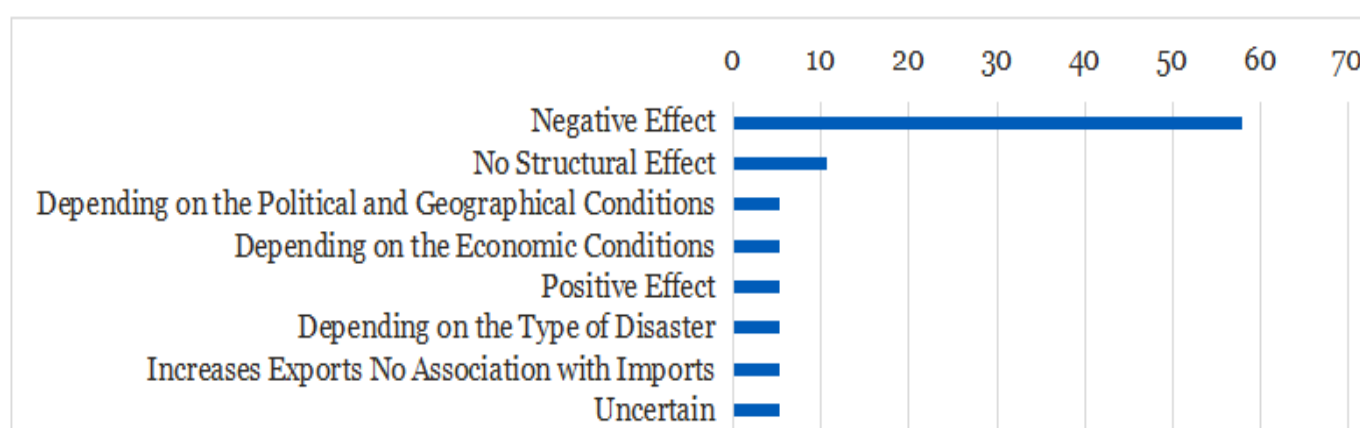
Source: Created by the Author

Difference in Differences (DiD) method is used to gauge how disparities between two groups evolve over time. It is often applied to measure the impact of a policy change or an intervention. DiD employs control groups to isolate the effects of policy changes or interventions, enabling direct impact measurement. However, its proper execution demands meticulous experimental design and selection of suitable control groups. It also relies on the “parallel trends” assumption, implying that without any intervention, the intervention and control groups would follow a similar trend.

Cointegration is used to explore the long-term relationship among two or more time-series variables. It is particularly capable of tackling the issue of “non-stationarity”, a common phenomenon in time series data. To correctly apply this model, the variables must be co-stationary, which can be a challenge, and the model might require a substantial dataset.

Upon examining the findings of the aforementioned publications, approximately 58% of the analyzed studies concluded that natural disasters have a negative impact on international trade. About 11% of the studies determined that natural disasters do not induce any structural impact. One study which used the “import demand and export supply” model found that, contrary to the prevailing view in the literature, natural disasters can have a positive effect on trade. This represents around 5% of the studies. In another study, representing around 5% of the total, it was discovered that the influence of natural disasters on trade can vary depending on certain factors such as a country’s level of democratization and geographical size. Similarly, another study, constituting about 5%, determined the effect on trade could be influenced by a country’s economic condition. A further study, representing around 5%, which examined four different types of natural disasters separately, concluded that the impact on trade differs based on the type of disaster. One study, also representing around 5% of the total, specifically examining China, found that natural disasters increase exports but reduce imports in the country. Finally, another study, constituting about 5% of the total, presented inconsistent data regarding the impact of natural disasters on the global supply chain. This comprehensive literature review demonstrates that the findings regarding the impact of natural disasters on international trade may vary depending on different variables, methods, and areas of analysis, reflecting the complexity of the issue.

Figure 5. Distribution according to the findings of the studies (%)



Source: Created by the Author

2.3. GENERAL OVERVIEWS OF THE STUDIES

The reviewed studies in the literature review have been summarized in the context of their general scope. The publications were included in this study by being sorted according to their publication date. The summaries of the studies are as follows:

The research paper titled “Climate Shocks and Exports” (Jones & Olken, 2010), featured in the American Economic Review, delved into the connection between climate shocks and global trade. The primary aim of this study was to scrutinize and assess the impact of climate shocks on exports, utilizing international trade data. Panel regression analysis served as the method employed in the research. Data from 1900 to 2006 was evaluated, with climate data gathered on a monthly basis

from “Terrestrial Air Temperature and Precipitation.” The study’s results revealed that high temperatures significantly affected the exports of economically disadvantaged countries, while having no discernable impact on the exports of wealthier countries. However, it was noted that the economies of affluent countries would also experience effects since their imports were influenced, despite their exports remaining unaffected by temperature. The study found that a temperature increase of one degree led to a reduction in the export growth rate of a financially struggling country by 2.0 to 5.7 percent. A sector-by-sector analysis of temperature effects showed that the impacts were predominantly observed in agricultural product exports and light manufacturing. This research is considered one of the most important studies on the subject in the literature.

The article “Shaken, Not Stirred: The Impact of Disasters on International Trade” (Gassebner, Keck, & Tech, 2010) was published in the *Review of International Economics* and analyzed the effects of disasters on international trade. The article aims to examine the impact of major disasters on import and export flows using the gravity model. Data on trade were examined for 170 countries between 1962 and 2004, and data on natural disasters were taken from EMDAT. Approximately 300,000 observations were made in the study. Two important findings were obtained in the study. Firstly, It was found that the lower a country’s democratic values, the higher the import loss. However, the type of government did not have an effect on export losses. One of the most important comparisons related to the findings was made between Costa Rica and Togo. Following a disaster that occurred in Costa Rica, a democratic and developing country, in 2001, exports decreased by 3.9%, and imports increased by 3.2%. In Togo, which has the same physical size and an autocratic government, exports decreased by 3.7% and imports by 6.2% after the disaster. Another result obtained is that the physical size of a country is also important, especially for exporters.

The article “Climatic natural disasters, political risk, and international trade” (Reuveny & Oh, 2010) published in the *Global Environmental Change* journal examines the association between natural disasters, political risk, and international trade. The article statistically analyzes the effects of climate-related natural disasters and political risk on bilateral trade in various countries using a gravity model. 116 countries were examined, and data from 1985 to 2003 were analyzed. Data on natural disasters are taken from EM-DAT. The study found that if climate change increases the frequency of climate-related disasters as predicted by science, economic globalization could decline. The impact of this could spread to the macroeconomies of many countries due to the critical role of international trade in the global system. As a result, natural disasters or increased political risk in importing or exporting countries reduce bilateral trade. Countries with lower political risk experience a smaller decrease in trade flow when hit by natural disasters compared to the average. On the other hand, countries with higher political risk face a larger decrease in trade flow than the average during natural disasters. Based on the empirical findings of the study, trade helps the global economy withstand negative shocks such as natural disasters by enabling countries to provide each other with emergency goods and aid, and facilitating recovery efforts. The study is one of the most cited works in the literature on the possible effects of natural disasters on trade. As of April 1, 2023, it has received 152 citations.

The article “Coping with loss: the impact of natural disasters on developing countries’ trade flows” (Cernat, 2012) was published as a European Commission Chief Economist Note and discusses the impact of natural disasters on trade flows in developing countries. The study investigates the impact of natural disasters on the exports of trading countries. Data on natural disasters were obtained from the Emergency Events Database (EM-DAT). Two main distinctions were made in the study, resulting in the creation of two different models to analyze the data. In the first model, developing countries were treated as a whole. In the second model, small developing countries were specifically evaluated, with the definition of a “small” country being one with a population of less than 20 million. The gravity modeling technique was used to test the data. The study found that 9% decrease in exports was observed as a result of the disasters. When specifically examining the impact on the exports of small countries, it was found that the decrease was 22%, indicating that the effect of natural disasters on the exports of small countries differs from that on larger developing countries. The negative effect of disasters was felt for an average of about 3 years in small developing countries.

The article “The Economic Impact of Hurricanes in History: Evidence from Sugar Exports in the Caribbean from 1700 to 1960” (Mohan & Strobl, 2013) was published in the *Weather, Climate, and Society* journal and investigates the economic impact of hurricanes on sugar exports in the Caribbean from 1700 to 1960. Panel regression analysis served as the method employed in the research. The article examines the tropical cyclone events affecting the Caribbean colonies/countries between 1700 and 1960 and their impact on sugar exports. Data from 1700 to 1850 were obtained by examining academic studies on the period, while data from 1851 to 1960 were obtained from the National Hurricane Center’s HURDAT dataset. The primary aim of the study is to provide quantitative evidence of the economic impact of hurricanes, an important natural and largely unpredictable phenomenon that shaped the economic history of the Caribbean. To do this, hurricane event data were combined with historical sugar export data in a regression framework over the 1700-1960 period. The results suggest that hurricanes had significant negative economic consequences for Caribbean sugar colonies. In general, the study confirms historical documents that argue that hurricanes had a major impact on the sugar industry in the Caribbean.

The article “Global supply chains and natural disasters: implications for international trade” (Puzzello & Raschky, 2014) was published in *Asia and Global Production Networks* and examines the implications of natural disasters on global supply chains and international trade. The study examines data from 1995 to 2010, during which time 5,479 major natural disasters occurred according to the Emergency Events Database (EM-DAT). The study focuses on all-natural disasters rather than a specific event. The aim of the study is to determine the impact of supply chain disruptions due to major natural disasters on exports. The study aims to create models that can understand the impact of failures in the supply chains of countries that export or import when local economies are hit by disasters. Additionally, the study creates a comprehensive model by modeling the impact of disasters in countries outside the trading pair. The study found that exports significantly decreased, especially when major disasters occurred. The natural disasters that have the most significant impact on a country’s supply chains and trade are earthquakes, tsunamis, storms, and floods. The study also emphasizes that it is not all-natural disasters but only major ones that affect international trade.

The article titled “Disasters and Trade: Did Hurricane Katrina Affect US Imports?” (Parsons, 2014) was published in the journal “*International Economics and Economic Policy*” and examines the impact of Hurricane Katrina on US imports. The main aim of the study was to investigate the extent to which Hurricane Katrina affected the import of the United States in 2005. The article focused on a single developed country. It was stated that the fact that articles examining the association between natural disasters and trade collectively examined many countries and many disasters prevented accurate determinations regarding the association between natural disasters and trade. For this reason, the impact of a single disaster in a single country was examined in the study. Panel data analysis was used to test the data in the article. Data between the first quarter of 1983 and the second quarter of 2008 were examined. The reason for choosing this period was that it was when the recession officially ended in November 1982. The reason for only examining imports is that export supply models are rare and generally lack solid theoretical foundations. According to the results obtained in the study, it was seen that the estimated demand was robust during the period covering Hurricane Katrina. In this context, it was concluded that the hurricane did not have a significant effect on US imports, which is contrary to the pre-evidence that natural disasters can cause a break in import demand. Therefore, it is stated in the study that decision-making mechanisms in the United States did not pursue any macro policies to smooth out trade balance fluctuations even in the biggest American disasters.

The research article “How do natural and man-made disasters affect international trade? A country-level and industry-level analysis” (Oh, 2015) was published in the *Journal of Risk Research* and examines the impact of natural and man-made disasters on international trade, using a gravity equation model to compare the effects of these two types of disasters. The study examines data from 53 countries between 1984 and 1998, with a total of 17,828 observations. The study aims to measure the effects of natural and man-made disasters on international trade and make a comparison between the two types of disasters. According to the results, natural disasters significantly decrease

trade flows, while man-made disasters have mixed effects. The study also examines the impact of disasters on international trade according to the socioeconomic status of the trade pairs. Natural disasters negatively affect bilateral trade and increase trading costs. On the other hand, technological disasters and terrorist attacks in developed countries increase trade with other developed countries but do not result in an increase in trade with less developed countries. Therefore, the study's most important finding is that a country's socioeconomic status is crucial in international trade during times of disasters. The article highlights the relatively new recognition of the importance of natural disasters, technological disasters, and terrorist attacks in international business compared to financial and political risks. The article suggests that disaster risk assessment and planning should be an integrated effort between firms and governments to minimize direct and indirect damages and enhance operational flexibility. Overall, the study provides an original contribution to the literature by examining disasters comparatively and from an international business perspective.

The article "The asymmetric impact of natural disasters on China's bilateral trade" (Meng, Yang, Shi, & Jeager, 2015) was published in the *Natural Hazards and Earth System Sciences* journal and investigates the asymmetric impact of natural disasters on China's bilateral trade. A gravity model adapted to national conditions was used in the study to examine the impact of natural disasters in China and trade partner countries on China's imports and exports. Statistical data for China and trade partners from 1980 to 2012 were analyzed. The study used a gravity model. According to the findings of the study, disasters in China increase exports but do not have a significant impact on imports. However, an increase in disasters in China's trade partner countries reduces both China's imports and exports. The development levels and land areas of China's partners are important in determining the size of the disaster effects on China's bilateral trade. If the partner country affected by the disaster is developed, the declines in China's bilateral imports and exports deepen. Additionally, if the affected partner has a larger land area, the decline in China's bilateral imports is less, but the decline in bilateral exports is greater.

The article "Climate shocks and international trade: Evidence from China" (Li, Xiang, & Gu, 2015) was published in the *Economics Letters* journal and presents evidence on the association between climate shocks and international trade in China. The study examines the effects of climate shocks on international trade in China. The aim of the study is to identify the impact and depth of weather shocks on international trade. Data related to weather were obtained from the China Statistical Yearbook. The study analyzes data from 2000 to 2011, Panel method is used as the methodology in the study. According to the results obtained in the study, there are significant climate impacts on exports, but very little impact on imports. Poorer, hotter, and non-coastal cities are found to be more affected by weather changes. Additionally, the results of the study suggest that climate shocks have significant impacts on China's exports, revealing the high cost of potential climate change. The study also suggests that this may demonstrate China's "great country effect," affecting not only its own wealth but also global welfare by raising prices and reducing the number of products exported to the world market.

The article "Do Natural Disasters Stimulate International Trade?" (Li & van Bergeijk, 2016) was published in the *International Institute of Social Studies* journal and examines whether natural disasters have a stimulating effect on international trade. The dataset used in the study covers 63 countries from 1970 to 2014, and the "import demand and export supply" approach is used to test the data. The study finds that natural disasters have a positive impact on import demand (1.6%) and export supply (1.9%). The study suggests that the increase in imports is due to the need to purchase products for reconstruction after natural disasters. For exports, the study suggests that more autocratic regimes may prioritize the survival and reconstruction of the export sector. The study's findings challenge the general perception that natural disasters have a negative impact on trade and highlight the positive effects that can occur. The study also recommends further research on different countries and time periods to fully understand the impact of natural disasters on international trade.

The article "Weather Variations and International Trade" (Dallmann, 2018) was published in the *Environmental and Resource Economics* journal and investigates the association between weather

variations and international trade. Panel data analysis was used as the method in the study. The data of 134 countries between 1992 and 2014 were examined in the study. The weather-related data were obtained from the University of East Anglia's Climate Research Unit. The data were analyzed using panel data methodology. The study tested specific characteristics that make countries vulnerable to weather shocks, including income level, location, initial weather conditions, institutional quality, transportation costs, and free trade agreements. In addition, another aspect examined in the study was the channels through which weather changes affect production and productivity and thus affect bilateral trade. In addition to the country analysis, the impact of temperature on 95 different products was also examined in the study to identify which products are sensitive to weather conditions. This identifies which products are sensitive to weather conditions. Finally, another aspect investigated was whether adaptation measures can reduce future impacts. The aim of the study was to understand whether temperature and precipitation changes have an impact on bilateral trade within the scope of the data. According to the findings, higher temperature changes in the exporting country and temperature differences between the exporting and importing countries were found to reduce total bilateral trade. Another result seen in the study is that this situation is higher for exporters with low-quality institutions and closer to the equator. When the analysis was done at the product level, it was seen that the negative effect of temperature is dominant, but the effects vary from product to product in a negative and positive context. The agricultural sector, the manufacturing sector, especially the metal and textile sectors, are among the most affected sectors. In long-term analysis, the results show that the temperature in the exporting country has a permanent effect for up to 20 years. The study titled "Floods and Exports: An Empirical Study on Natural Disaster Shocks in Southeast Asia" (Tembata & Takeuchi, 2018) was published in the Economics of Disasters and Climate Change journal and empirically analyzes the impact of floods on exports in Southeast Asia. The study examines the impact of floods and storms on trade. The data used was between 2004 and 2016, and a total of four countries were included in the study: Indonesia, Malaysia, the Philippines, and Thailand. The study differs from climate impact research in that most of the literature focuses on agriculture, while this study examines the effects of weather shocks on both agricultural and non-agricultural products. Export data were separated into agricultural and manufacturing product groups to investigate the effects of disasters by sector. The results show that natural disasters have a significant impact on exports, with floods and storms reducing export values. The impact of floods was seen to occur within one month of the disaster. The findings also show that the sudden impact of floods led to an average decrease of 3-5% in bilateral export values from Southeast Asian countries. The study emphasizes the need for commercial organizations and policymakers to pay more attention to climate-related risks in international trade.

The article "Natural Disasters and Countries' Exports: New Insights from a New (and an Old) Database" (El Hadri, Mirza, & Rabaud, 2018) was published by The World Economy journal and provides new insights into the association between natural disasters and countries' exports, using a new and an old database. The main focus of the study is to examine and determine the impact of a disaster on a country's total exports due to a reduction in its resource capacities, such as labor capacity, agricultural products, and public infrastructure. Panel data analysis was used to test the data available in the study. The data analyzed in the study covers the years 1979-2000, and the natural disasters examined were earthquakes, floods, extreme temperatures, and storms. The main point that distinguishes the study from the general literature is the sources of the data analyzed. In this study, the data were taken from both EM-DAT and Geophysical and Meteorological Database (GeoMet) to compare the results systematically. The comparison was made to determine the impact of using data from different sources on the results of the study. The findings of the study show that there is a clear negative impact on a country's exports after earthquakes, regardless of the country's economic or political characteristics. For storms, no significant impact was observed on exports regardless of the country's characteristics or the intensity of the event. Floods were found to have a negative impact on the exports of small countries, especially when floods are severe. An ambiguous effect was observed for extreme temperatures.

The article “How do natural disasters affect services trade?” (Xu & Kouwoaye, 2019), published by the World Trade Organization, is the first to examine the impact of natural disasters on services trade in the literature. The gravity model was used in the study. Natural disasters were measured using two different sets of variables, namely, their human casualty and economic loss, and their geophysical and meteorological magnitudes. Capital-intensive service sectors, such as transportation and communication, are most affected by a major natural disaster’s negative impact on communication exports for up to five years after the disaster. The data covers the years 1995–2012. Data on natural disasters are taken from EM-DAT. All-natural disasters are considered in general. The results of the study show that natural disasters cause a decrease in service trade exports by 2% to 3%. However, concrete data on imports could not be obtained, as the study states that affected countries may need more service imports to meet their consumption needs, but major disasters can also disrupt trade infrastructure and impair service imports. Another important point mentioned in the study is that natural disasters that disrupt economic activities and hinder international service trade can create serious challenges for developing countries’ development process. One of the most striking results of the study is that the negative impact of natural disasters on service trade is larger than the impact on merchandise trade, as shown by statistical tests. This can be explained by the fact that trade in services faces higher costs and is more heavily reliant on physical infrastructure for cross-border delivery. Natural disasters causing damage to infrastructure and disrupting economic activities, therefore, affect service trade more severely. Another point investigated in the study is whether openness in service trade mitigates or aggravates the impact of natural disasters. The results show that although countries with higher service trade restrictions tend to import and export fewer services in general, these countries tend to import relatively more services after a major natural disaster. This may be due to the fact that countries with higher trade restrictions are less prepared for disasters and thus require more service imports to respond to and recover from a major natural disaster.

The study “Natural disasters and trade: the mitigating impact of port substitution” (Hamano & Vermeulen, 2019) was published in the *Journal of Economic Geography* and examines the mitigating impact of port substitution on the association between natural disasters and trade. The study examines the impact of natural disasters on exports at the port level. The study employed a gravity modeling approach to analyze the data. Japanese customs data were used to test the model, and the study examined the extent to which there was a change in port usage after the Great East Japan Earthquake of 2011. The study found that at least 40% of exports were diverted to other ports as a result of the earthquake. The findings suggest that external variability in transportation costs and fixed export costs specific to each port cause exports to shift from one port to another. One of the most significant implications of the study is that the results should inform decision-making processes for policymakers. When storms and earthquakes occur regularly, preparedness for natural disasters becomes a global issue rather than a concern for individual countries. The recovery of economies and the resumption of trade after natural disasters depend on the infrastructure available, such as alternative routes and options for firms. The study points out that businesses have continuity plans, but these plans are dependent on existing infrastructure, such as ports and roads, making decision-making mechanisms important. Another focus of the study is the importance of the type of product in port substitution. The study therefore focuses on export data at the port level, with an emphasis on the impact on international trade. The study found that the effect of port substitution was most significant for technology products that are important in supply chain networks, while there was no such effect for products that have larger domestic transport costs and can be stored for longer periods.

The study “Natural Disasters and the Reshaping of Global Value Chains” (Freund, Mattoo, Mulabdic, & Ruta, 2022) was published in the *IMF Economic Review* and analyzes the effects of natural disasters on global value chains, and explores how firms respond to natural disasters by reshaping their production processes and sourcing strategies. The aim of the study is to understand the long-term effects of natural disasters on global value chains. In this context, the practices of firms in the automotive and electronics sectors were examined after the 2011 earthquake in the Tōhoku region of Japan. The study investigated whether the 2011 earthquake led to diversification of imports from

Japan and reshoring or nearshoring of production by more dependent importers. The results of the study show that countries that were more dependent on Japanese suppliers before the earthquake experienced larger declines in imports from Japan after the earthquake. When the decline was examined by product, it was found that the decline in intermediate goods and electronics was less pronounced compared to final products. Another important point expressed in the study is that, despite the decline in trade flows after the natural disaster, supplier companies in Japan did not re-shore, nearshore, or diversify production to reduce risk. In summary, the study provides insights into the effects of natural disasters on global value chains and highlights the resilience of established association and supply chains, even after a significant shock.

The article “The nexus between natural disasters, supply chains and trade—Revisiting the role of preferential trade agreements in disaster risk reduction” (Permani & Xu, 2022) was published by The World Economy journal and examines the nexus between natural disasters, supply chains, and trade, and revisits the role of preferential trade agreements in reducing disaster risk. The data of 42 countries between 2000 and 2014 were analyzed using the gravity model. The main purpose of the study is to understand the impact of natural disasters on global value chains and to examine whether a country’s Preferential Trade Agreements with its trading partners can mitigate the effects of natural disasters on the global value chains. According to the results of the study, there is strong evidence of a positive association between the depth of trade agreements and the global value chains. The study finds that a natural disaster in an exporting country increases the impact of the disaster on trade. This situation supports the idea that the development of regional and global value chains can create a risk profile that increases economic vulnerability in the event of a disaster in a highly interdependent region.

The research paper titled “Natural disasters, climate change, and structural transformation: A new perspective from international trade” (Wu, 2022), published by The World Economy journal, offers a fresh outlook on the connection between natural disasters, climate change, and structural transformation through the lens of global trade. Utilizing a “Difference-in-differences” modeling technique, the study analyzes a panel dataset spanning 158 countries from 1997 to 2018. natural disaster data come from the Emergency Events Database (EMDAT). The study aims to investigate the long-term consequences of natural disasters on economies. To achieve this, the economic effects of natural disasters are empirically explored within various time frames. One key finding of the research is that climate-related disasters trigger a structural decline in the short term but don’t hinder structural growth in the long run. The magnitude of natural disaster impacts depends on a country’s overall development level and trade openness. For instance, more developed, higher-income, or more internationally traded countries are less affected by natural disasters. The study also finds that economic development and trade openness significantly influence the impact of natural disasters. Developed or high-income countries are less affected by natural disasters compared to their developing or low-income counterparts, as per the statistical analysis. Trade openness is shown to mitigate disaster damages and foster economic resilience to such natural shocks.

3.LIMITATIONS

This study presents a detailed literature review but acknowledges certain limitations. First, a potential selection bias exists in the studies reviewed due to subjective inclusion criteria. The use of Google Scholar as the primary database might have resulted in overlooking certain related research. Second, the broad subject matter may result in gaps in the review, particularly regarding certain regions or disaster types. Lastly, despite a systematic approach, researcher bias may be present in study categorization and interpretation, a common issue in literature reviews addressed by transparency in methods and decisions. Despite these, this study contributes to understanding the trade impact of natural disasters. Future research should address these limitations, considering various time frames, data sources, and a more diverse range of locations and disaster types.

4.CONCLUSION

After conducting a systematic literature review, 19 prominent studies rigorously analyzing the intricate association between natural disasters and trade were thoroughly examined. Many of these

comprehensive studies utilized EM-DAT data from the prestigious Centre for Research on the Epidemiology of Disasters (CRED) and the reliable gravity model for data analysis. A significant portion of the studies predominantly focused on global data. Meanwhile, the rest of the compelling studies targeted specific regions or individual countries.

When meticulously evaluating the results of these studies, various outcomes have been observed. However, the majority of the studies have conclusively determined that natural disasters indeed have a detrimental impact on international trade. In contrast, different results have been discovered in studies that specifically limit the context of the country, disaster, or both, and utilize econometric models other than the widely used gravity model. This intriguing situation highlights the crucial need for diversifying studies in the literature at a more detailed micro-level and with different models.

Publications examining the association between natural disasters and trade aim to determine the direction and magnitude of the impact of natural disasters on trade. In a significant portion of these studies, it has been found that natural disasters have a substantial effect on international trade, negatively impacting supply chains and reducing countries' competitiveness. In this context, many studies have revealed that the destruction and impact of natural disasters. These studies demonstrate the importance of international cooperation for decision-making mechanisms. This highlights the need to develop international trade policies against natural disasters accordingly. Overall, the findings from these studies allow policymakers and businesses to make rational decisions in response to the potential effects of natural disasters on trade.

Another focus of some studies is which regions and sectors are most affected by disasters. These studies show which sectors are more impacted by natural disasters. As a result, they reveal which businesses and policymakers in a region or country need to develop more strategies to minimize risks related to natural disasters. These studies play a critical role in determining investment decisions and resource allocation, as they provide an understanding of which sectors are more affected by natural disasters.

The type of disaster is also crucial in the natural disasters-trade association. Studies in the literature have assessed if and how specific disasters impact trade. These investigations enable determining the damage caused by each disaster to trade.

Indeed, light has been shed on the intricate connection between natural disasters and trade through the findings of this study, but more importantly, significant potential for practical application in real-world scenarios is carried by these findings. There are a number of valuable inferences that can be drawn from this understanding that can substantially benefit disaster management strategies and policy formation. For instance, the knowledge of which regions and sectors are more severely affected by natural disasters can provide the cornerstone for targeted disaster management strategies. This is a crucial insight for policymakers who could then prioritize the establishment of resilient infrastructures in these high-risk regions, along with promoting industries that demonstrate greater resilience to natural calamities. The in-depth comprehension of how specific disaster types impact trade could provide a guideline for risk assessment and mitigation strategies. As a result, both businesses and policymakers would be empowered to prioritize threats based on their potential to disrupt trade and direct resources for risk mitigation accordingly. The crucial role of international cooperation is further underlined by these findings, given the substantial influence of natural disasters on global trade. This knowledge could act as the foundation for governments negotiating trade policies, ensuring that the implications of natural disasters are taken into consideration. Such agreements might encompass measures like temporary tariff relief or financial assistance, designed to support countries that have suffered extensively due to a disaster. An opportunity has also been identified for governments and businesses to allocate more investment towards developing disaster-resilient infrastructure. This approach is particularly relevant for regions and sectors that are more vulnerable to the repercussions of natural disasters, as such investment could help minimize economic and trade-related losses induced by these events. Given the escalating frequency and intensity of climate-related disasters, The significance of sustainable development and proactive climate action is also reemphasized by this study. To counteract the future impact of such disasters on trade, it's imperative that sustainability and climate resilience become integral to long-term strategies adopt-

ed by governments and businesses. In conclusion, while contributing to academic literature, these findings also carry with them important practical implications. Policymakers and businesses, by leveraging these insights, can take preemptive measures to counter the negative effects of natural disasters on trade, and in doing so, nurture a more resilient and sustainable global economy.

The necessity for a more extensive body of research to deepen the understanding of the complex interplay between natural disasters and trade is indeed suggested by these enlightening findings. Here are some suggestions for future studies that might enrich the existing literature:

Greater detail exploration of certain economic, environmental, or sociopolitical variables should be encouraged when considering the influence of natural disasters on trade. For instance, examining a country economic openness, resilience, the relative scale or frequency of disasters, or the presence of disaster management policies and institutions, could present crucial variables in econometric models. By doing so, fresh insights might be unearthed into how these variables interact with the effect of natural disasters on trade. There's also a call for methodological diversity in this area of research. For example, adopting machine learning techniques could help dissect large and complex datasets related to natural disasters and trade. Furthermore, the use of models that demonstrate the delayed effects or unexpected shifts resulting from natural disasters on trade could yield more nuanced results. Future research would also benefit from examining individual countries or regions more closely, especially those prone to particular types of natural disasters or possessing unique trade dynamics. In addition, a comprehensive examination of trade-dependent economies like may reveal how these trade-reliant countries mitigate the effects of natural disasters. Additionally, conducting more detailed studies at regional or national levels can help provide clearer guidelines for policymakers, particularly in regions frequently afflicted by natural disasters. These studies could concentrate on specific types of natural disasters prevalent in certain regions, analyzing how these disaster types uniquely impact different sectors of trade. To conclude, while substantial progress has been made in this area, there remains a need for more detailed and targeted research. The ongoing exploration of the significant impacts of natural disasters is essential for devising effective strategies to mitigate their effects. It is hoped that these findings inspire further research and inquiry into this critically important domain.

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PROSPECTS FOR THE DEVELOPMENT OF THE ESG CONCEPT IN THE FACE OF NEW CHALLENGES

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Received 26.01.2023.

| Send to review 09.02.2023.

| Accepted 21.04.2023.

Original Article



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JEL Classification:

Q01, Q57, Q54

Doi: 10.61432/CPNE01011791

UDK: 005.721/.722:330.34.01

ABSTRACT

Regulators and businesses worldwide are gradually understanding the importance of climate change adaptation and mitigation measures. Therefore, decision-makers - national regulators, regional authorities, and heads of corporations - need an appropriate toolkit that ensures adequate decision-making based on quantitative assessments of various decarbonization and adaptation scenarios. The most promising tools for the decarbonization of the economy are analyzed. It was noted that technological modernization and structural transformation of the industry within the framework of decarbonization are necessary for the positive effect of the transition to low-carbon development. It was emphasized that enterprises should independently form their ESG strategies to adapt to climate change. Applying an ESG strategy in the long term means increasing business competitiveness and profitability. ESG analysis can help identify several potential long-term financial risks and opportunities, including the possible impact of future carbon regulations and cost savings associated with more efficient use of resources. It was noted that the decarbonization of the economy creates new opportunities for developing green finance and low-carbon technologies. Still, at the same time, it is necessary to remember about possible risks of different nature. The transition to sustainable development is perceived as an objective requirement of time, determining the future of any country. This is not only a problem of the contradiction between the development of economic potential and the limited possibilities of technogenic load on the environment but also a contradiction between the moral principles that a large part of society adheres to and the axioms of social justice.

Keywords: ESG, decarbonization, environmental factor, rational use of resources, sustainable development, climate change, climate policy priorities

1. INTRODUCTION

A modern challenge for enterprises worldwide is ensuring the sustainable development of both enterprises and the economic system. Unfavorable climatic and social events force representatives of society (clients, owners, regulators) to focus on environmental and social aspects of the functioning of enterprises, proposing appropriate requirements.

Once considered an “environmental problem,” climate change is increasingly being included as an integral element in national and international security agendas. Climate change is seen as a “threat multiplier”, exacerbating existing security threats, increasing environmental stress, and amplifying pressures that can affect the ability of governments to respond to climate change.

Climate change can affect security in several ways. Increased competition for access to natural resources can lead to conflict without effective dispute resolution mechanisms. An increase in the frequency of extreme weather events and natural disasters caused by climate change may increase political instability and threaten livelihoods, pushing populations to migrate or turn to illegal sources

es of income. Undermining food production and rising food prices can lead to social instability, protests, and unrest. Impacts on energy production caused by rising temperatures, reduced precipitation, and threats to power generation and transmission infrastructure from extreme weather events undermine supply chains and energy security. Growing demand for water resources and irregular water supply are increasing pressure on existing water management mechanisms and may complicate political relations.

Extraordinary measures have been taken in recent years to reduce greenhouse gas emissions to counteract the climate threat at the global level. Back in 2015, the Paris Agreement (Paris Agreement 2015) was adopted, aimed at keeping the average temperature increase at a level no higher than 1.5°C, increasing the ability to adapt to the consequences of climate change, and transitioning to low-carbon development with the goal of achieving zero-carbon economy emissions by 2050. As of May 2021, 189 countries have joined the agreement. All participating countries voluntarily set themselves the goal of reducing the net emissions of CO₂ and other greenhouse gases into the atmosphere until 2030. Still, many have gone further - to date, more than 60 leading countries of the world have declared their desire for complete carbon neutrality (that is, zero emissions of CO₂ into the atmosphere) by 2050. (Official website of the UNFCCC).

Many countries that have joined the Paris Agreement have launched CO₂ emissions trading systems or other forms of carbon pricing and “carbon fees” or plan to do so soon. Many introduce a ban on internal combustion engines (Wappelhorst S., 2020), set target shares of renewable energy sources in the national energy balance, or select a percentage of low-carbon fuels.

In December 2019, the European Union announced a comprehensive strategy for the development of a sustainable economy, “Green Course” (Communication from the Commission 2019), the goal of which is to achieve climate neutrality (i.e., zero emissions of all greenhouse gases) by 2050. It also set an ambitious intermediate goal - reducing emissions of greenhouse gases by 2030 compared to 1990, which assumes a share of renewable energy sources of 38-40% in the energy balance and its 65% share in electricity production. At the same time, by 2030, compared to 2015, it is expected to reduce energy consumption by 39-40%, coal consumption by 70%, and oil and gas consumption by 30% and 25%, respectively. The EU consistently creates comprehensive regulations forcing market participants and national governments to meet these overambitious goals.

Achieving these tasks requires a systematic approach to implementing ESG practices in business activities. At the same time, problems of a fragmented movement toward sustainable development are often observed today, which requires further research to find practical tools for implementing the ESG management concept (Amaradasa, 2018).

2. LITERATURE REVIEW.

The abbreviation ESG is formed from the English words Environmental, Social, Corporate Governance, or ecological, social, and corporate management. The development of this direction at the enterprise or in a particular industry implies a more responsible fulfillment of environmental requirements and using resource-saving technologies to reduce the negative environmental impact. Observance of environmental standards in this concept can be seen as additional social obligations since voluntary willingness to preserve a favorable ecological environment satisfies current needs without harming future generations. The idea of ESG is considered either in the context of the transition to “green” growth - economic growth that ensures the support of biodiversity, the preservation and rational use of natural resources and the environment, and the reduction of negative climate changes, or in terms of compliance with the requirements of social responsibility, both externally and internally contour Actualization of the problems of climate change and maintaining biodiversity stimulated a surge of interest of the scientific and expert community in issues related to various aspects of the “green” agenda.

Scientific works use many different interpretations of ESG. For example, it can include not only the apparent components of the acronym but also concepts such as sustainable development, responsible investment, social acceptance, public relations and social responsibility, supply and procurement chains, human rights, labor issues, transparency, control, renewable energy, and climate change.

The theoretical framework of ESG research is mainly focused on institutional theory. From the perspective of institutional theory, Chatterji and Toffel explained the impact of ESG rating on improving environmental performance (Chatterji, Toffel, 2010), Jayachandran et al. demonstrated the influence of social indicators on corporate indicators (Jayachandran et al., 2013), Koch et al. studied the risk prevention role played by ESG (Koh et al., 2014) and Flammer et al. studied the binding effect of contracts on the social responsibility of managers (Flammer et al., 2019).

ESG research shows that businesses most responsive to ESG stakeholder demands will outperform irresponsible ones. Interest in socially responsible investments arose 50 years ago (Sparkes, Cowton, 2004). And already in the period from 2000 to 2010, the number of studies on the causes and consequences of applying ESG criteria in making investment decisions has increased significantly (Chelawat, Trivedi, 2013). The application of ESG criteria has firmly entered the practice of investors in developed countries and is gradually finding its supporters in developing markets (Celani et al., 2020).

The further development of the concept of “green finance” acquired a dualism: representatives of scientific research circles concentrated on studying the issues of assessing the impact of responsible business behavior on the sustainable development of the markets of its presence and the country’s economy as a whole; representatives of business and government regulators - on the application of the concept of “green finance” to acquire market power and lobby for their interests ESG research shows that companies that respond best to the demands of stakeholders on ESG will perform better than irresponsible companies.

Participants in the movements for the decarbonization of the world economy strive to reduce and ideally eliminate emissions of greenhouse gases into the atmosphere by 2050. Various programs and technologies are proposed to achieve the set goal with the help of the production of new types of energy, technologies for capturing and injecting carbon dioxide into the earth’s crust for slowing the accumulation of CO₂ in the atmosphere, etc., which requires huge investments.

The financial plane of “green” management solutions is actively supplemented with “green” marketing tools. Today, socially responsible business management policies largely determine products’ competitiveness and brand popularity (Jafar et al., 2019).

In the book “How to Avoid a Climate Catastrophes,” Bill Gates calls on governments to focus on two numbers in environmental policy: 51 billion tons - the number of greenhouse gases emitted into the atmosphere, and 0 - the number of emissions that should be achieved by 2050. For this, he suggests awarding a “green” premium for the minimum gap between the price covered by greening programs and the price of abandoning dirty industries and reducing greenhouse gas emissions to zero, since in Europe, many of the largest industrial enterprises, being the largest polluters, use free credits when obtaining permits for greenhouse gas emissions gases. They have no motivation to reduce emissions.

3. AIM OF THE RESEARCH

The article aims to study the growing trend and importance of implementing the ESG concept.

4. METHODS

The research materials are reports and reports of domestic and international organizations, government orders, and scientific and practical manuals in ESG, economic and financial spheres. Research methods are analysis, comparison, and classification.

The dynamics of ESG-bond development are pretty high, which requires the development of forecasts for their different dynamics. One of the most straightforward forecasting tools is trend building. Trends involve considering the previous trends in the change of the indicator over time, and by constructing a dependence equation of various types, a formula is calculated that reflects this dependence in dynamics. A trend line is a line that approximates the original data based on a regression equation or moving average. Approximation takes place by the method of least squares. Options for forming a trend line are presented in table 1.

Table 1. Types of trend line approximation functions

Name	Type	Description
Linear	$Y = mx + b$	m – the tangent of the angle of inclination of the straight line;
Logarithmic	$Y = c \ln x + b$	b – displacement;
Polynomial	$Y = b + c_1x + c_2x^2 + c_3x^3 + c_4x^4 + c_5x^5 + c_6x^6$	c and b – constants;
Degree	$Y = cx^b$	$c_1, c_2, c_3, c_4, c_5, c_6$ – constants;
Exponential	$Y = ce^{bx}$	c and b – constants;
Linear filtering	$F_t = \frac{(A_t + A_{(t-1)} + \dots + A_{(t-n+1)})}{n}$	e – the base of the natural logarithm; c and b – constants;

Source: (Soshnykova, L., Tamashevych, V., Uebe, H., Sheffer, M., 1999)

The approximation coefficient is calculated as follows:

$$R^2 = 1 - \frac{\sum (y_i - \hat{y})^2}{(\sum y_i^2) - \frac{(\sum y_i)^2}{n}} \quad (1)$$

Analyzing indicators that reflect the volume of air emissions by European countries, it is advisable to determine the presence or absence of dependence between these indicators and the value of “green” bonds issued in European countries. It is advisable to construct a multiple regression equation to solve this problem.

The general multiple regression model looks like this:

$$y = f(x_1, x_2 \dots x_p) + \varepsilon \quad (2)$$

y - dependent variable;

$x_1, x_2, \dots, x_p$ - factors (independent changes);

If the multiple regression is linear, then it is presented as follows:

$$y = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \varepsilon_i, i = \overline{1, n}$$

Or in matrix form:

$$y = X\beta + \varepsilon \quad (3)$$

where, $y = [y_1, y_2, \dots, y_p]^T$ – vector of values of the dependent variable;

$\beta = [\beta_1, \beta_2, \dots, \beta_p]^T$ – vector of regression model coefficients;

$\varepsilon = [\varepsilon_1, \varepsilon_2, \dots, \varepsilon_n]$ – error vector.

$X = \begin{bmatrix} 1 & x_{11} & x_{12} & x_{13} & \dots & x_{1p} \\ 1 & x_{21} & x_{22} & x_{23} & \dots & x_{2p} \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & x_{n2} & x_{n3} & \dots & x_{np} \end{bmatrix}$ – matrix of factor values.

The regression equation is the sample model estimate:

$$\hat{y} = \hat{b}_0 + b_1 x_1 + b_2 x_2 + \dots + b_p x_p \quad (4)$$

where $\hat{y}$ – estimation of the mathematical expectation of the dependent variable

$b_i (i = \overline{0, p})$ - estimation of coefficients $\hat{\beta}_i (i = \overline{0, p})$ - regression model

The least squares method is used for estimation:

$$S(b_0, b_1, \dots, b_p) = \sum_{i=1}^n (y_i - b_0 - b_1 x_{i1} - b_2 x_{i2} - \dots - b_p x_{ip})^2 \rightarrow \min \quad (5)$$

After solving the system of normal equations

$$\begin{cases} \frac{\delta S}{\delta b_0} = -2 \sum_{i=1}^n (y_i - b_0 - b_1 x_{i1} - b_2 x_{i2} - \dots - b_p x_{ip}) = 0 \\ \frac{\delta S}{\delta b_1} = -2 \sum_{i=1}^n x_{i1} (y_i - b_0 - b_1 x_{i1} - b_2 x_{i2} - \dots - b_p x_{ip}) = 0 \\ \vdots \\ \frac{\delta S}{\delta b_p} = -2 \sum_{i=1}^n x_{ip} (y_i - b_0 - b_1 x_{i1} - b_2 x_{i2} - \dots - b_p x_{ip}) = 0 \end{cases} \quad (6)$$

After that, we will get the values of the coefficients of the regression equation, which in matrix form have the following form:

$$b = (X^T X)^{-1} X^T y \quad (7)$$

where $b = [b_1, b_2, \dots, b_p]^T$ vector of regression equation coefficients.

The coefficient (index) of multiple correlation R is used to assess the closeness of the joint influence of factors on the dependent variable:

$$R = \sqrt{1 - \frac{\sum_{i=1}^n (y_i - \hat{y}_i)^2}{\sum_{i=1}^n (y_i - \bar{y})^2}} = \sqrt{\frac{\sum_{i=1}^n (\hat{y}_i - \bar{y})^2}{\sum_{i=1}^n (y_i - \bar{y})^2}} \quad (8)$$

Coefficient (index) of multiple determination R^2 :

$$R^2 = \frac{\sum_{i=1}^n (\hat{y}_i - \bar{y})^2}{\sum_{i=1}^n (y_i - \bar{y})^2} \quad (9)$$

The coefficient of determination is one of the most important indicators of the quality of the constructed model, as it determines the degree of adequacy of the model, and the closer the value is to "1", the better the calculated model describes the set of initial data. In addition, the statistical significance of the coefficient of the equation is calculated using the Student's t-test. Accordingly, only those independent variables whose value is less than 0,05 remain in the model.

5. RESULTS

At the beginning of the 2020s, humanity faced serious climatic and ecological challenges caused by climate change and environmental degradation. The most common understanding of climate change is a transformation of the climate system that occurs independently of cause over decades or more extended periods (Houghton, 2001). But in recent decades, this concept has been increasingly used to define climate change caused by human activity.

Climate change and environmental degradation remain one of the most severe challenges of the current century. As part of the 27th UN International Climate Conference (November 2022), world leaders and representatives of international organizations called the fight against climate change a battle for the survival of humanity. The risks caused by climate change, in terms of probability of occurrence and the expected magnitude of damage, are unprecedented and threaten the world already.

The economic activity of people is mainly responsible for climate change and environmental pollution. Since the 19th century, the increase in average global temperatures and the saturation of the atmosphere with such greenhouse gases as CO₂ and methane (CH₄) has been caused precisely by burning fossil fuels and deforestation (Climate Change 2021). The ecological footprint indicator (Ecological Footprint), which compares the resources consumed by households, corporations, and government structures with the possibilities of biological regeneration of the Earth, has already increased to 1.7 (Global Footprint Network).

The critical points of strengthening human influence on the environment are related to the understanding that:

- climate change is a global problem, but each of us is capable of changing the situation;

- even small changes in our behavior can prevent greenhouse gas emissions without harming the quality of life;
- measures to protect the climate must be taken by all people at all levels of life organization (Bird, E 2008.)

The EU strategy is focused on developing and implementing adaptation solutions that will help reduce the risk of the impact of existing climate development trends, increase its protection, and ensure the availability of freshwater (Forging a Climate, 2021). Acceleration of the processes of adaptation to climate change is a sign of increasing responsible attitudes towards life among people and organizations. Essentially, it is a more profound and severe interpretation of a sustainable lifestyle, corresponding to the idea of “common responsibility” and care for the community of all living things. The attention of people and organizational structures here is focused not only on knowledge and their conscious application but also on the actual manifestation of activity, directly or indirectly aimed at improving the quality of life of other people to improve the quality of one’s life without harming the quality of life of others.

Given that almost every resident of Europe already feels the consequences of climate change, it is necessary to organize operational support and assistance in the processes of faster and more comprehensive adaptation to climate change.

The countries’ measures to decarbonize the world economy create new risks - transitional climate risks. The losses associated with them arise not as a result of climate change but as a result of the actions of the public and private sectors aimed at curbing these changes (introduction of cross-border carbon regulation (TRC), the introduction of new technologies, changes in the structure of energy consumption, etc.).

The European Union (EU) has practiced internal carbon regulation through carbon taxes for about 30 years. The average size of such a tax in Europe is about 50 euros per ton of CO₂. As a result of strict internal regulation, the European Union faced the phenomenon of “carbon leakage” - the transfer of carbon production to countries with loyal environmental rules and more favorable conditions for doing business, which reduces the flow of a certain amount of income to the EU economy, and reduces the number of jobs. Moreover, goods produced in countries with lower environmental requirements are cheaper and more competitive, pushing European producers out of the market. Therefore, the “Green European Course” was adopted to neutralize these EU risks.

Presented to the public in 2019, the European Green Deal envisages making Europe the first climate-neutral continent by 2050 and aims to develop a modern, resource-efficient, and competitive economy. Its activities are financed within the framework of the InvestEU program, on the implementation of which EU member states will spend 1 trillion euros over the next decade. Prepared by the European Commission in 2021, the large-scale Fit for 55 packages of measures is aimed at a legally binding reduction of greenhouse gas emissions by 55% by 2030 (compared to 1990), provides mechanisms for pricing greenhouse gas emissions and border carbon regulation, as well as increasing the production of renewable energy, stimulating the sustainable development of transport and limiting the import of products that contribute to deforestation (European Green Deal... 2021).

A cross-border carbon tax (TCT) is proposed as a critical tool to protect against “carbon leakage”, which would tax carbon-intensive products according to the amount of greenhouse gas emissions associated with their production. Currently, the size of the TPE has not been established; according to preliminary estimates, it will range from 25 to 75 euros per ton of CO₂. In addition, the European Commission has developed a plan to bring the EU economy out of the crisis caused by the coronavirus pandemic, where TVE will be a significant source of income (€5-14 billion per year (until 2027)).

Considering current trends, the UN Environment Program predicts a 10.6% increase in greenhouse gas emissions. By 2030 compared to 2010 and a global temperature increase of 2.5-2.8% by the end of the century. To prevent these negative consequences, countries in the medium term will have to step up measures to transition to a low-carbon economy. At the same time, the current high price of hydrocarbons contributes to an increase in investments in renewable energy sources (RES), which will stimulate the energy transition.

The problem of greening is related to issues of social responsibility of business. While there are active discussions about the causes and consequences of global climate change, the impact of greenhouse gas emissions and pollutants on the population's quality of life in areas of industrial localization or high urbanization is a generally recognized fact. The world's leading countries that provide the maximum contribution to CO₂ emissions (million tons per year) are China (10,357); the USA (5414); India (2274); Japan (1237); Germany (798); Iran (698); Saudi Arabia (601); South Korea (598); Canada (557)

In the world, a mechanism that will provide the necessary assessment of various scenarios of adaptation to changes is in demand by several stakeholders. Among the main ones, the following can be distinguished ([Hare, 2018](#); [UN official site](#)):

- regulators and executive authorities at the national level – it is essential for them to understand how to organize regulation within the country, as well as to understand which of the support measures or which restrictions will help to achieve the set goals in the climate and sustainable development field.
- regulators at the international level – this group of stakeholders solves tasks related to negotiations at the international level.
- the financial sector is also an important stakeholder: depending on the prospects of a particular business, financial flows will be redistributed. For example, large investors are already beginning to abandon coal and oil and gas investments, including Norway's sovereign wealth fund and the World Bank. They are refocusing on green energy and other assets less vulnerable to decarbonization scenarios.
- the business community needs to understand what awaits them in the short and long term to build their business strategies. At the same time, this business requires reliable, clear, and understandable signals from regulators and executive authorities.
- climate activists. For this category of stakeholders, transparent and accessible information about business activities and government regulators is essential to timely focus on what has not yet been done on their part.
- people. This category of stakeholders is the most numerous and, at the same time, the most diverse. The population needs clear signals and accessible information about what the rest of the stakeholders are doing and how it will be helpful and essential for society - what benefits it will receive since such large-scale changes will necessarily lead to an additional tax or other financial burdens on the population.

For all the described stakeholders, such information is essential because it provides quantitative assessments of energy demand, greenhouse gas emissions, energy prices, public welfare, GDP level, necessary infrastructure investments, and state support, as well as evaluations of the degree of impact of regulatory measures.

Today it is evident that the problem of the green economy has a systemic nature. The sustainable development theory is based on the idea put forward by Academician V.I. Vernadsky's view of transformation (under the influence of scientific thought and human activity) of the biosphere into the noosphere - the sphere of the mind. The further development of civilization depends to a large extent on the level of education of the population, which is faced with the issues of resource conservation, overpopulation of the planet, etc., at the threshold of the 21st century.

The term "sustainable development" has a relatively long history, dating back to the Declaration of the first U.N. Conference on the Environment ([Stockholm, 1972](#)) and the works of the Club of Rome in the early 1970s, when the connection between environmental problems, economic and social development was realized. Sustainable development can be characterized as stable socio-economic development that does not destroy its biological basis and ensures the continuous progress of society.

The transition to sustainable development is perceived as an objective requirement of time, determining the future of any country. This is not only a problem of the contradiction between the development of economic potential and the limited possibilities of technogenic load on the envi-

ronment but also a contradiction between the moral principles of most societies and the axioms of social justice.

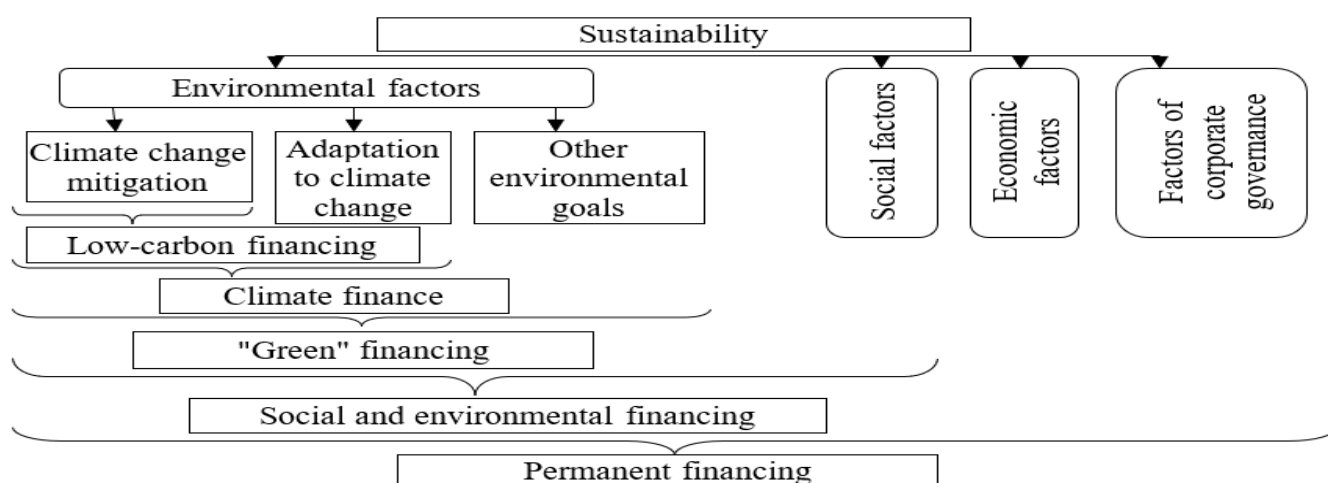
Climate challenges are global but linked to the local ecology. Environmental factors are considered broader in the sustainable development of each specific country/region, including climatic factors. Environmental factors affect society and are largely determined by the nature of business management. Therefore, social and governance factors are mandatory components of sustainable development. The materials of the European Commission emphasized that the specificity of sustainable financing consists of the compulsory consideration of environmental, social, and management factors when making financial decisions ([European Commission. Overview](#)). Such an approach ensures more excellent long-term investment and stability of individual projects, programs, and the entire economy. In the last few years, a responsible attitude to the environment, high social responsibility, and high quality of corporate management have become the basis of transforming enterprise strategies from purely economic indicators to indicators of long-term sustainability ([Wesselink et al., 2020](#)).

The principles of sustainable economic activity are that only those activities can be considered sustainable:

- 1) has a significant contribution to the achievement of one or more of the six environmental goals. The definition of a substantial contribution depends on the specific ecological objective. For example, according to the Paris Agreement, to mitigate the consequences of climate change is to stabilize the concentration of greenhouse gases during the activities of renewable energy, energy efficiency, eco-transport, etc. Technical criteria establish specific definitions of a significant contribution;
- 2) does not cause significant damage to any other environmental objective. A significant contribution to the achievement of an environmental goal should not be achieved at the cost of substantial damage to another plan. Technical criteria establish specific definitions of considerable damage;
- 3) is carried out in compliance with minimum social guarantees ([OECD Recommendations on TNCs](#), [UN Guiding Principles on Business and Human Rights](#), [documents of the International Labor Organization](#), [International Charter of Human Rights](#)).

The problem of sustainable development for agribusiness enterprises is particularly relevant due to the dual nature of their functioning. This is manifested in the fact that, firstly, the activity of agricultural producers is a large-scale source of greenhouse gases in the atmosphere and, at the same time, is a large consumer of natural resources (water, land), without which the functioning of the agricultural sector itself is impossible. Secondly, agricultural enterprises provide the population with products and contribute to the development of rural areas. Based on this, an essential aspect of the activities of agro-industrial complex enterprises is the need to find various sources of financing that would allow the full implementation of environmental and social projects (Fig. 1).

Figure 1. Interrelationship of the components of sustainable development and sustainable finance



Source: ([Design of Sustainable Financial System, 2016](#))

The development of supranational and national legislation, requirements for standardization, and the expansion of producer responsibility have led to the formation of a new approach to enterprise goal setting with an orientation not only on short-term, purely commercial purposes but on long-term sustainability. This is how the concept of ESG principles of the enterprise was formed, which orients the company to the high efficiency of corporate management and the achievement of social and environmental business goals (Gillan et al., 2021). What is the role of the ESG concept? It is one of the main elements of the corporate strategy, which is focused on achieving the company's corporate goals, which are ensured by releasing new products, transforming business models, and a compelling value creation chain with reduced risk. At the same time, compliance with ESG principles is an indicator that banks, investors, and the state are guided by when deciding on financing or allocation of subsidies. For agricultural producers,

the strategic development of the agro-industrial complex relates to the priority implementation of ESG principles, which is caused by the spread of "green" and "climate-oriented" agriculture. In this situation, the ability and readiness of the agricultural industry for climate change are of great importance. Implementing ESG principles in the conditions of the agro-industrial complex will create all the opportunities to ensure sustainable development and development in its industries.

For organizations, the challenges of the green economy have led to significant changes in the management system. Adherence to the principles of "green economy" and social responsibility become new factors of competitiveness, forming a positive image of the company and positively affecting the interactions of the organization and society. The critical challenge is balancing the necessary investment costs for creating new infrastructure, developing, and implementing green technologies, and the expected results. Companies strive to optimally organize the financing of relevant programs, including using green finance tools - unique financial products that provide an inflow of capital for implementing environmental and social programs. Adherence to ESG principles in several cases can improve the quality of risk management and allow income that can be compared with the profitability of traditional investments in financial markets. More and more companies in various sectors of the economy are ready to give up receiving a high share of profit in the short term in favor of ensuring the long-term sustainability of investment indicators and compliance with social values within the framework of responsible environmental and socially oriented management.

Medium and small businesses face the most significant difficulties in implementing the ESG agenda since the participants' efforts to develop appropriate methodological approaches have yet to result in the emergence of single agreed standards for regulating corporate ESG practices globally.

Analyzing the main trends in the development of the ESG agenda, the following trends can be concluded:

- the emergence of carbon regulation: new carbon regulation standards are gradually being introduced in the world;
- development of green and responsible financing tools: the gradual introduction of new regulation leads to the need to classify what is considered environmentally sustainable activity, as well as business motivation to support such projects;
- ESG disclosure obligations: the development of the ESG agenda and the introduction of additional regulation in turn form new reporting requirements;
- risk management: emerging trends lead to the need to improve financial organizations' approaches to managing ESG-related risks.

The need for ESG transformation is because, during investment analysis, potential investors increasingly use tools for identifying risks and opportunities for sustainable development, focusing not only on financial criteria but also on factors directly related to environmental, social, and managerial aspects, in including obtaining positive environmental or social effects.

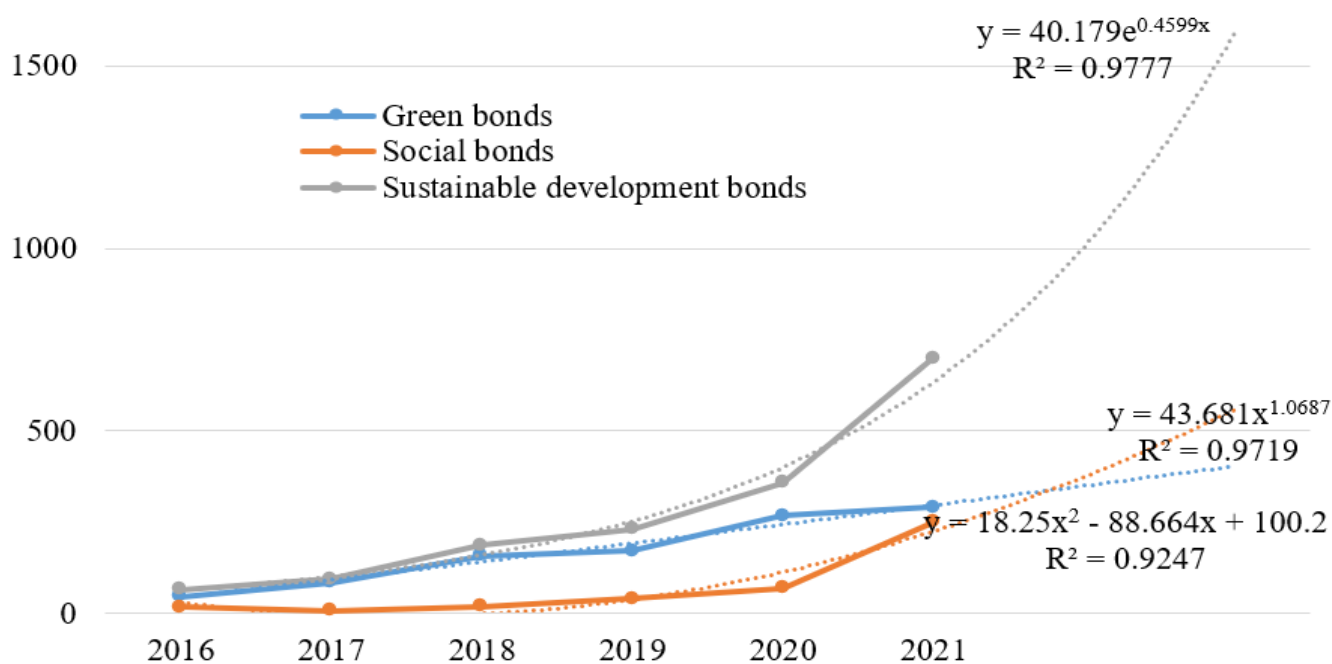
Thus, in making investment decisions, along with financial indicators, social, environmental, and ethical principles of the company's activity are increasingly considered, which requires the disclosure of corporate information in the field of ESG.

The COVID-19 pandemic has become a catalyst for ESG investments. According to the American financial company MSCI, the pandemic has created a powerful narrative around ESG investing, and investment in ESG funds has reached a record level. Yes, 78% of American investors are ready to increase ESG investments in response to COVID-19. At the same time, 55% of investors with assets over 200 billion dollars. have already significantly increased them ([MSCI Investment... 2021](#)).

According to the Global Sustainable Investment Association, ESG assets exceeded \$35 trillion in 2020, up from \$30.6 trillion in 2018 and \$22.8 trillion in 2016. The total value of ESG assets is expected to exceed \$50 trillion by 2025, accounting for more than a third of the projected \$140.5 trillion of total global assets under management (AUM) ([ESG Assets, 2020](#)).

Among the widespread ESG investment instruments, ESG bonds can be singled out. Otherwise, they are called “green” social bonds or sustainable development bonds. If we analyze the results of the functioning of the ESG bond market, it can be noted that in recent years, the volume of their placement has increased more than ten times (Fig. 2).

Figure. 2. Dynamics of ESG bonds in terms of the global economic system, \$ billion



Source: ([Agriculture Criteria ...](#))

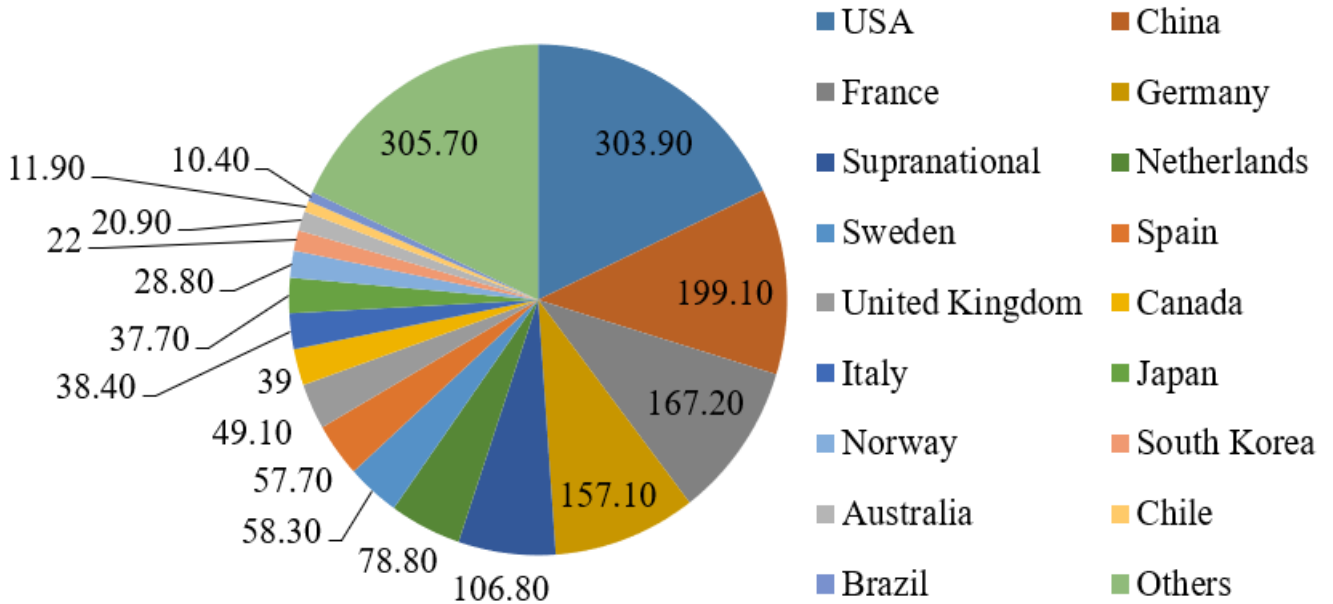
Analyzing the dynamics of changes in the volumes of the respective bonds and based on the constructed trend models, it is worth noting that the most significant growth is predicted for sustainable development bonds. On the other hand, in the future, due to the reduction in the issuance of green bonds, social bonds will surpass them in terms of growth. The best approximation for the three types of bonds under consideration was chosen accordingly: for green bonds – graded; for social bonds – polynomial; for sustainable development bonds – exponential.

“Green” bonds are the most popular instrument for financial support of sustainable projects. At first, green bonds were issued mainly by the USA, Japan, and France; then, they were joined by other European Union states, China, and Southeast Asian countries. The key players in the “green” bond market, along with the USA and China, were European countries, whose total volume of such bonds issued reached almost \$300 billion. About 40% of this volume is accounted for by Germany, France, and Great Britain (Fig. 3).

The World Bank Group is solving global problems involving states and various organizations. Solving the problem of depletion of natural resources and negative human impact on the environment became one of the World Bank’s priority areas of activity in 2008. The pioneer of “green” bonds is the European Investment Bank, which in 2007 issued Climate Awareness Bonds to finance projects

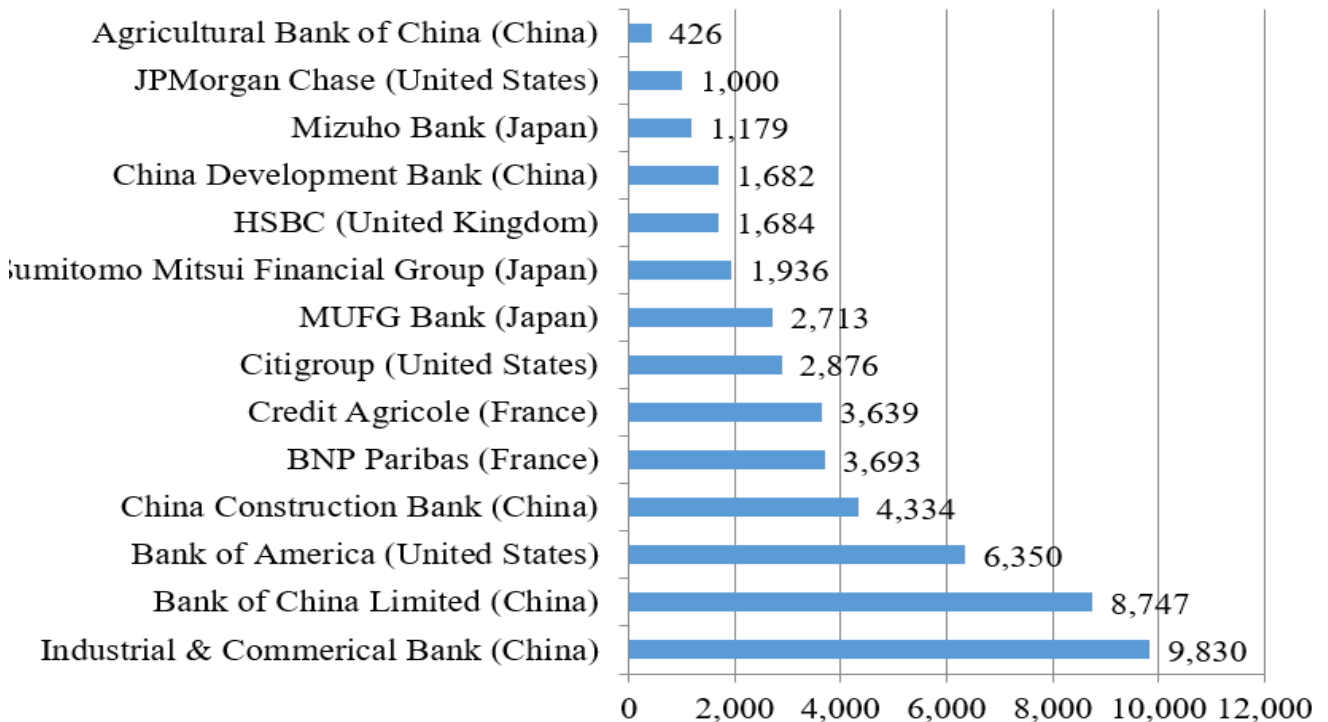
in the field of alternative energy sources and efficiency improvement. From 2007 to 2013, “green” bonds were issued only by supranational international financial organizations - the European Investment Bank, the International Bank for Reconstruction and Development, the International Finance Corporation, the European Bank for Reconstruction and Development, and the Asian Development Bank. They are still large issuers of “green” bonds. In 2020, the leaders in issuing “green” bonds were the banks of China, the United States, and France (Fig. 4).

Figure 3. Cumulative value of green bonds issued worldwide between 2014 and 2021, by country (in billion U.S. dollars)



Source: (STATISTA, 2023)

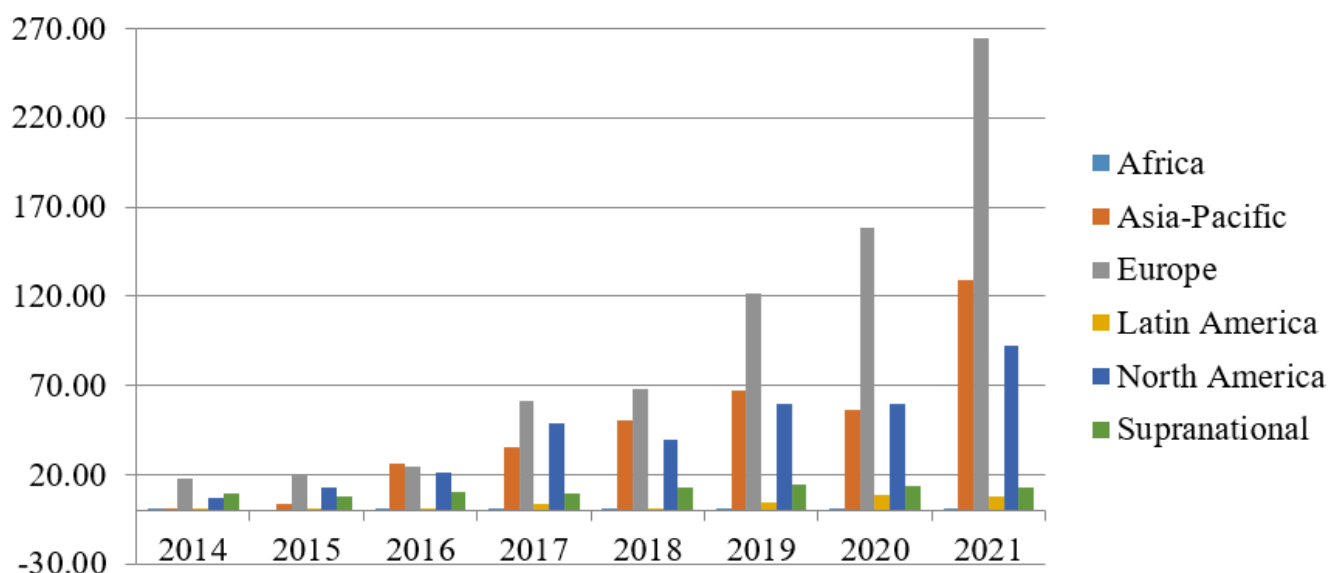
Figure 4. Value of green bond issuance of the largest banks worldwide in 2020 (in million U.S. dollars)



Source: (STATISTA, 2023)

European issuers are driving the development of the world market of “green” bonds. They occupy 45% of the market. As you know, the European Union countries pay active attention to environmental issues. “Green” investment has dramatically developed in France and the Scandinavian countries. A distinctive feature of the French market is a high degree of transparency and large volumes of assets. In the Scandinavian countries, on the contrary, a significant number of such issuers carry small emissions of “green” bonds. Also, a substantial share of the world market of “green” bonds belongs to Asian countries - about 25% (Fig. 5).

Figure 5. Value of green bonds issued worldwide from 2014 to 2021, by region (in billion U.S. dollars)

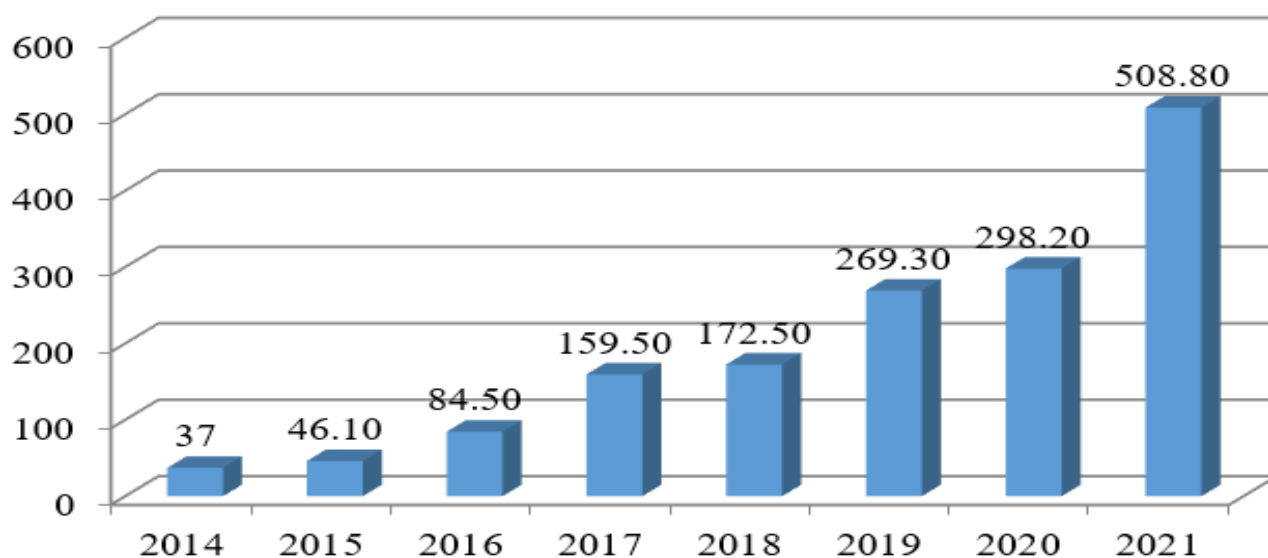


Source: (STATISTA, 2023)

ESG financing is developing in the direction of greater flexibility. If, when issuing classic bonds, the issuer had to indicate the goals for which the raised funds will be directed, ESG bonds allow the issuers to allocate finances at their discretion.

As we can see, the world market of “green” bonds is actively developing, in which more and more participants are involved. This market has gained relevance now, in the “post-war” era, when sustainable development has become one way to restore various countries’ economies. According to forecasts, the capacity of the “green” bond market will grow to \$5-6 trillion by 2035, with a simultaneous increase in its geographic and industry coverage (Fig. 6).

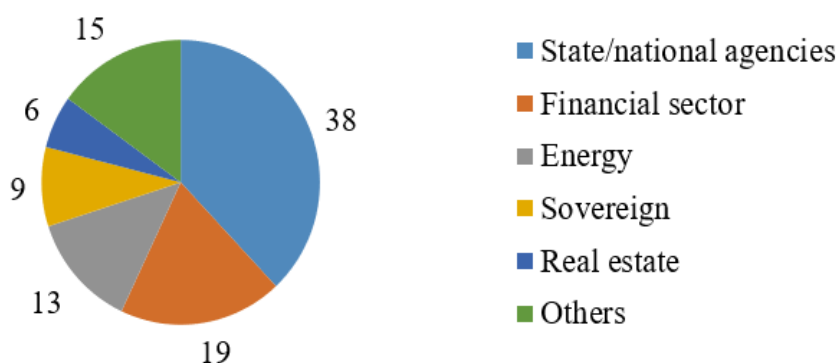
Figure 6. Value of green bonds issued worldwide from 2014 to 2021 (in billion U.S. dollars)



Source: (STATISTA, 2023)

The structure of the sustainable development bond market depends on the country's economy and the state's role. In the US, a large share of ESG bonds belongs to municipal authorities, utility companies, and real estate companies. China dominates the region's banking and ESG bonds. In Europe, almost 35% of all ESG bond issues are accounted for by public ESG agencies, development banks, and the Ministry of Finance. Gradually, the leading market issuers will not be banks and investment companies but transport, industrial, including agro-industrial, energy companies, and developers.

Figure 7. Structure of ESG bonds by sector (%)



Source: (Bloomberg, 2023)

Many investors believe investing in ESG is less profitable than investing in companies that need to consider responsible investing principles. But studies show the opposite (Boffo et al., 2019).

The mentioned studies provide convincing evidence that in Western financial markets, the securities of companies with a higher ESG rating are less volatile and more profitable than those with a lower rating. At the same time, the high profitability of green bonds is ensured by tax benefits for both issuers and investors, such as: providing investors with a tax credit in the amount of 70% of the coupon income (Qualified Energy Conservation Bond - QECCB, USA); direct subsidization of investors (bonds with direct subsidization); exemption from income tax, which allows reducing interest rates. At the same time, the number of issuers of such "green" securities in the corporate sector is limited by the inconsistency of business structures with the acceptable level of ESG risk.

According to the results of the analysis of the consulting company Sustainability Consulting Group (Sustainability Consulting...), the four most practical and valuable ratings were identified, which are advisable to use when forming investment portfolios focused on the goals of sustainable development:

- S&P Global Scores (SAM);
- Sustainalytics ESG Risk Rating;
- MSCI ESG Rating;
- CDP Climate, Water & Forest Scores.

A linear model of the dependence between predictors and the resulting change was built to determine the impact of indicators that reflect the degree of environmental pollution in Europe on the issuance of green bonds. The indicator was used as the resulting variable – cumulative value of green bonds issued in Europe between 2014 and 2021 by country (in billion U.S. dollars).

As predictors:

- Net greenhouse gas emissions (source: EEA);
- Greenhouse gas emissions intensity of energy consumption;
- Average CO₂ emissions per km from new passenger cars;
- Generation of waste by waste category;
- Generation of waste by economic activity;
- Waste generated by households by year and waste category.

The correlation coefficient is **0.843**, and the coefficient of determination is **0.712**, which indicates the sufficient quality of the model to establish the influence of the predictor on the dependent variable. As a result, only one indicator was statistically significant: Table 2.

Table 2. Regression coefficients

Variables	Standard- ized re- gression coefficients	Error of stan- dardized regression coefficients	Error of stan- dardized regression coefficients	Error of un- standardized regression coefficients	Student's criterion	Level of significance
Intercept			2,684499	5,330723	0,503590	0,618634
Generation of waste by waste category	0,843727	0,103302	0,000000	0,000000	8,167599	0,000000

Source: calculated by the authors

The most important conclusion that can be drawn from this analysis is that the activity of countries regarding the issue of green bonds does not depend on their level of environmental pollution. This requires a review of the standard European policy regarding issuing these bonds and increasing countries' interest in their distribution.

ESG-oriented investing is more than just a short-term desire to please the public. A company that acts responsibly is managed for strategic development. This means that it can be a reliable object for investment. The impact of ESG factors on the value of companies is likely to increase. The more investors and analysts monitor companies' corporate responsibility, the more critical ESG factors will play. Currently, ESG investments typically result in lower returns because the investor is limited in their choice of instruments. However, in the long term, the attractiveness of investing in companies that are not focused on ESG criteria will decrease. Thus, in the future, the application of ESG criteria will become an aspect of the survival of companies on the world market, and the degree of influence of ESG principles on investment decisions will only increase.

The lack of a transparent regulatory system for the disclosure of non-financial information by the business community, a high need for institutional ESG investors, and a low level of market awareness of environmental, social, and management factors in the investment decision-making system is seen as the fundamental problems holding back the development of ESG investing in the economy.

6.DISCUSSION

The advantages of the studied concept for each side of the financial market, namely for the producer, consumer, and investor, are highlighted. The influence of ESG investments on the economy of the European Union countries has been studied. Information on trends and forecasts for developing the green economy and ESG directions is given. Features of financial support of the investment process demonstrate a high level of budgetary and banking participation. The need to expand the resource base has been confirmed, reinforced by the deterioration of the ecological situation and the growth of social tensions, requiring the search for new approaches to the formation of the necessary and sufficient level of social responsibility of the business community. The development of ESG-principles implementation processes in the global investment practice can be ensured in the context of scaling the instrumental provision of responsible investment processes and increasing the degree of significance of reputational business characteristics. The most significant aspects characterizing the impact of the ESG transition on the "greening" of the global economy and finance are analyzed, and the readiness to function following ESG principles is assessed.

The authors will analyze the advantages of the concept considered for each side of the financial market, namely for the producer, consumer, and investor, and the impact of ESG investments on the economy of the European Union countries. Information on trends and forecasts for developing the green economy and ESG directions is given.

Companies worldwide are forced to modernize and rethink their business models, considering climate factors, which is confirmed by the scientific work of Wesselink A., Fritsch O., and Paavola J. (2020). Adherence to

the principles of “green economy” and social responsibility become new factors of competitiveness, forming a positive image of the company, and positively affecting the interactions of the organization and society. The critical challenge is balancing the necessary investment costs for creating new infrastructure, developing, and implementing green technologies, and the expected results. The development of ESG-principles implementation processes in the global investment practice can be ensured by scaling the instrumental provision of responsible investment processes and increasing the significance of reputational business characteristics. Decarbonization, as a condition of sustainable development, is becoming an essential component of ESG principles. This is also facilitated by increasing regulatory pressure regarding implementing ESG practices.

The world market of “green” bonds is actively developing, and more and more participants are involved. This market has gained relevance now, in the “post-war” era, when sustainable development has become one way to restore various countries’ economies.

Based on research conducted by Boffo R., Patalano R., Antoncic M, Bekaert G., Rothenberg R., Noguer M., and Ferrarini G. (2020), we agree with the thesis that ESG investments are more profitable than company investments because they are not considered the principles of responsible investment. Accounting for ESG criteria allows for improved portfolio profitability, which creates good long-term prospects for the ESG investment segment.

The situation in our country showed how fragile the world is and constantly needs unity and partnership to face global challenges to humanity and ensure the goals of sustainable development.

7. CONCLUSIONS

Technological innovations have made the energy transition and decarbonization of the global economy economically achievable – thanks to the declining cost of renewable energy. In turn, climate change has accelerated the transformation of social values and habits toward responsible consumption and care for the environment. At the same time, all this leads to the spread of the concept of responsible investment. ESG investing further improves the quality of life and working conditions, increasing the ethics of business methods.

The concept of ESG provides for the company’s implementation of environmental, social, and managerial responsibility in its activities. The performance of this concept has a significant impact on the functioning of enterprises, and in the future, this trend will become more and more meaningful. ESG is integral to investment decisions, brand image, and building trust between stakeholders, the public, and businesses. It is worth seriously approaching the study and implementation of the ESG concept to ensure financial stability. If a company is not environmentally and socially oriented, it may lose potential investments and be limited in entering specific communities. The presence or absence of commitment to the concept helps investors identify companies to invest in and weed out those companies that represent financial risks due to the possibility of an environmental accident or disaster resulting from their activities. The increase in demand for ESG investments will be facilitated by concrete measures and actions to implement the ecological agenda of companies, a clean regulatory environment, and systematic government support.

Currently, ESG investing usually brings lower returns: the investor limits his choice of instruments. On the other hand, the ESG trend can lead to the fact that the securities of companies that are not in demand among socially responsible investors will be undervalued. For other investors, this is an opportunity to make money. Suppose businesses do not adhere to ESG principles in their activities. In that case, they will likely face significant risks of being eliminated from the global investment pool and hurting their market capitalization.

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A METHODOICAL APPROACH TO DETERMINING THE LEVEL OF DEVELOPMENT OF DIGITAL TRADE IN GLOBAL MARKETS

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Received 01.03.2023.

| Send to review 10.03.2023.

| Accepted 08.05.2023.

Original Article



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JEL Classification:

B4, E60, F02, F59

Doi: 10.61432/CPNE0101196s

UDK: 658.8.012.12:004.738.5

ABSTRACT

The global digital transformation market is showing increasing performance every year, and growth forecasts have a long-lasting effect. In the conditions of digitalization of the economy, the relevance of research in the field of digital economy in general and digital trade in particular is increasing. The study developed a methodical approach to determining the level of development of digital trade on global markets by determining the integral indicator and clustering countries. The research is based on categories of theoretical and empirical levels of knowledge. With the help of cluster analysis, the classification of countries was carried out by methods of classification of multidimensional indicators, based on the definition of the concept of distance between objects, followed by the selection of their groups of clusters. Using the cluster method, countries were represented, which made it possible to visualize the result of the mental process when building a methodical approach to determining the level of development of digital trade on global markets. The proposed methodological approach makes it possible to assess the level of development of digital trade, taking into account the specifics of the development of a certain country. The implementation of the proposed approach will make it possible to conduct a more complete analysis of digital trade and ensure the sustainable development of the economic system.

Keywords: digital economy, digitalization, methodology, integral indicator, indices, development, globalization, global economy

1. INTRODUCTION

In recent years, due to the pandemic, the volume of the world economy has decreased. However, it is worth noting that this negative factor caused the rapid development of digitalization throughout the world. Lockdowns, as a result of closing and suspending the work of many industries. As a result, digital sectors of the economy are gaining special relevance.

According to experts' forecasts, the global digital transformation market will grow to \$2.3 trillion in 2023. Digitalization affects all spheres of economy and social life. 90% of the leaders of the world's leading companies call digital transformation the main priority of their business. Big data processing systems give businesses enormous advantages, allowing them to save resources, make predictions and meet market expectations. Along with companies, states also compete in digitization. This necessity is dictated by modern socio-economic standards. Leadership in the digital economy is a guarantee not only of international prestige, but also of technical and humanitarian progress in the conditions of sustainable development.

For many years, the United States has been the unchanging leader of digitalization, followed by Europe, and now Asian countries are taking the first places in international rankings. According to the Digital Evolution Index, the "digital elite" include Singapore, Great Britain, New Zealand, the UAE,

Estonia, Hong Kong, Japan and Israel - these countries demonstrate the highest indicators of digital technology development. South Korea, Australia, Western Europe and Scandinavia are slowing down. China, Kenya, Russia, India, etc. can be considered promising countries. But in South Africa, Peru, Egypt, Greece, Pakistan, rates of digitization are still lower.

At the end of the last century, the leadership in the number was captured by the USA. The emphasis in the US was on digital commercial services: in the 1990s, the AMAZON trading platform and aggregator services for the sale of goods and services appeared. In European countries, digitization has also started in the service sector. In Great Britain, Europe's technological leader, the regulatory basis for the development of the digital economy is represented, in particular, by the law "On the Digital Economy" and the Digitalization Strategy adopted in 2017. Today, Britain prefers to invest in robotics and artificial intelligence, but socially significant areas that determine the standard of living of people are still prioritized: services, trade, banking, education, health care and transport.

Digital technologies are actively being implemented in the field of commercial operations. Their use becomes an important competitive advantage, as it fundamentally simplifies and accelerates access to consumers and markets, as well as opens up new opportunities for customization and introduction of new types of products. The development of digital commerce will require long-term commitment at the global level. The expediency of the involvement of the leadership at the national and regional levels, all levels of society, strong state institutions, capital investments, a modern and effective legal framework, is determined by the creation of digital transformation management structures with broad powers. Taking into account the scale of growth of digital trade, the formation of mechanisms and tools for monitoring the measures taken, measuring the achieved indicators and the results of transformations will be of the utmost importance. Thus, analyzing the above aspects, the author sees the need to reveal the level of development of digital trade of the countries of the world by clustering them according to digitalization indicators.

2. LITERATURE REVIEW

In the conditions of digitalization, in recent years, many works related to the digital economy have appeared, however, to achieve the goals of the study, the author analyzed the works related to the promotion of digital technologies in international trade Abelian-sky A. L., and Hilbert M. ([Abelian-sky, Hilbert 2016](#)), the work reveals the key issues of the impact of technologies on the development of trade, which ensures the development of the digital economy. In the work, a thorough study was carried out, which made it possible to make sure that the characteristics of developed countries and developing countries have their differences. For the current study, this is extremely important and was taken into account when clustering countries.

Bokovets V.V., Davydiuk L.P. ([Bokovets, Davydiuk, 2021](#)) reveal the issue of e-commerce from the point of view of promoting business development, in the opinion of the author, this work has thorough conclusions that are interesting for the current research.

To achieve the goal of the research, the author analyzed a number of works devoted to the dominance of the digital economy and digital transformation of global value chains, the results were reflected in the works of Deardorff A. V. ([Deardorff, 2017](#)), Freund C., and Weinhold D. ([Freund, Weinhold, 2002](#)), Fu X. ([Fu, 2020](#)).

Also, for the current research, works devoted to the digital economy, its development and state in the conditions of globalization processes are extremely important. In the work Ahmedov I. ([Ahmedov, 2020](#)) revealed the role of digitization processes in the economy and its impact on trade. Emphasis is placed on the digital space as the main element of world trade. The author emphasizes that the paradigm shift of digital trade and cross-border virtual space will lead to the rapid development of the digital economy around the world. Also, as part of the study, the work of Huaping G., Binhua G. was considered ([Huaping, Binhua, 2022](#)) which is devoted to the digital economy and the general structure of demand for personnel.

The work of Semenog A.Yu. ([Semenog, 2020](#)), which investigates the current state of development and formation of the digital economy, which is extremely relevant for the current study, allowed us

to draw certain conclusions that were reflected in the proposed methodical approach to the development of the digital economy in the context of globalization.

Also, the work of Pyshchulina O. is an important achievement (Pyshchulina, 2020), which reveals the main trends, warns about risks and characterizes the social determinants of the digital economy. The study is dedicated to revealing the current stage of development of the digital economy through digitalization. The work reveals the social determinants and grounds for the development of the digital economy, the introduction and use of digital technologies. In addition, the potential risks and threats of digitalization in the world are analyzed.

The work of Pahwa A. (Pahwa, 2022), which refers to the digital economy for this study, served as the basis for creating a theoretical basis by which the digital ecosystem was defined.

The transformation of the market transition to the digital economy is revealed in the work of Lytovchenko I.L. (Lytovchenko, 2020) and is the basis for the study of works related to insider profits and foreign investments, which are levers for ensuring the development of the digital economy. That is why the work analyzed the works of some scientists such as: Aboody D., and Lev B. (Aboody, Lev, 2000), Aizenman J., and Noy I. (Aizenman, Noy, 2006), Barro R.J. (Barro, 2001), Chuang Y.C., and Hsu P.F. (Chuang, Hsu, 2004), which is a significant contribution to the current study.

Digitalization assessment and political dimensions are revealed in Aliev T. M., Ismagilova O. D., and Popova V. N. (Aliev, Ismagilova, Popova, 2020). In the work of Dziuba Yu. V., Doronina O.A. (Dziuba, Doronina, 2020), which is dedicated to highlighting the features of the transformation of the global labor market under the influence of the processes of digitalization of the economy. The work concludes that not all subjects of the labor market want to use information technologies in their activities, but the influence of the digitalization process on the global labor market is constantly increasing. Thanks to the use of digital technologies, new types of relations between employees and employers are emerging. Also, thanks to digitalization, it is possible to increase the percentage of employed people in different countries.

In the opinion of the author, it was also appropriate to study works that directly affect only digitalization, its impact on globalization and the persistence of competitive advantages. Therefore, the work disclosed in the study: Gupta M. S. (Gupta, 2020), Rwanda F.-E.-S. (Rwanda, 2020), Pizhuk O. I. (Pizhuk, 2019) and Knudsen E. S., Lien L. B., Timmermans B., Belik I., and Pandey, S. (Knudsen et al., 2021).

Also, it is worth paying attention to the work of Henfridsson O. and Bygstad B. (Henfridsson, Bygstad, 2013), which is devoted to the generative mechanisms of the evolution of digital infrastructure and Ittelson P. (Ittelson, 2022), which define the role of standards in digital transformation and digital trade.

Thus, the topic of research is really quite relevant, a lot of works today are dedicated to its disclosure and in the future their number will increase. However, in the opinion of the author, despite the number of scientific achievements, the issues of the development of the digital economy, taking into account the characteristics of countries, remain unresolved. A significant number of indices and indicators are sufficiently unstudied and prompt current research.

3. AIM OF THE RESEARCH

The purpose of the study is to develop a methodical approach to determining the level of development of digital trade in global markets by determining the integral indicator and clustering countries.

4. METHODS

A characteristic feature of the study is the study and consideration of socio-economic processes, which were carried out through the analysis of scientific activity and its results, as well as through the identification of current interests and current problems and needs of society in the conditions of the digital economy.

The research is based on categories of theoretical (hypothesis, concept, theory, problem) and empirical (facts, empirical generalizations, empirical dependencies) levels of knowledge, the characteristic features of which are: objectivity; rationality; high level of generalization; universality and use of

special ways and methods of cognitive activity. Scientific and special research methods were used to achieve the goal and solve research problems. The work uses theoretical research methods that combine abstraction and generalization with the aim of systematizing the material to achieve the research goal. An analysis of the literature was carried out in order to better understand the research topic and identify promising directions. With the help of synthesis, the work combined disparate elements into a single whole in order to obtain a general idea of digital trade in global markets. Modeling for a detailed study of digital commerce. Classification for the distribution of information by digitization and the level of development of digital government based on common features. An analogy for finding certain similarities between countries, in order to build clusters. Abstracting to identify the characteristics of the development of digital trade in global markets. Each of the methods and tools has its advantages and disadvantages related to the various factors used to ensure the equilibrium state of the economy, as well as the combined use of these methods and tools. at the right moment contributes to the achievement of the chosen goal.

The usual form of presentation of initial data in tasks of cluster analysis is a matrix: each row of which represents the result of measurements of k analyzed features on one of the surveyed objects.

$$X = \begin{pmatrix} x_{11} & x_{12} & x_{13} & x_{14} \\ x_{21} & x_{22} & x_{23} & x_{24} \\ \dots & \dots & \dots & \dots \\ x_{i1} & x_{i2} & x_{i3} & x_{i4} \\ \dots & \dots & \dots & \dots \\ x_{a1} & x_{a2} & x_{a3} & x_{a4} \end{pmatrix}$$

The choice of distance (p) is the main moment of the study, which depends on the final options for the division. The most common are the “nearest neighbor” or “distant neighbor” principles. In the first case, the distance between clusters is taken as the distance between the closest elements of these clusters, while in the second - between the most distant from each other.

Euclidean and Hamming distances are often used in cluster analysis tasks.

The Euclidean distance is determined by the formula:

$$P_E(x_i, x_j) = \sqrt{(x_i^{1.2-k} - x_j^{1.2-k})^2}$$

the proximity of two objects is compared by a large number of features.

Hemingway distance:

is used as a measure of the difference of objects given by attributive features.

$$P_E(x_i, x_j) = \sum_{i,j}^{1.2-k} |x_i^{1.2-k} - x_j^{1.2-k}|$$

With the help of cluster analysis, the classification of countries was carried out by methods of classification of multidimensional indicators (digitalization and digital government), based on the definition of the concept of distance between objects, followed by the selection of their groups of observations (clusters). Using the cluster method, countries were represented, which made it possible to visualize the result of the mental process when building a methodical approach to determining the level of development of digital trade on global markets. A feature of this study is the construction of a methodological approach to determining the level of development of digital trade in global markets using a set of methods, tools of digital policy aimed at stimulating economic activity and implementing social initiatives, as well as ensuring competitiveness in global markets.

The integral index is built as a linear combination of selected indicators with different weights:

$$y = w_1 x_1 + w_2 x_2 + \dots + w_j x_j + \dots + w_n x_n,$$

where y - the integral index;

x_j - structural elements of the integral index;

w_j - weights with which structural elements are included in the integral index.

To determine the weight of each indicator, an approach was used based on the calculation of pairwise correlation coefficients, which are an estimate of the closeness of the relationship between changes in indicators over time.

If r_{ij} is the pairwise correlation coefficient between the i -th and j -th indicators ($i, j = 1, 2, \dots, n$), then the weights are determined by the following formula:

$$w_j = \sum_{j=1}^n r_{ij} / \sum_{j=1}^n * \sum_{i=1}^n r_{ij}$$

The sum of the coefficients of pair correlation of each indicator with the rest is correlated with the total sum of coefficients according to the matrix of coefficients of pair correlation. Given that the latter reflects the relationship between all indicators, the obtained values of w_j show the specific weight of each indicator in the total value of the integral index. As a result, by accordingly weighing the compared values of the indicators for each year and summing them up, we get the value of the integral index.

The results of the calculations are presented in Table 1.

Table 1. Integral indicators of the level of development of digital trade in global markets: a description of the constituent elements

Indicator	Indicator weight
Leading index	
DEI (Digital Evolution Index)	0,124
GII (Global Innovation Index)	0,161
DESI (Digital Economy and Society Index)	0,153
Matching index	
NRI (Networked Readiness Index)	0,243
e-Intensity (Boston Consulting Group)	0,245
WDCI (IMD World Digital Competitiveness Index)	0,240
Lagging index	
DAI Digital Adoption Index)	0,144
IDI (ICT Development Index)	0,130

Source: Author calculated

As can be seen in Table 1, three target integral indices were formed. To understand the close relationship with the reference indicator, the intercorrelation functions of the annual growth rates of the calculated integral indices were calculated.

The results fully confirmed the correctness of the obtained structure of integral indicators.

In the case of the leading integrated index, the maximum value of the coefficient of mutual correlation in the influence of the lagging index on the development of digital trade is $r_2 = 0.948$.

There is no lag between changes in the digital trade index and the coincident integral index with a maximum correlation coefficient of $r_0 = 0.954$.

The connection between digital trading and the lagged integral index is also significant. The maximum cross-correlation coefficient indicates the presence of a lag in the change of the lagged integral index with respect to the dynamics of digital trade with $r_8 = 0.971$.

It is worth noting that confirming the correctness of the chosen structure of integral indicators, the obtained results hide another important conclusion. The identified asymmetry of leading and lagging has high practical significance, in particular, when forecasting economic dynamics in Ukraine. A regression equation was constructed (taking into account the lags) characterizing the dependence of industrial production on integral indices. So, for the leading index, the regression equation has the form

$$Y = 112,605 + 0,056x,$$

(95,447) (32,962)

where Y is the index of industrial production in %,
x is the leading index in %.

The values of the t-test for the regression coefficients are indicated in parentheses under the equation. The coefficient of determination is 0.899, the Durbin-Watson criterion is 0.0565.

On the basis of this equation, the forecast values of the index of industrial production for July and August 2009 were obtained - 163.9 and 166.5%, respectively. The forecast error did not exceed 2.9%. The information base of the research is the scientific development of theoretical economists and practicing economists.

5. MODELING RESULTS

Over the past two decades, there has been a rapid growth of information and communication technologies and an increase in their role in economic development. An additional stimulus for the development of digitalization was provided by the pandemic of the coronavirus infection (COVID-19). Digitalization has changed many aspects of human society. It has significantly affected business processes in international trade, reducing costs, increasing the volume and speed of cross-border transactions. E-commerce, the scale of which is growing year by year, is becoming the most important engine of trade. Among the main trends caused by digitization and affecting international trade, we can include: the growth of e-commerce volumes in the world and the turnover of global marketplaces; increasing the scale of international trade in information and communication goods and services, as well as services delivered in digital form; the growth of the world export of services by the first method of supply, i.e. in the form of cross-border supplies. The dynamism of the digitalization process leads to the emergence of problems of its assessment - determining the level of digitalization of the economy and its individual segments, primarily international trade and related digital trade policy measures. Leading international organizations (including the OECD, WTO, IMF, UNCTAD) are engaged in the development of approaches to solving these problems.

In order to build a methodical approach to determine the level of development of digital trade on global markets, the author considers it necessary to conduct an analysis of the indicator of the level of digitalization over 10 years in 86 countries of the world. The work uses publicly available data in order to conduct a detailed analysis of the level of digitization in the world. The author of the study collected data and evaluated the dynamics of the level of digitization in Table 2.

Table 2. Analysis of the level of digitization of the countries of the world from 2012-2022

Country	The level of digitization										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Singapore	50,21	56,21	60,87	65,33	78,69	79,01	80,63	84,31	98,82	71,86	65,47
USA	49,71	51,79	50,37	65,27	69,20	70,14	73,78	78,09	89,82	73,81	65,78
Finland	46,59	51,49	55,32	59,87	63,27	70,89	80,92	83,39	87,30	75,84	68,26
Denmark	47,02	49,03	53,76	59,98	63,28	66,13	73,62	77,69	87,17	83,80	73,47
Norway	45,36	47,04	52,06	56,47	62,38	68,89	74,30	80,49	85,34	69,24	63,89
Switzerland	51,12	53,32	56,62	61,08	67,24	70,25	75,81	82,37	86,89	70,85	65,70
Netherlands	48,30	49,86	54,10	58,39	64,11	69,44	72,74	81,14	85,48	70,61	68,43
Sweden	54,21	55,23	57,77	60,03	63,47	68,22	70,23	79,44	85,07	70,10	68,95
Iceland	44,01	47,56	50,27	54,13	61,02	67,36	74,73	82,08	84,29	73,69	70,15
Ireland	40,35	45,81	49,35	53,29	58,31	66,74	72,73	79,91	82,32	65,27	61,49
South Korea	48,77	50,63	54,13	59,48	65,89	72,03	77,39	78,88	83,09	76,63	66,60
Australia	47,20	48,14	54,13	59,64	63,44	69,12	75,16	79,35	80,09	68,42	58,06
Canada	48,98	51,17	54,89	59,69	62,55	63,89	69,78	78,22	80,24	66,52	60,38
New Zealand	44,03	46,26	47,08	53,70	59,99	64,78	77,26	80,06	80,46	64,81	59,66
Germany	44,20	47,18	50,09	56,78	60,17	66,89	71,24	76,33	79,27	70,80	71,23
Austria	40,18	44,13	51,20	54,39	59,98	66,55	70,81	74,17	75,42	66,61	62,14
Japan	41,23	45,71	49,67	53,34	59,61	64,33	70,25	73,14	77,76	70,24	67,85
Estonia	35,06	39,36	41,20	47,34	50,03	56,12	65,91	70,46	76,66	66,44	65,54
Israel	35,87	39,69	42,03	44,77	49,93	58,88	64,38	71,30	75,02	74,40	76,10
UAE	33,23	43,29	46,36	50,00	54,10	60,09	67,59	69,39	74,44	57,69	51,30
Belgium	39,54	43,49	47,34	49,37	52,48	61,26	67,74	71,19	74,51	63,83	62,35
France	39,60	44,07	46,33	48,20	51,07	57,71	62,30	70,25	72,99	71,20	71,05
Spain	35,36	37,29	41,30	44,99	50,86	56,88	60,82	64,29	66,95	67,63	65,33
Slovenia	30,24	33,17	38,12	44,11	49,88	54,17	62,53	66,01	67,35	60,47	58,67
Czech	29,38	31,87	36,64	41,50	49,68	54,33	63,42	64,12	68,68	62,24	61,23
Malaysia	34,66	39,43	43,01	48,33	52,01	55,14	60,08	64,31	69,03	61,46	55,80
Lithuania	30,28	37,18	40,31	43,75	47,44	50,12	52,33	65,58	68,02	68,62	66,48
Qatar	31,46	36,55	38,88	43,60	49,16	53,47	60,00	60,89	66,58	60,63	50,88
Portugal	30,67	33,41	37,88	40,12	43,88	50,23	56,31	62,23	65,75	61,82	62,60
Slovakia	25,13	28,27	30,08	33,15	39,37	44,02	51,04	60,94	63,01	62,09	59,32
Latvia	25,41	29,68	31,20	30,16	36,77	42,54	55,03	61,22	65,06	58,37	58,54
Poland	22,58	26,73	29,17	35,17	39,99	46,68	54,22	60,78	63,58	63,62	61,50
Saudi Arabia	28,74	31,87	36,26	39,16	44,10	49,99	53,62	59,18	62,42	55,67	48,38
China	27,31	32,20	34,45	37,77	41,23	47,69	54,17	55,33	61,89	65,22	52,61
Bahrain	28,06	35,18	38,80	44,03	46,31	50,09	55,27	57,44	63,00	59,06	44,88
Italy	24,36	27,12	33,06	37,80	36,12	45,18	53,41	59,21	61,27	63,81	63,30
Hungary	19,34	21,92	22,00	26,33	34,17	42,99	50,42	53,09	57,75	61,07	59,99
Croatia	24,51	26,69	31,02	35,60	38,64	46,19	53,78	54,19	56,60	59,21	58,80
Greece	23,18	24,08	29,98	34,50	40,02	46,98	53,52	52,28	56,54	59,27	55,61
Bulgaria	26,45	29,87	32,08	36,77	35,03	43,78	49,42	50,84	57,14	56,83	59,07
Romania	25,09	29,33	31,29	34,78	38,80	41,09	46,70	47,60	54,06	60,08	58,47
Uruguay	26,31	28,05	33,01	36,15	38,88	42,37	47,15	52,00	54,29	53,28	54,72
Thailand	25,34	28,42	32,09	36,66	38,94	43,02	47,06	54,98	53,04	56,84	49,04
Turkey	26,07	31,95	33,04	36,67	39,88	45,17	49,33	50,36	52,43	54,60	48,14
Georgia	19,45	23,77	25,69	29,13	34,58	41,39	50,34	51,41	53,46	50,04	41,27

Country	The level of digitization										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Costa Rica	20,01	24,89	27,88	30,04	36,49	42,00	49,84	50,27	52,08	52,60	44,47
South Africa	24,69	30,06	33,47	36,14	39,18	44,30	48,66	49,63	50,79	49,31	41,31
Serbia	20,39	25,17	28,89	34,67	39,98	43,10	47,56	51,48	52,27	56,64	49,76
Kazakhstan	21,33	26,96	30,07	31,28	36,66	42,07	49,88	50,20	50,71	54,80	44,05
Azerbaijan	22,58	27,77	30,00	34,74	38,88	43,11	47,54	50,17	51,85	49,21	39,17
Jordan	23,01	25,69	28,66	31,09	34,78	39,57	46,38	48,69	49,07	37,60	33,95
Argentina	24,37	26,88	29,13	34,41	38,97	42,34	45,28	47,75	48,26	55,63	51,06
Indonesia	15,36	19,85	21,34	26,28	31,09	38,99	44,39	45,21	47,72	48,41	40,32
Brazil	24,36	29,86	32,08	34,78	36,84	41,31	43,21	46,62	47,19	53,62	45,95
Mexico	24,34	27,23	30,00	34,27	33,97	37,02	42,95	44,20	45,86	49,83	43,02
Vietnam	18,56	20,29	24,66	29,16	34,45	38,20	41,19	45,38	46,79	48,23	40,72
Ukraine	19,06	21,09	24,66	27,61	32,03	34,22	39,75	44,19	46,03	56,61	48,93
India	20,14	23,17	25,31	28,99	32,08	33,41	39,05	45,23	46,57	52,43	44,36
Philippines	17,55	19,38	20,07	23,36	25,08	31,58	39,67	43,39	44,29	56,21	45,20
Rwanda	18,61	21,22	25,39	24,01	28,97	33,01	38,33	40,24	42,75	40,28	39,12
Kenya	14,41	16,98	19,36	22,45	24,87	34,12	37,46	39,48	44,08	46,42	38,36
Iran	14,11	17,08	20,18	22,09	25,32	30,00	36,54	40,25	43,13	45,60	34,78
Colombia	18,32	22,97	25,07	29,88	34,05	32,08	37,14	45,07	43,80	50,20	44,61
Namibia	17,15	20,98	24,10	27,45	30,14	32,07	35,17	37,55	42,69	35,80	27,40
Ecuador	17,20	19,62	21,00	28,01	26,34	29,16	33,51	36,43	40,90	47,41	36,43
Ghana	18,31	21,28	23,05	27,70	29,64	32,50	37,53	40,28	41,69	42,60	33,30
Sri Lanka	17,63	22,03	25,07	29,64	30,08	33,10	34,88	39,46	42,83	41,28	33,02
Tunisia	19,03	22,47	24,30	26,64	25,00	28,36	32,85	33,41	40,94	46,23	38,48
Peru	18,58	23,64	22,08	24,59	27,13	30,05	34,36	35,48	40,15	49,24	40,18
Morocco	18,30	23,01	22,41	26,39	28,02	31,12	36,66	38,88	40,58	44,40	40,51
Lebanon	17,58	22,34	24,00	26,13	29,41	30,12	32,10	38,47	40,05	40,78	41,23
Bosnia and Herzegovina	16,55	23,17	20,17	25,13	28,89	30,12	31,15	34,33	39,65	47,60	37,85
Egypt	11,69	17,28	25,17	20,17	26,33	30,78	33,60	36,00	39,41	35,87	34,75
Pakistan	16,36	20,14	25,10	23,48	28,20	30,88	32,09	30,47	34,03	37,16	30,76
Uganda	17,09	19,64	21,03	24,44	25,06	24,10	29,08	31,45	33,70	30,14	29,38
Tanzania	16,17	18,33	20,40	25,00	23,99	25,87	28,18	30,37	33,34	31,62	25,31
Algeria	14,13	17,52	20,16	24,39	26,78	24,05	26,39	28,11	34,31	43,07	32,22
Ivory Coast	15,33	18,47	20,33	24,16	22,00	24,78	25,14	30,63	32,16	39,40	29,46
Bangladesh	17,41	20,11	19,44	23,04	26,70	24,21	26,34	29,64	32,67	34,20	38,49
Bolivia	16,64	19,20	18,03	21,33	25,07	26,78	28,61	29,06	30,82	37,01	31,87
Cambodia	15,22	19,13	20,36	24,55	23,08	25,60	27,13	30,14	32,31	27,61	28,45
Laos	16,27	18,21	19,99	24,13	22,82	24,69	26,55	28,29	32,14	34,82	22,90
Nigeria	10,08	13,77	15,03	17,54	16,99	20,14	22,64	25,66	27,75	36,61	34,37
Cameroon	11,34	14,02	16,13	18,21	17,05	20,66	23,15	24,19	28,01	27,88	20,92
Ethiopia	9,14	11,80	14,66	16,38	15,02	16,47	17,52	20,88	21,11	19,85	20,04

Source: systematized by the author based on International Trade Commission of the United States, BCG, The World Bank

As can be seen from Table 2., the trend in the world can be traced from a developed digital environment to countries that are just implementing digitalization. The coronavirus disease 2019 (COVID-19) pandemic has accelerated the digital revolution and accelerated the process of global digital commerce. In the immediate aftermath of the COVID-19 outbreak, governments around the

world issued lockdown, quarantine, restriction and shutdown orders. To maintain the rhythm of life and learning, society needs to look for alternative methods, including telemedicine, the virtual classroom, online shopping, social interactions and remote work that includes all aspects of living in isolation. All this requires access to the Internet and digital technologies, so digital commerce, especially digital services, has grown rapidly. Compared to 2008 and 2020 data from the International Trade in Digital Services (DDS) published by UNCTAD, exports of international trade in digital services increased from approximately US\$1.88 trillion to approximately US\$3.17 trillion, and its share in global services exports increased from 46.30 to 63.55%, indicating that digital trade has become the new major driver of global services trade growth. Meanwhile, a UNCTAD report (2021) shows that the COVID-19 pandemic has also revealed a highly uneven global digital transformation between countries, particularly with countries such as the US, UK and Ireland. ranks first in the export of supply-side digital trade in services, while India, Japan and China were among the leaders in the growth rate of supply-side digital trade, accounting for 11.37, 9.89 and 8.61% respectively. It may be known that low-income countries are more likely to face digital barriers due to lack of access to the Internet, as well as insufficient knowledge and independent use of digital devices. However, these countries had a high level of development potential.

It is the developed digital environment and physical infrastructure that are necessary for the arrangement of the digital ecosystem. The availability of broadband Internet, the quality of roads for the delivery of goods from online stores and other factors must be taken into account when ensuring a decent level of digitization. It is worth following the trend among the population, whether it has the ability to participate in the digital economy. The next element is the country's laws and government actions that facilitate or hinder the development of digital technologies. Availability of investments in digitization by the state. It is necessary to monitor whether the adopted measures of state regulation contribute to the use and storage of data. The last element is an analysis of the development of the main components of the innovation ecosystem: a) access to talent and capital; b) processes and c) access to the consumer.

To achieve the goal, the author considers it necessary to evaluate the economy of the countries of the world with the level of development of digital government. (Table 3).

Table 3. Analysis of the level of development of digital government from 2012-2022

Country	The level of development of digital government										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Singapore	0,85	0,88	0,91	0,93	0,84	0,87	0,88	0,91	0,92	0,90	0,92
USA	0,87	0,87	0,87	0,87	0,84	0,86	0,88	0,90	0,93	0,91	0,92
Finland	0,85	0,85	0,84	0,84	0,75	0,83	0,88	0,90	0,95	0,94	0,93
Denmark	0,89	0,83	0,81	0,80	0,81	0,87	0,91	0,94	0,97	0,96	0,97
Norway	0,86	0,85	0,84	0,85	0,84	0,84	0,86	0,89	0,91	0,90	0,91
Switzerland	0,81	0,80	0,73	0,74	0,80	0,78	0,85	0,87	0,89	0,87	0,89
Netherlands	0,91	0,90	0,89	0,87	0,87	0,87	0,88	0,91	0,92	0,91	0,93
Sweden	0,86	0,84	0,82	0,81	0,83	0,84	0,89	0,92	0,94	0,90	0,92
Iceland	0,78	0,78	0,80	0,79	0,80	0,81	0,83	0,91	0,91	0,89	0,90
Ireland	0,71	0,75	0,78	0,80	0,80	0,81	0,83	0,84	0,84	0,83	0,84
South Korea	0,93	0,94	0,95	0,94	0,94	0,92	0,90	0,95	0,96	0,95	0,93
Australia	0,84	0,85	0,91	0,91	0,90	0,90	0,91	0,94	0,94	0,94	0,95
Canada	0,84	0,84	0,84	0,84	0,85	0,86	0,83	0,82	0,84	0,84	0,85
New Zealand	0,84	0,84	0,86	0,85	0,84	0,87	0,88	0,92	0,93	0,93	0,93
Germany	0,81	0,80	0,79	0,79	0,81	0,83	0,88	0,87	0,85	0,84	0,85
Austria	0,78	0,79	0,79	0,81	0,82	0,82	0,83	0,87	0,89	0,87	0,89
Japan	0,80	0,87	0,89	0,89	0,89	0,86	0,88	0,89	0,90	0,87	0,89
Estonia	0,80	0,79	0,82	0,82	0,84	0,88	0,85	0,93	0,95	0,90	0,93
Israel	0,81	0,81	0,82	0,82	0,81	0,80	0,80	0,83	0,84	0,85	0,84

Country	The level of development of digital government										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
UAE	0,73	0,72	0,71	0,70	0,76	0,80	0,83	0,84	0,86	0,86	0,86
Belgium	0,77	0,76	0,76	0,77	0,78	0,80	0,81	0,80	0,80	0,78	0,81
France	0,86	0,87	0,89	0,88	0,87	0,86	0,88	0,88	0,87	0,86	0,87
Spain	0,78	0,81	0,84	0,83	0,84	0,84	0,84	0,86	0,88	0,87	0,88
Slovenia	0,75	0,70	0,65	0,68	0,67	0,75	0,77	0,84	0,85	0,80	0,84
Czech	0,65	0,61	0,61	0,61	0,62	0,65	0,71	0,80	0,81	0,78	0,82
Malaysia	0,67	0,63	0,61	0,61	0,67	0,69	0,72	0,77	0,79	0,74	0,76
Lithuania	0,66	0,70	0,73	0,73	0,75	0,81	0,75	0,84	0,87	0,82	0,87
Qatar	0,64	0,64	0,64	0,62	0,65	0,70	0,71	0,71	0,72	0,71	0,73
Portugal	0,72	0,70	0,69	0,71	0,72	0,78	0,80	0,81	0,83	0,80	0,82
Slovakia	0,63	0,62	0,61	0,66	0,64	0,71	0,72	0,76	0,78	0,77	0,79
Latvia	0,73	0,73	0,72	0,71	0,71	0,71	0,70	0,75	0,78	0,77	0,78
Poland	0,64	0,65	0,65	0,65	0,67	0,75	0,79	0,84	0,85	0,84	0,85
Saudi Arabia	0,67	0,68	0,69	0,70	0,69	0,71	0,71	0,78	0,80	0,78	0,79
China	0,54	0,54	0,55	0,57	0,60	0,64	0,68	0,78	0,79	0,78	0,79
Bahrain	0,69	0,74	0,81	0,75	0,79	0,78	0,81	0,82	0,82	0,81	0,81
Italy	0,72	0,74	0,76	0,77	0,77	0,81	0,82	0,82	0,82	0,82	0,83
Hungary	0,72	0,70	0,66	0,68	0,69	0,70	0,73	0,75	0,77	0,77	0,77
Croatia	0,73	0,69	0,63	0,63	0,66	0,70	0,70	0,75	0,77	0,76	0,78
Greece	0,69	0,70	0,71	0,70	0,73	0,75	0,78	0,79	0,80	0,80	0,77
Bulgaria	0,61	0,57	0,54	0,53	0,59	0,64	0,72	0,76	0,80	0,76	0,78
Romania	0,61	0,59	0,56	0,66	0,59	0,65	0,67	0,74	0,76	0,74	0,75
Uruguay	0,63	0,71	0,74	0,73	0,75	0,72	0,70	0,70	0,71	0,71	0,72
Thailand	0,51	0,50	0,46	0,63	0,61	0,63	0,65	0,72	0,76	0,73	0,74
Turkey	0,53	0,54	0,54	0,63	0,61	0,65	0,71	0,74	0,77	0,77	0,77
Georgia	0,56	0,59	0,60	0,64	0,68	0,68	0,69	0,71	0,72	0,70	0,70
Costa Rica	0,54	0,60	0,61	0,60	0,61	0,65	0,70	0,75	0,76	0,74	0,76
South Africa	0,49	0,48	0,49	0,50	0,50	0,58	0,66	0,68	0,69	0,69	0,71
Serbia	0,63	0,60	0,55	0,55	0,64	0,69	0,72	0,72	0,75	0,74	0,74
Kazakhstan	0,68	0,70	0,73	0,71	0,73	0,74	0,76	0,83	0,84	0,81	0,82
Azerbaijan	0,50	0,51	0,55	0,58	0,54	0,59	0,66	0,70	0,71	0,69	0,71
Jordan	0,49	0,50	0,52	0,52	0,55	0,55	0,56	0,52	0,53	0,53	0,53
Argentina	0,62	0,63	0,63	0,65	0,66	0,69	0,73	0,81	0,83	0,81	0,83
Indonesia	0,49	0,44	0,45	0,48	0,50	0,50	0,53	0,61	0,66	0,61	0,65
Brazil	0,62	0,61	0,60	0,60	0,63	0,69	0,73	0,75	0,77	0,76	0,77
Mexico	0,62	0,60	0,57	0,56	0,63	0,67	0,68	0,71	0,73	0,72	0,72
Vietnam	0,52	0,50	0,47	0,45	0,54	0,57	0,59	0,63	0,67	0,68	0,68
Ukraine	0,57	0,51	0,50	0,52	0,53	0,59	0,62	0,70	0,71	0,73	0,73
India	0,38	0,39	0,38	0,42	0,47	0,53	0,57	0,57	0,60	0,60	0,61
Philippines	0,51	0,50	0,48	0,52	0,53	0,60	0,65	0,67	0,69	0,69	0,71
Rwanda	0,33	0,34	0,36	0,37	0,40	0,43	0,46	0,47	0,48	0,48	0,51
Kenya	0,42	0,39	0,38	0,39	0,41	0,44	0,45	0,53	0,53	0,52	0,53
Iran	0,49	0,45	0,45	0,47	0,47	0,56	0,61	0,65	0,66	0,66	0,67
Colombia	0,66	0,64	0,62	0,62	0,63	0,65	0,69	0,70	0,72	0,71	0,72
Namibia	0,39	0,39	0,39	0,40	0,42	0,44	0,46	0,51	0,57	0,58	0,58
Ecuador	0,49	0,50	0,51	0,51	0,54	0,58	0,61	0,70	0,70	0,70	0,72
Ghana	0,32	0,37	0,37	0,39	0,40	0,47	0,54	0,59	0,60	0,60	0,60

Country	The level of development of digital government										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sri Lanka	0,44	0,52	0,54	0,55	0,54	0,56	0,58	0,66	0,67	0,66	0,68
Tunisia	0,48	0,53	0,54	0,56	0,56	0,62	0,63	0,64	0,65	0,64	0,62
Peru	0,52	0,54	0,54	0,53	0,61	0,63	0,65	0,69	0,71	0,69	0,70
Morocco	0,32	0,42	0,51	0,50	0,50	0,52	0,52	0,56	0,57	0,57	0,57
Lebanon	0,51	0,44	0,50	0,50	0,55	0,55	0,55	0,53	0,50	0,51	0,51
Bosnia and Herzegovina	0,53	0,48	0,47	0,48	0,52	0,52	0,53	0,60	0,64	0,63	0,63
Egypt	0,46	0,48	0,51	0,50	0,51	0,53	0,49	0,54	0,55	0,54	0,55
Pakistan	0,28	0,26	0,26	0,26	0,29	0,33	0,36	0,41	0,42	0,41	0,42
Uganda	0,32	0,30	0,26	0,28	0,32	0,38	0,41	0,43	0,45	0,46	0,45
Tanzania	0,33	0,31	0,28	0,29	0,30	0,34	0,39	0,41	0,42	0,42	0,42
Algeria	0,36	0,33	0,31	0,35	0,36	0,41	0,42	0,51	0,52	0,50	0,52
Ivory Coast	0,26	0,23	0,20	0,23	0,25	0,27	0,28	0,44	0,45	0,44	0,45
Bangladesh	0,30	0,29	0,28	0,29	0,34	0,44	0,49	0,51	0,52	0,50	0,52
Bolivia	0,47	0,46	0,46	0,46	0,52	0,53	0,53	0,63	0,61	0,61	0,63
Cambodia	0,29	0,29	0,30	0,30	0,35	0,36	0,38	0,45	0,51	0,51	0,51
Laos	0,29	0,28	0,27	0,28	0,30	0,30	0,31	0,32	0,33	0,32	0,33
Nigeria	0,27	0,28	0,29	0,33	0,36	0,37	0,38	0,40	0,44	0,43	0,45
Cameroon	0,31	0,29	0,28	0,29	0,32	0,37	0,40	0,37	0,43	0,43	0,44
Ethiopia	0,23	0,24	0,26	0,27	0,31	0,32	0,35	0,31	0,27	0,26	0,26

Source: systematized by the author based on EU4Digital, IMF, MoneyControl

Thus, 4 clusters of countries were formed: leaders, promising, problematic and inhibiting.

Using cluster analysis, four clusters were formed. It is worth noting that the choice of a specific method of cluster analysis depends on the classification.

Using cluster analysis, countries were divided into four clusters.

Table 4. Clustering of countries by level of digitization and digital government (developed by the author)

		Name	Country
8,45-15,44	Cluster 4	Problematic	Egypt, Pakistan, Uganda, Tanzania, Algeria, Ivory Coast, Bangladesh, Bolivia, Cambodia, Laos, Nigeria, Cameroon, Ethiopia;
15,45-22,44	Cluster 3	Retarded	Bahrain, Hungary, Croatia, Greece, Bulgaria, Romania, Uruguay, Thailand, Turkey, Georgia, Costa Rica, South Africa, Serbia, Kazakhstan, Azerbaijan, Jordan, Argentina, Indonesia, Brazil, Mexico, Vietnam, Ukraine, India, Philippines, Rwanda, Kenya, Colombia, Ecuador, Ghana, Sri Lanka, Tunisia, Peru, Morocco, Lebanon, Bosnia and Herzegovina;
22,45-29,44	Cluster 2	Promising	Estonia, Israel, UAE, Belgium, France, Spain, Slovenia, Czech, Malaysia, Lithuania, Qatar, Portugal, Slovakia, Latvia, Poland, Saudi Arabia, China, Italy;
29,45-36,44	Cluster 1	Leaders	Singapore, USA, Finland, Denmark, Norway, Switzerland, Netherlands, Sweden, Iceland, Ireland, South Korea, Australia, Canada, New Zealand, Germany, Austria, Japan.

Source: Author's calculated

Thus, as can be seen from the results of the clustering of the country, white is divided into: leaders, promising, slowing down and problematic.

In order to achieve the research topic, the author proposes to reveal these clusters. “Leaders” cluster. This zone includes economies that are characterized by a high initial level of digitization and a strong pace of development in this area. Three countries stand out here: Singapore, Finland, Switzerland. Along with several other economies — for example, Denmark, Norway, the Netherlands — they consistently rank among the leaders in such indices, demonstrating both adaptability and institutional support for innovation. Interestingly, the US ranks fourth in digital evolution after Singapore: an outstanding growth rate for an economy of its size and complexity. Each individual case of each country is unique, but the analysis suggests that the most successful of them chose the following priorities:

1. Support for the implementation of digital consumer tools (online shopping, digital payments, entertainment, etc.);
2. Recruitment, training and retention of IT personnel;
3. Fostering digital startups;
4. Provision of fast and publicly available access to the Internet — both terrestrial (for example, fiber optic) and mobile;
5. Specialization in the export of digital goods, services or media;
6. Coordinated innovation process: universities, businesses and ministries responsible for digital development.

“Promising” cluster. This zone is characterized by economies whose digital infrastructure is still limited, but which are rapidly developing. This is where France stands out: it is significantly ahead of all other countries in terms of the pace of digital evolution — primarily due to a combination of rapidly growing demand and innovation. Two more notable members of the group are Belgium and Israel: these are huge countries that occupy the third and fourth places in the world in terms of growth rates. In addition to these large developing countries, several medium-sized countries - such as Estonia, the UAE, Spain, Slovenia, the Czech Republic - are also experiencing accelerated digital development, which indicates the potential for the flourishing of digitalization, which will have a beneficial effect on the recovery of the economy after the COVID-19 pandemic, and for long-term transformation.

Based on our analysis, the author found that successful breakthrough economies focus on the following tasks:

1. Improvement of mobile Internet access, its availability and quality for wider dissemination of innovations;
2. Strengthening the institutional environment and development of digital legislation;
3. Encouraging investments in digital enterprises, financing digital R&D, training IT personnel and using applications to create jobs;
4. Actions to reduce inequalities in access to digital tools along gender, class, ethnic and geographic lines (although access remains largely uneven).

“Retarded” cluster. This zone includes countries with mature digital systems, but a low pace of further development. Many of these countries are members of the European Union. This is partly due to the natural growth slowdown that comes with maturity. In addition, many countries in the zone have deliberately decided to sacrifice growth rates for responsible and inclusive development. In order to return to growth rates (at the same time without giving up their values), these countries should make the following tasks a priority:

1. Protection against “digital plateaus”: further investment in stable institutional pillars, regulatory environment and capital markets to support further innovation;
2. Continued use of policy tools and regulation to ensure equal access to digital opportunities and protect all consumers from privacy breaches, cyber-attacks and other threats (while preserving data availability for new digital applications);

3. Attracting, training and retaining professionals with digital skills — most often through immigration policy reforms;
4. Identification of new technological niches and creation of ecosystems that promote innovation in these areas.

“Problematic” cluster. After all, the last zone, which includes countries from Africa, Asia, North America and Southern Europe, is characterized by both problems in the existing digital ecosystem and a low growth rate. The countries of this zone should take an example from promising economies in using digital growth as a tool for economic stability. In particular, in those troubled economies where there is good demand in the digital segment, the priorities should be as follows:

1. Long-term investments in solving basic infrastructure problems;
2. Creating an institutional environment that supports the safe and widespread distribution of digital products and services among consumers — especially if these products contribute to productivity and the creation of new jobs;
3. Support of initiatives for the development of digital access for segments of the population that are historically in a weak position (especially due to the cooperation of the state with private business);
4. Support programs that solve pressing problems and thus can become catalysts for the spread of digital tools (for example, digital payment platforms).

The development of a basic system of indicators for monitoring the digitalization of the economy and social relations is being conducted by many influential international organizations, institutions and various analytical agencies. The most common methods of assessing the state of development of the digital economy are the formation of rating indexes.

Using the analysis of indices, the author singled out those that, in his opinion, are the most appropriate from the point of view of determining the level of development of digital trade in global markets (Table 5).

Table 5. Indices of the level of development of digital trade in global markets (highlighted by the author)

Name of the index	Definition	Characteristic
<i>Development of digital trade markets</i>		
Digital Evolution Index	DEI	The Digital Evolution Index (DEI) is the basis of the rating of the country's digital development and competitiveness, formed by Taft University (USA) together with Mastercard. The rating takes into account two main factors: the current level of digital development and the growth rate of digitization over the past nine years, which are determined on the basis of 170 indicators characterizing the rate of digitization. These indicators are combined into four sub-indices (level of supply, demand for digital technologies, institutional environment, innovation climate) and reflect progress in the digital transformation of the economy. Depending on the results of the DEI index calculation, all countries are divided into four categories: leaders, promising, slowing and problematic.
IMD World Digital Competitiveness Index	WDCI	The Global Digital Competitiveness Index (WDCI) of the Swiss business school IMD reflects the potential opportunities and readiness of various countries to adapt to the digital transformation of the economy. The WDCI index is based on 50 criteria, which are aggregated into three sub-indices of the first level, consisting of three sub-indices of the second level. The IMD Global Digital Competitiveness Score is calculated for the 63 countries covered by the WCY. Countries are ranked from most competitive to least digital. These ratings provide a more detailed analysis of specific aspects of digital transformation and can be used to assess a country's technological structure or support international investment decisions.

<i>Development of information and communication technologies</i>		
ICT Development Index	IDI	Calculated by the International Telecommunication Union (ITU) since 2009. In 2018, the index was supplemented with three new indicators such as: subscriptions to mobile broadband Internet traffic, the percentage of mobile phone owners and the percentage of people with ICT skills. The IDI index is intended for: - monitoring of IT development in countries and their positioning on the global IT market; - measuring progress in ICT development in both developed and developing countries; - definition of the digital divide (differences between countries in terms of the level of ICT development); - identifying the potential of ICT development and the level to which countries can use it to enhance their own growth and development. This index includes 28 indicators, which are calculated as a weighted average sum of three sub-indices: infrastructure development, online spending and user activity. All sub-indices are formed from the weighted average values of several parameters underlying them.
Networked Readiness Index	NRI	The NRI index is an assessment of a country's ability to use the capabilities of information and communication technologies for networking purposes. This index provides information on the main factors affecting the development of the network economy, with the aim of accounting for them in state policy. Such information in the long term contributes to the involvement of a larger number of people, organizations and communities from around the world in the network space. NRI not only assesses the readiness of a particular country to participate in the information world, but also shows what underlies the differences between countries.
<i>The degree of penetration of digital technologies into the economy and social life</i>		
Boston Consulting Group	e-Intensity	The Boston Consulting Group created the BCG e-Intensity Index. It examines Internet activity for the members of the Organisation for Economic Co-operation and Development (OECD), for the BRICI nations of Brazil, India, China, and Indonesia, and for other noteworthy economies, such as Hong Kong, Saudi Arabia, Singapore, and South Africa.
Global Innovation Index	GII	The Global Innovation Index is an annual ranking of countries by their capacity for, and success in, innovation, published by the World Intellectual Property Organization. It is based on both subjective and objective data derived from several sources, including the International Telecommunication Union, the World Bank and the World Economic Forum. The index is computed by taking a simple average of the scores in two sub-indices, the Innovation Input Index and Innovation Output Index, which are composed of five and two pillars respectively. Each of these pillars describe an attribute of innovation, and comprise up to five indicators, and their score is calculated by the weighted average method.
Digital Adoption Index	DAI	The DAI is a worldwide index that measures countries' digital adoption across three dimensions of the economy: people, government, and business. The index covers 180 countries on a 0–1 scale, and emphasizes the “supply-side” of digital adoption to maximize coverage and simplify theoretical linkages. The overall DAI is the simple average of three sub-indices. Each sub-index comprises technologies necessary for the respective agent to promote development in the digital era: increasing productivity and accelerating broad-based growth for business, expanding opportunities and improving welfare for people, and increasing the efficiency and accountability of service delivery for government. DAI can assist policymakers in designing a digital strategy with tailored policies to promote digital adoption across different user groups.
Digital Economy and Society Index	DESI	This index gives an idea of the state of digitization of EU countries. The DESI index consists of five sub-indices: connectivity, human capital, use of the Internet by the population, integration of business with digital technologies, digital public services. The databases of the DESI index are those of Eurostat, ITU and the UN. The DESI index is calculated as a composite index that summarizes various indicators of digital development and tracks the evolution of EU countries in terms of their digital competitiveness. The advantage of this index is that it includes the level of integration of digital technologies with business and the state, which gives a certain idea about the state of digital transformation of the economy.

Source: Author's calculated

The author analyzed and systematized a large list of international indices, distinguishing three main blocks: the first block includes indices characterizing the level of development of e-commerce markets; in the second - indices evaluating the development of information and communication technologies; in the third - indices assessing the degree of penetration of digital technologies into the economy and social life.

Existing studies, which tend to conduct comparative analysis in terms of international differences, pay relatively less attention to the influencing factors of digital trade, especially lacking analysis of the influencing factors constructed using econometric models.

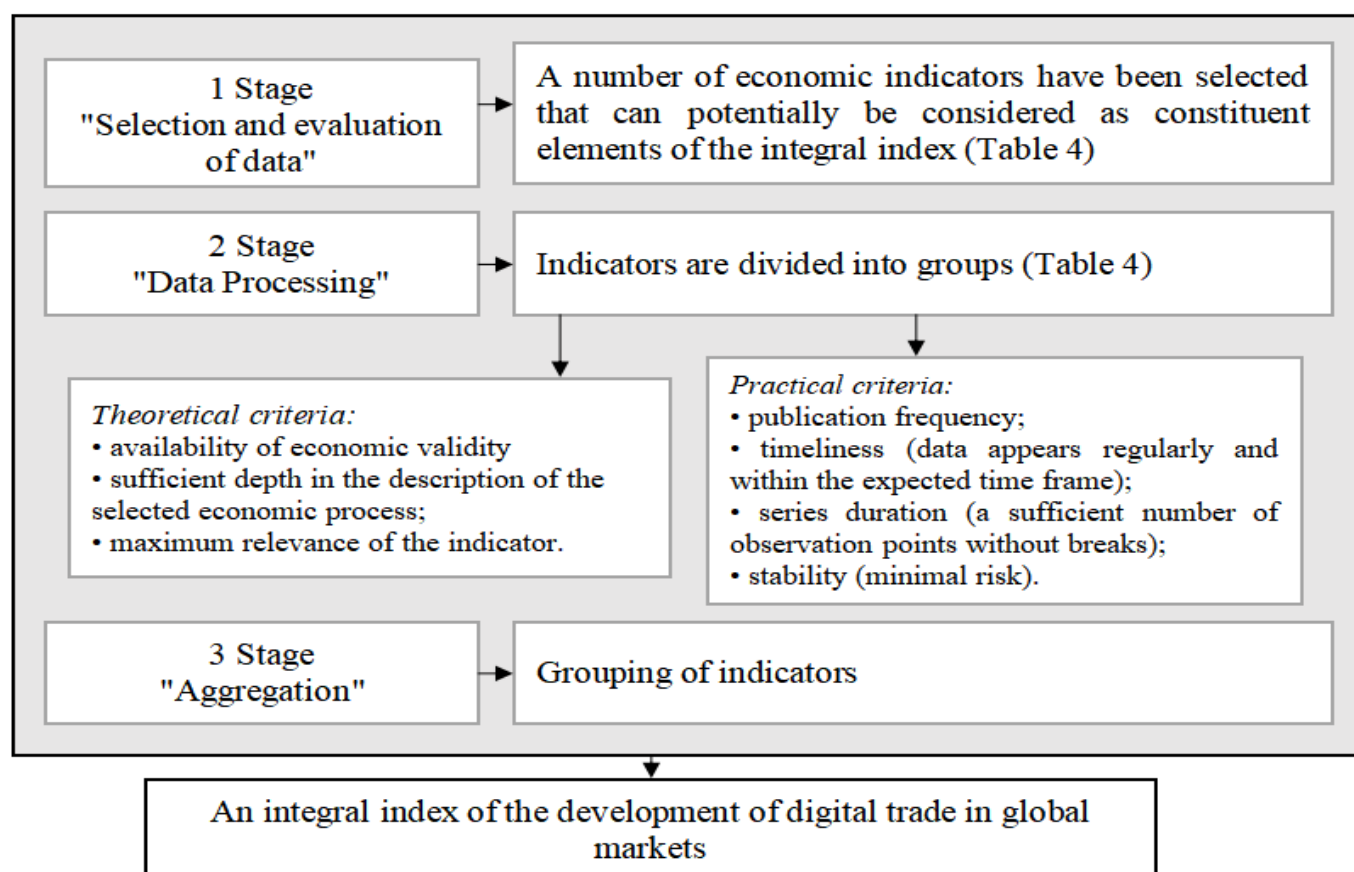
It is very important to note that this study aims to identify the commonalities between the differences and to identify the critical factors affecting digital trade by comparing the differences in digital trade between countries, based on which an analysis of how to optimize the organization and management at the national and corporate levels, with the aim of promoting digital trade for countries that are temporarily lagging behind, bridging the digital divide at the level of digital trade and giving a better role to digital trade promotion. in the economy.

At the same time, digital trade research can also enable many SMEs to participate in the international market through digital technologies, supporting them to perform better in a trade structure that exhibits increasing volatility and uncertainty.

The desire to combine multiple time series into one integral indicator for further use in assessing and forecasting the development of digital trade in global markets is appropriate in the author's opinion. Business cycles vary in length and depth. The influence of individual factors is also unstable. That is why the integrated indicator, in the opinion of the author, better describes the general economic dynamics of the development of digital trade on global markets.

The author made an attempt to construct an integral index to determine the development of digital trade on global markets.

Figure 1. Algorithm for building an integral index of the development of digital trade in global markets (author's vision)



Source: Author's calculated

The Composite Index of Cyclical Indicators is a composite indicator designed to determine the development of digital trade in global markets.

The process of building an integral index is shown in Fig. 1.

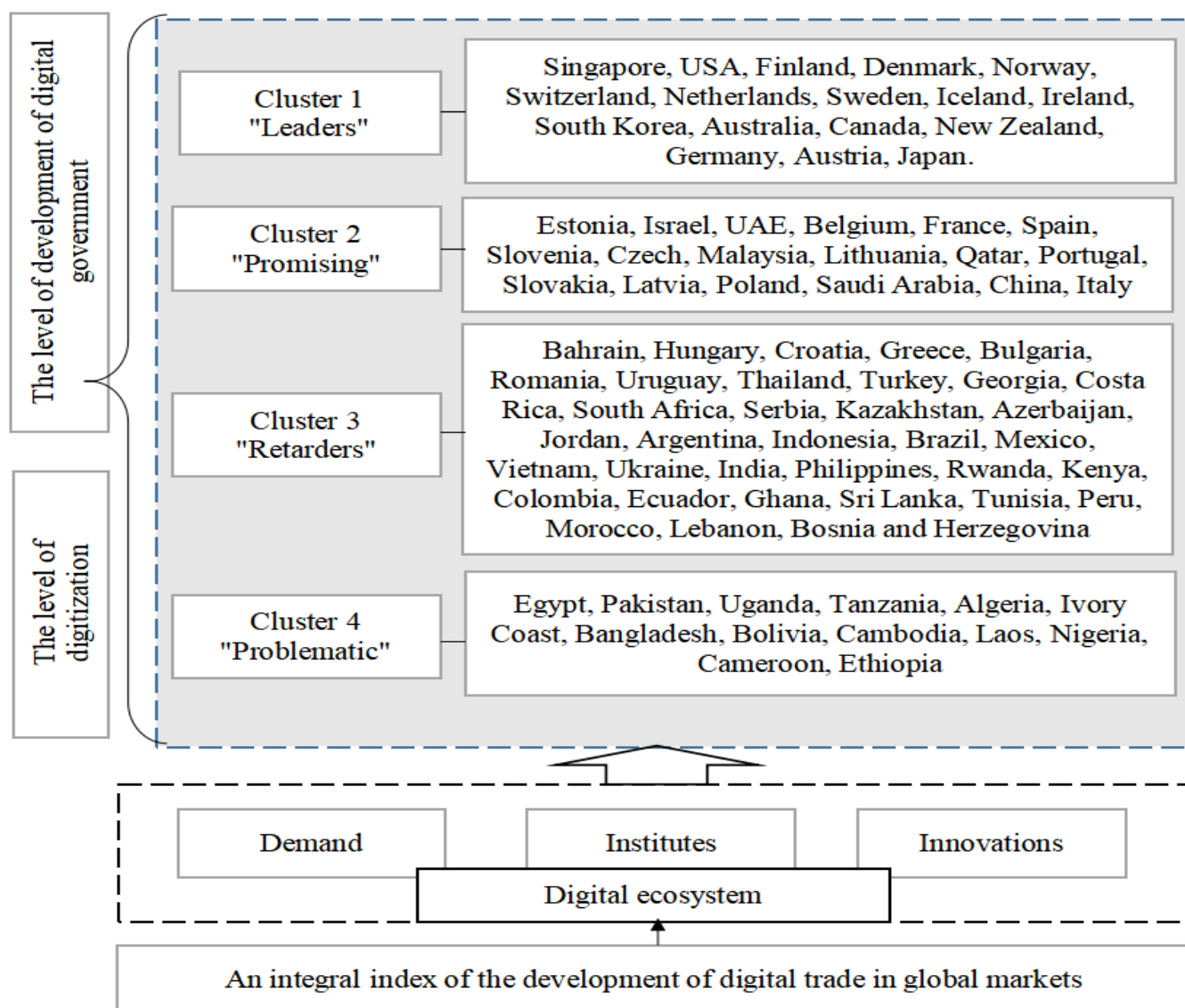
As can be seen from Fig. 1. the construction of the integral index is based on three stages. At the first stage, as part of data selection and evaluation, the author selected a number of economic indicators that can potentially be considered as constituent elements of one of the target integral indexes. (Table 4)

Then all the indicators were conditionally divided between several groups. (Table 4) This classification made it possible to provide the necessary breadth of data and guarantee a balanced representation of different indicators. At the same time, the selection and evaluation of indicators was carried out on the basis of theoretical and practical criteria.

At the last stage, the selected indicators are grouped based on a special aggregation methodology into an integral index of the development of digital trade on global markets.

Thus, the proposed integrated index allows you to accurately describe the development of digital trade in global markets and can be used for the purpose of forecasting the development of digital trade in global markets.

Figure 2. Methodological approach to determining the level of development of digital trade (author's vision)



Source: Author's calculated

As can be seen from Fig. 2. the methodological approach is built by clustering countries according to the level of digitization and the level of development of the digital society. The proposed approach

includes a digital ecosystem based on three components: demand, institutions and innovation. Also, it is worth noting that the methodological approach consists in the application of an integral index of the development of digital trade in global markets. The existing connection between the level of digitization of the country and the development of e-commerce is confirmed by the establishment of digital trade channels. Countries will be able to reach a qualitatively new level of trade, attract small and medium-sized businesses to it, and correct structural and sectoral imbalances through the development of digitalization. The transition of trade relations to the electronic sphere is currently facilitated by digitization and globalization conditions.

It is worth noting that the methodological approach makes it possible to assess the development of digital technologies at different levels of their use, as well as to assess the degree of digitization in the state, region, city and business.

Digital innovations and new business models are the engine of transformation for both the state and business.

Data-driven innovation, new business models and digital applications are changing what happens in science, governments and cities. Policy measures to support digital innovation focus on innovation networks, access to finance and the use of data, but pay less attention to investment in ICT, knowledge-based capital and data analysis. The impact of digital transformation is also manifested in the elimination and creation of jobs in various sectors, the emergence of new forms of work and changes in the landscape of trade, in particular services. In response, the government is revising labor laws and trade agreements.

Against the background of increasing intensity of use of ICT, enterprises and people are faced with increasing risk in the field of digital security and protection of personal information.

The potential of artificial intelligence is promising and, at the same time, raises serious political and ethical questions

Artificial intelligence opens up new horizons for increased efficiency and productivity, but at the same time it can exacerbate existing policy challenges and raise new political and ethical questions, for example about its potential impact on the future of work and skills development, or about the related implications for supervision and transparency, accountability, and security.

6.DISCUSSION

The basis of the methodological approach to determining the level of development of digital trade in global markets, according to the author, is the integral index of the development of digital trade in global markets. The difficulty of conducting a comparative assessment of the development of digital trade in global markets is due to the incommensurability of their economies and the presence of multidimensional, sometimes heterogeneous statistical data. The prospect for solving this problem opens up the development of an integral index that combines various sub-indices and indicators. This integral index included a list of key indicators responsible for digitization, digital access, digital economy, and others. It is worth noting that the included indicators are responsible for the level of development of digital trade markets, the development of technologies and the penetration of digitalization into social and economic life are evaluated. The developed index makes it possible to rank countries according to the general index. The values of individual indicators of the sub-indices make it possible to determine to what extent the existing potential for the development of digital trade in global markets is used. In addition, the use of the proposed toolkit allows you to monitor the change in country indices over time, provided that the normalized values of the indicators used are preserved.

However, in order to build a methodological approach, it was important to make the ratio of the selected sub-indices to the integral indicator with the level of digitalization and the level of development of the digital government. The author chose these levels for the proposed approach, because the development of digital trade is ensured by digitization and support of government programs. Thus, this justifies the selection of the above-mentioned levels, which are the information basis for the clustering of countries included in the methodological approach.

7. CONCLUSIONS

The use of digital technologies and their introduction into social and economic life passed from the stage of formation to the next phase a long time ago. Digital commerce will eventually gain a complete monopoly, excluding some features of commerce. That is why the development of digital trade in global markets is the most urgent issue today, taking into account sustainable development.

The study is devoted to the development of a methodical approach to determining the level of development of digital trade in global markets by constructing an integral indicator and clustering countries according to the level of digitalization and development of digital government.

The article uses the method of building an integral index with the procedure of normalizing the values of indicators to ensure their compatibility. Weighting coefficients of indicators were determined by the method of expert evaluations.

The results of the research can be applied in the analytical support of the policy regarding the improvement of the conditions for the development of digital trade in global markets and the creation in the future of a single space of digital trade, which contributes to the strengthening of global economic integration and ensures sustainable development. In addition, the article contains methodological recommendations that can be used to develop similar assessment tools for other groups of countries. The limitations of the study are related to the need to account for regional specific features of the analyzed countries or regions.

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DIAGNOSTICS OF CRISIS SITUATIONS IN THE MANAGEMENT OF FINANCIAL SECURITY: AN EXAMPLE OF FOOD INDUSTRY ENTERPRISES

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Received 25.02.2023.

| Send to review 07.03.2023.

| Accepted 29.04.2023.

Original Article



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JEL Classification:

C13, C19, D81, G30, G32

Doi: 10.61432/CPNE0101217Z

UDK: 005.334:339.564]:641.1

ABSTRACT

Food industry enterprises play an important role in the economy. They provide the population with food, create jobs, and make a significant contribution to the production of the gross domestic product. However, competition and an unstable market situation lead to crisis situations. Therefore, for the financial security of the enterprise, it is necessary to determine and analyze the probability of bankruptcy in advance and diagnose the reasons for its occurrence. The methods of discriminant analysis and economic and statistical forecasting create opportunities for determining the probability of the occurrence of crisis phenomena. The purpose of the study is to compare approaches and methods of forecasting the probability of crisis phenomena and to determine the factors that cause them. The article, based on the example of a leading Ukrainian company in the food industry, provides the results of the application of various models for determining the probability of bankruptcy by Beaver, E. Altman, Tafler, K. Springate, and domestic models. Thus, the study confirms the possibility and expediency of using the above-mentioned models to predict the probability of bankruptcy of enterprises. The key factors that affect the company's activity and can be the causes of crisis situations are identified. The implementation of forecasting models in management activities makes it possible to predict the onset of crisis phenomena and generate measures to prevent bankruptcy and ensure financial security in competitive conditions of instability and uncertainty of the market environment.

Keywords: *analysis, management, crisis phenomena, bankruptcy, discriminant analysis, model, forecasting, financial security*

1. INTRODUCTION

A characteristic feature of the modern world is the significant influence of external factors on the financial and economic activity of economic entities, which are often caused by force majeure circumstances. Moreover, these are not only economic factors, namely demographic, social, political and medical characteristics (pandemic, military aggression, global competition), which play an equally important role, the negative impact of which causes the emergence of crisis phenomena both for the economy and for the economy in general and for individual economic units. This affects the financial and economic activity and leads to insolvency, lack of working capital, i.e. it causes the bankruptcy of the enterprise, which negatively affects the financial security of the business entity. In such conditions of chronic uncertainty, the issues of forecasting, prevention and countermeasures against crisis phenomena are becoming more and more relevant. There is a need to implement methods and models of anti-crisis management into practical activity, which can be used to analyze and assess the probability of bankruptcy. Early forecasting of crisis phenomena makes it possible to apply a set of measures to prevent bankruptcy, which will ensure financial security.

Therefore, the relevance of early determination of the probability of bankruptcy and the analysis of factors affecting these processes is beyond doubt. At the same time, it is important to use a complex of methods and tools for diagnosing the causes and factors that lead to the emergence and deepening of crisis phenomena, and their complex application creates opportunities for preventive activities in order to ensure the financial security of economic entities.

2. LITERATURE REVIEW

The etymology of the term “crisis” is of Greek origin and means a sharp break, a severe transitional state, the extreme point of a fall, acute lack, discrepancy. The crisis is a phase of the cycle of economic development that repeats itself, that is, it is the end of the previous periodic cycle and the beginning of the next one (Schumpeter J., 1978). The reason for the emergence of crisis phenomena in Ukraine is the lack of a reliable system of economic security, which would contribute to the creation of a self-sufficient, competitive, socially oriented economy and would ensure its protection from external and internal destructive influences (Yakubenko Yu. L., Sirko A. Yu., 2021). That is, there is a direct dependence of the impact of crisis phenomena on financial and economic security.

During the study, we will take into account that a crisis is an unpredictable, unexpected situation that threatens the organization's priority goals with limited time for decision-making. A state of crisis as a set of crisis phenomena is critical and can lead to the liquidation of the enterprise. Crisis phenomena are a small number of unstable crisis manifestations that occur synchronously with each other in different directions of the enterprise's activity or a certain phenomenon that occurs during the implementation of a specific process of the functioning of economic entities (Yakubenko Yu., Sirko A., 2021). However, crisis phenomena caused by difficult economic and military conditions are not a traditional crisis that enterprises often face. After all, during a war, institutions, phenomena, systems, mechanisms change and adapt to wartime. The anti-crisis management mechanism of the enterprise is no exception. Vatchenko, B., Sharanov, R. (2022) defined the differences between a traditional crisis and a wartime crisis at an enterprise.

Crisis phenomena lead to the inability of a business entity to fulfill its financial obligations to ensure current production activities, that is, to a financial crisis, which is a phase of unbalanced activity of the enterprise and limited opportunities for its management to influence financial relations (Shvets Yu., 2017). In practical activity, the crisis is identified with insolvency, lack of profit and potential for effective functioning, that is, with bankruptcy.

The Code of Ukraine on Bankruptcy Procedures defines bankruptcy as the inability of the debtor to restore his solvency through the rehabilitation and restructuring procedure and to repay the monetary claims of creditors established in accordance with the procedure specified by this Code, other than through the application of the liquidation procedure (Code of Ukraine on Bankruptcy Procedures, 2022).

Bankruptcy is a court-determined financial inability of an enterprise to meet its obligations to creditors and the budget on time (Lohmann, C., Möllenhoff, S., 2023). Being bankrupt, the company cannot meet the demands set by creditors and obligations to the budget in the required time, which is caused by the problem of insufficient assets in liquid form (Blank I., 2006). In addition, catastrophic risks of the enterprise are realized in the process of its financial activities, as a result of which it is not able to satisfy the demands put forward by creditors and fulfill its obligations to the budget within the established terms (Lyashenko O., 2015). Avci, P., Sümerli Sarıgül, S. (2023) explain bankruptcy as a situation that occurs when a business cannot obtain sufficient value to cover the costs of doing business.

Bankruptcy of enterprises is a consequence of the financial crisis and a threat to financial security, which requires the implementation of a system of measures by the state aimed at ensuring the recovery and stabilization of the development of the economic system (Keynes J., 1998.). The specific management function of preventing and overcoming crisis phenomena, the process of preparing anti-crisis actions involves the structure of the management apparatus, powers, duties of employees, qualified and professional management personnel, which monitors the identification of signs of crisis (Khalilov, E., 2023). It should be a constantly active process of identifying signs of crisis phe-

nomena and implementing a general plan to prevent the spread of crisis phenomena and stagnation of the enterprise's development, which is carried out throughout the entire period of its operation" (Blank I., 2006).

The consequences of crisis phenomena are the difficulties and troubles of financial and economic activity, which are studied and highlighted in the scientific literature as financial failure, economic failure, technical failure, negative capital and bankruptcy (Demirkhan, H., Sayilgan, G., 2021). Biver W. (1966) defined financial distress as the company's inability to pay interest on debt. Altman, E. (1968), Deakin, E. (1972), Ohlson, J. (1980) and Zmijewski, M. (1984) in their analysis considered the bankruptcy status of the company. Blum, M. (1974) defined financial distress as a company's failure to pay debts. Taffler, R. (1983) examined the stage at which creditors approach the court under the insolvency criterion.

A paradigm shift in the classic legal definition of bankruptcy has expanded the definition of financial insolvency to include economic, technical insolvency and bankruptcy (Rashmi Soni, 2019).

The application of methods for diagnosing the financial condition in order to determine the threat of bankruptcy of the enterprise involves the identification of solvency, the level of insolvency and the type of bankruptcy situation. Methodological recommendations define that "solvency (liquidity) is one of the main qualitative indicators of the enterprise's activity, which determines the enterprise's ability to make payments, settle debts in the required amount and within the specified period with its available funds or those that are continuously replenished at its expense activity, insolvency is the inability of a business entity to fulfill its monetary obligations to creditors, including wages, as well as to fulfill its obligations to pay insurance premiums for mandatory state pension insurance, taxes and fees (mandatory payments) no other way than through the restoration of solvency". The Code defines "insolvency - the debtor's inability to fulfill his monetary obligations to creditors after the set deadline has come, no other way than through the application of the procedures provided for by this Code".

Luchko, M., Zhukevich, S. and Farion, A. (2016), investigating the issue of financial analysis in the management of enterprises, highlight one of its tasks of determining the probability of bankruptcy, arguing that bankruptcy is the inability of an enterprise to pay its debt obligations and fulfill obligations to the budget. The authors distinguish the following types of bankruptcy: voluntary, forced, hidden, intentional and fictitious. Bankruptcy can be generated by external (exogenous) factors that do not depend on the activity of the enterprise, and internal (endogenous) factors that depend on the enterprise. According to financiers, one-third of bankruptcies in developed countries are due to external factors, and two-thirds are due to internal factors. The main external factors of enterprise bankruptcy are: macroeconomic and political instability; downturn in the economy; decrease in the purchasing power of the population; significant level of inflation; instability of economic and tax legislation; strengthening intra-industry competition; crisis of a separate industry; seasonal fluctuations; strengthening of monopoly in the market; discrimination of the enterprise by authorities and management; deterioration of the criminogenic situation, etc. It is also possible to single out a large number of internal factors of bankruptcy: ineffectiveness of operational, investment and financial activities; low quality of management; low level of personnel qualification; shortages in supply; low level of marketing; lack of innovation and rationalization; underdevelopment of financial controlling, etc. There is a connection between the factors, so you cannot concentrate on one of them, even a very important one, you should consider both internal and external factors and their interaction.

Taking into account the relevance and necessity of the development of theoretical foundations and the applied application of methods for determining the probability of bankruptcy, taking into account domestic conditions and factors, the authors examine both foreign approaches and the work of Ukrainian scientists in determining the probability of bankruptcy (Zhukevich, S. and Zhuk, N., 2023).

In particular, an attempt was made to apply the methods of determining the probability of bankruptcy to food industry enterprises. Considering the fact that the food industry is multi-sectoral and covers about 40 industries, while researching diagnostic methods for determining the probability of bankruptcy, the authors selected enterprises of the confectionery industry, which include

enterprises of various organizational and legal forms of business and differ in the size of business activities - large, medium, small. In this study, foreign and domestic models for determining the probability of bankruptcy of small enterprises in the confectionery branch of the food industry were used (Zhukevich, S. and Zhuk, N., 2023). At the same time, the possibility of applying the method of diagnosing the probability of bankruptcy for medium and large enterprises and corporations with the determination of their impact on financial security in modern business conditions is unresolved and quite relevant.

Therefore, the study of the main approaches to the analysis of the probability of the occurrence of crisis phenomena leading to bankruptcy in modern economic conditions is a necessary element of determining their impact on the level of financial security of food industry enterprises and determines the relevance of highlighting these issues.

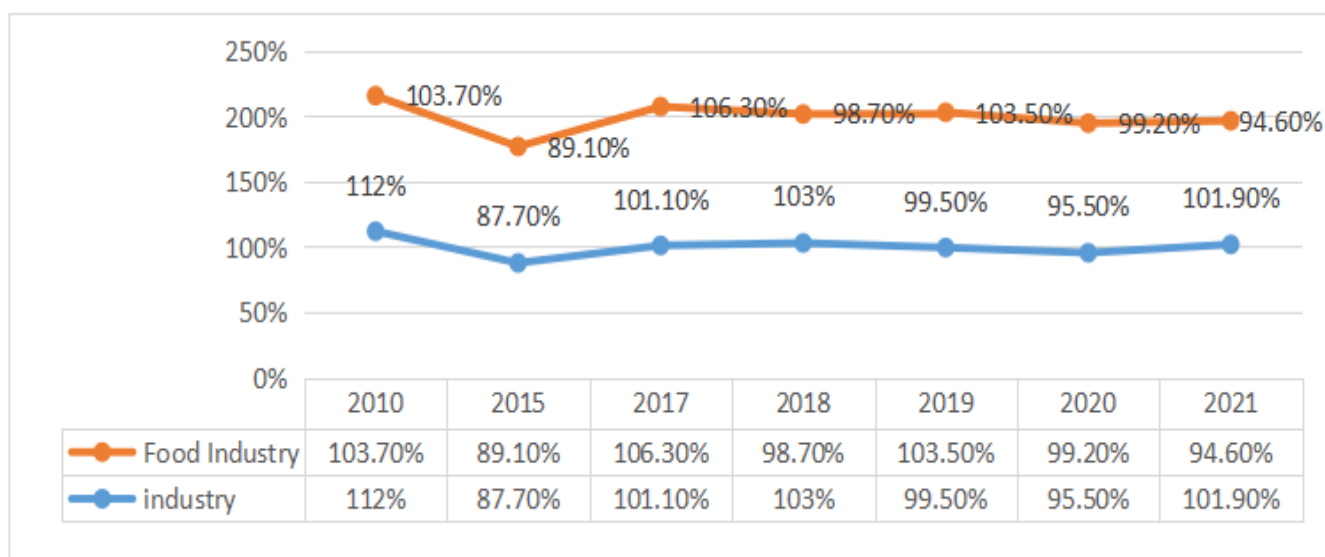
3. AIM OF THE RESEARCH

The purpose of the study is to diagnose the probability of the onset of crisis situations that lead to bankruptcy and affect the level of financial security of enterprises in the confectionery branch of the food industry. At the same time, apply foreign and domestic models and methods of determining the probability of bankruptcy and evaluate the effectiveness of these models for domestic enterprises.

4. METHODS

Over the past ten years, the food industry has become one of the top three sectors in which about 18% of the country's population works, taking a leading position in the economy of Ukraine. Thus, in 2021, the Ukrainian industry showed growth by 1.9% - 101.9% compared to 2019, although in 2021 the indicators of the food industry compared to 2019 were - 94.60%, which indicates a decrease in the index by 5.4% of the previous period (Figure 1).

Figure 1. Indices of industrial production by types of activity (percentages compared to the previous year).
for 2010-2021

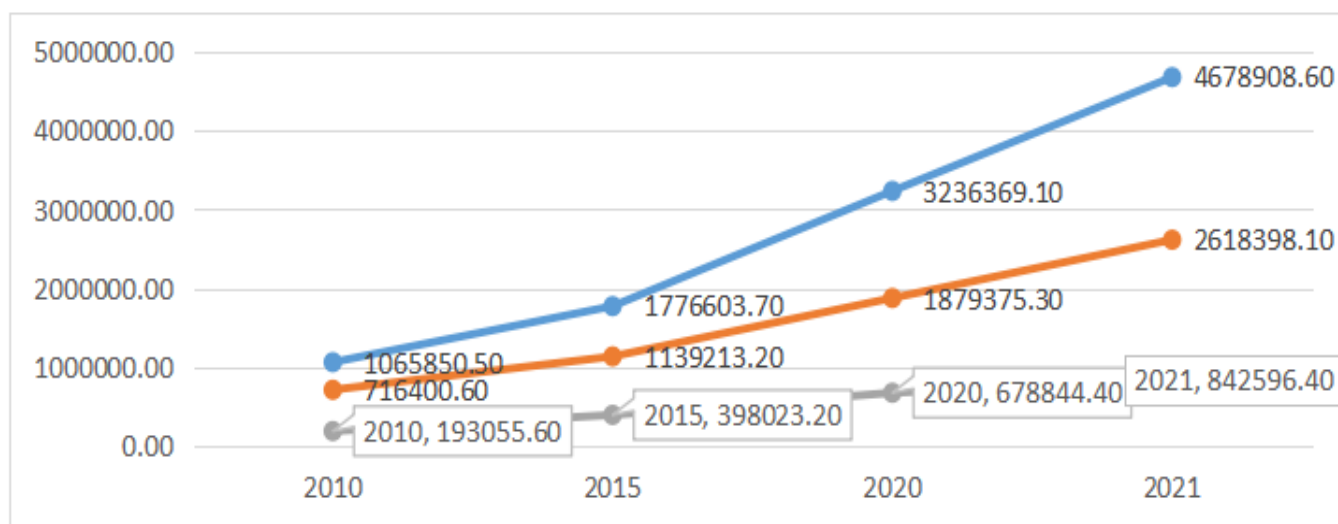


Source: compiled by the authors based on official statistical data

The food industry provides the population with food products – 5.5% of the total volume of sold products and 16.8% of industrial production, creates a large number of jobs – 4.1% of those employed in the economy, 16.7% of those employed in industry and 23.7% of the employed in the processing industry, makes a significant contribution to the production of the gross domestic product and attracts foreign capital to the country (Angel, E. 2022).

Despite the conditions of the systemic crisis, there is an increase in the volume of industrial production and sales in general and the food industry in particular (Figure 2).

Figure 2. Dynamics of the volume of industrial products sold, mln.hrn

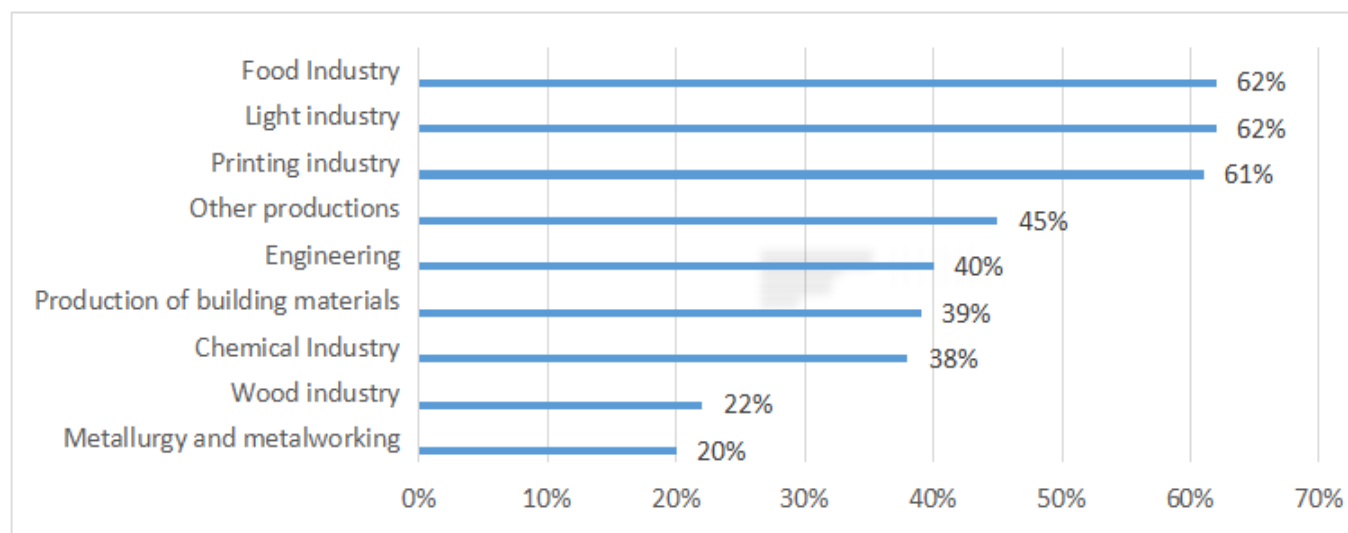


Source: compiled by the authors based on official statistical data

During the full-scale military invasion, Ukraine's economy naturally suffered numerous destructions and losses. According to the experts of the Institute of Economic Research and Political Consultations, the result of the war was a drop in industry by 42.6% while the GDP decreased by 31% (Angel, E. 2022).

However, the food industry shows relative stability against the background of other types of activity. In general, as of September, 62% of food industry enterprises were working at almost full (75–99%) or full and greater capacity compared to the pre-war period (Figure 3). This is partly due to the fact that industries that provide the basic needs of the population are in daily demand both inside and outside the country.

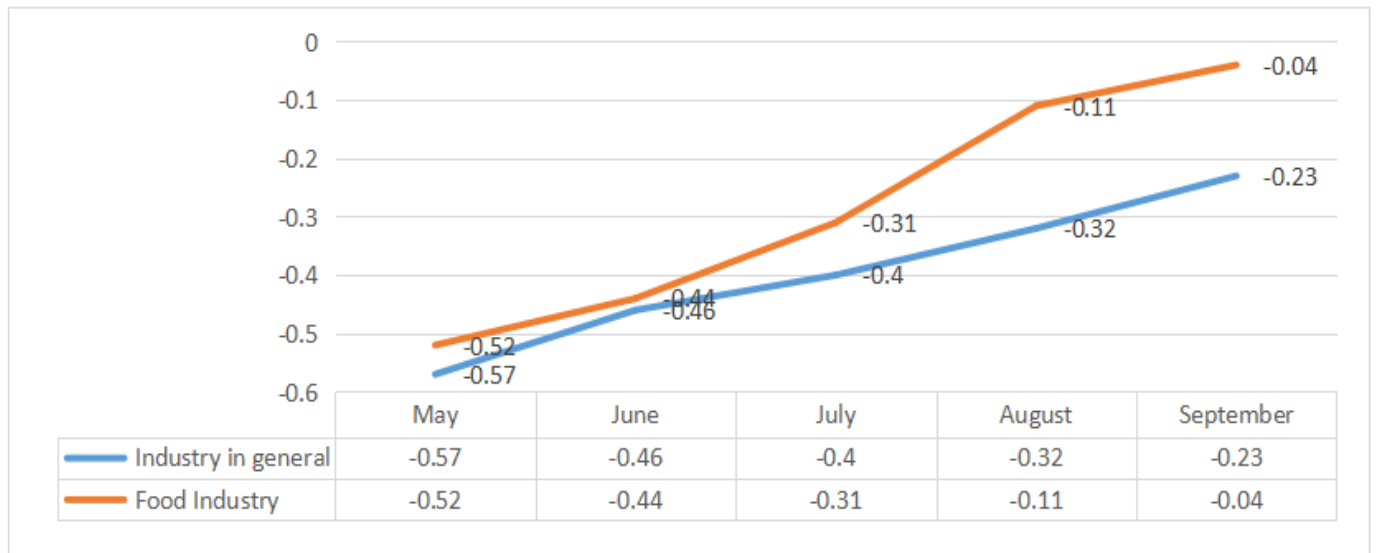
Figure 3. Share of industrial enterprises operating at almost full capacity (75-99%, 100%) as of September 2022



Source: constructed by the authors based on the results of official data

The food industry best maintains its powerful potential by supporting the economy in times of war. In the food industry, optimistic assessments of the business environment and the financial and economic situation at enterprises appear compared to other industries (Figure 4).

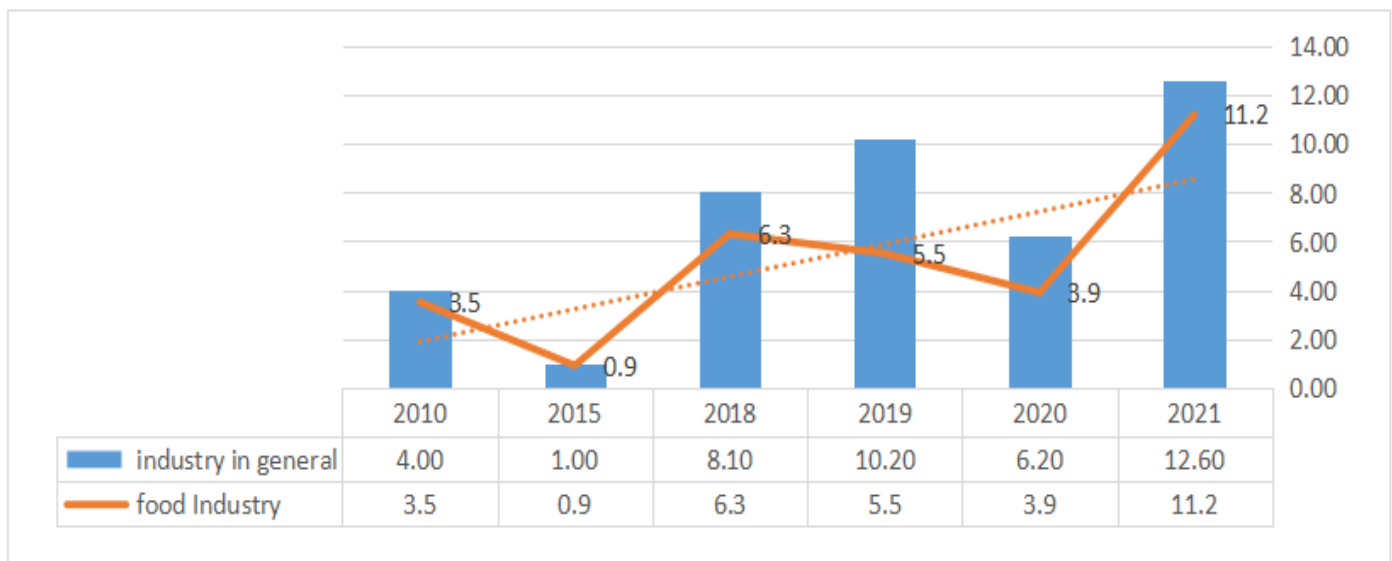
Figure 4. Indices of the general economic environment, 2022



Source: constructed by the authors based on the results of official data

The industry has a high investment attractiveness due to a shorter investment payback period (two to three years) compared to basic industries and a fairly high level of profitability, which especially increased in 2021 (Figure 5) and is an important factor in conditions of economic instability.

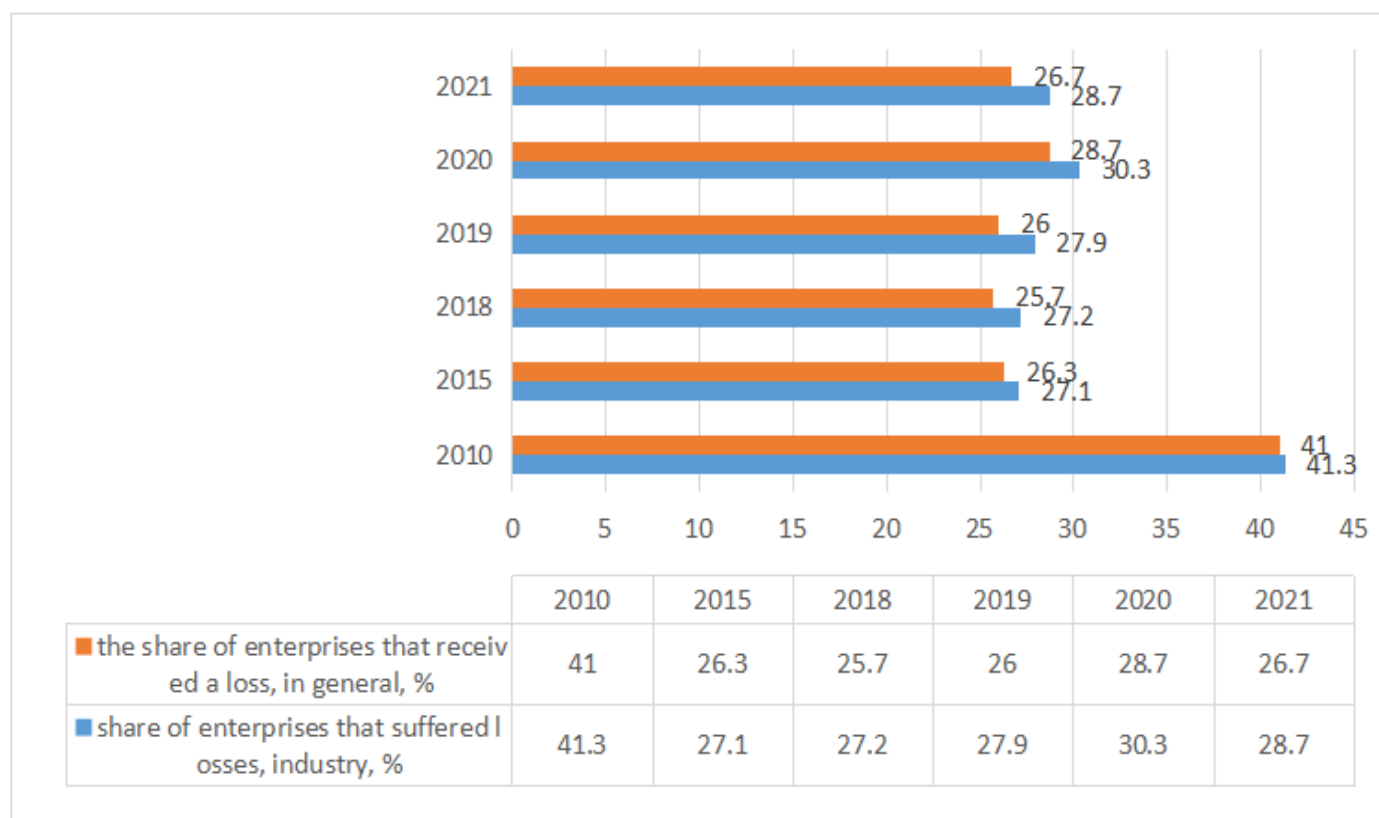
Figure 5. Profitability of operating activities for 2010-2021



Source: constructed by the authors based on the results of official data

Therefore, despite the received profits, which are growing significantly in the industry, the share of unprofitable enterprises is 28.7%, which is a rather significant indicator and once again proves the necessity and relevance of the issues of financial security of the food industry in general and of individual economic entities in the crisis conditions of the Ukrainian economy (Figure 6).

Figure 6. Share of unprofitable enterprises for 2010-2021



Source: constructed by the authors based on the results of official data

It should be noted that the food industry is a priority and strategically important component of the economy of Ukraine, which provides the needs of the world and domestic markets. The food industry covers more than 20 industries (40 industries), the specifics of which affect the efficiency of financial and economic activity and, accordingly, the determination of the probability of crisis phenomena and the onset of bankruptcy. For research, we chose the confectionery branch of the food industry. One of the tasks of managing enterprises in the confectionery branch of the food industry is forecasting the onset of crisis phenomena and preventing bankruptcy.

In order to timely warn of the insolvency of the enterprise, it is necessary to systematically analyze its activities using methods that make it possible to predict the onset of bankruptcy. All models of assessing and forecasting the probability of bankruptcy of enterprises can be divided into the following groups: expert methods; methods of assessing financial status; economic and mathematical methods; artificial intelligent systems (Shvets, Yu.O., 2017). The most common methods and models used in bankruptcy are logistic regression (LOGIT) and neural network (Bayhan, A., 2023). Manurung, A., Suhartono D., Hutahayan B., Halimawan, N. (2022) review the bankruptcy probability study using a support vector regression model and show good performance as it has the highest coefficient of determination compared to previous studies.

Lohmann, C., Möllenhoff, S. (2023) use generalized additive models to identify and analyze nonlinear relationships between accounting-based and market-based independent variables. Such consideration of nonlinear relationships significantly improves several measures of statistical reliability and increases the discriminatory power of bankruptcy prediction models.

Juškaitė, G. (2023) investigate methods for detecting intentional bankruptcies after examining financial statement fraud and its effect on the probability of bankruptcy. The study evaluated trends in the Altman Z'-Score model and applied binary logistic regression analysis to a sample of intentional and unintentional bankruptcies. Regression analysis created a model for intentional bankruptcies and identified the following metrics: net income/assets, liabilities/assets, liabilities/equity, and Altman's Z'-score. The authors proposed an independent t-test that shows the differences in the mean values of financial indicators between intentional and unintentional bankruptcies.

Papík, M., Papíková, L., (2022) investigated that the analysis of the impact of the crisis on the effectiveness of bankruptcy forecasting models. the performance of forecasting models was significantly weaker during crisis periods than the performance during non-crisis periods

Methodological recommendations suggest determining the probability of bankruptcy by calculating financial indicators that analyze all aspects of the enterprise's activity, especially financial using methods of financial analysis - horizontal, vertical, absolute differences, structural.

However, the complication of the financial and economic activity of enterprises by factors of the external environment and internal environment, and, accordingly, the emergence and functioning of economic formations on the market, which are determined by the organizational and legal form, size of the enterprise, branch affiliation, create the need to take into account the specifics of the activity in the algorithm for determining the financial condition, solvency and probability of bankruptcy.

Berest, M., Bobro, M., (2021) propose an approach to the diagnosis of crisis phenomena at the enterprise using the method of taxonomic analysis based on the construction of partial and total integral indicators of the level of crisis development. A system of indicators for assessing crisis phenomena has been formed, which is the result of a comparative analysis of models for assessing the probability of bankruptcy of enterprises. There are 3 groups of analytical coefficients for assessing the development of the crisis: indicators of the capital structure of the enterprise, indicators of the efficiency of the use of enterprise resources, and indicators of the structure of the formation and financing of assets.

Currently, the use of static models based on discriminant analysis, which involves estimating the ratio of financial coefficients when constructing a discriminant function using mathematical and statistical procedures and calculating the integral index Z, has gained considerable popularity. Note that the analysis with the calculation of the integral index has significant accuracy in predicting the bankruptcy of the subject management (86%), therefore it is most often used and makes it possible to develop directions and take measures for its prevention or improvement of anti-crisis, security-oriented management.

The most widespread are economic and mathematical methods of predicting the probability of bankruptcy, namely discriminant analysis, which includes Beaver's W. (1966) coefficient, two-factor, five-factor, adapted models of Altman, E. (1968, 1977, 2012), models of Lees, R., Tuffler J. (1983), Springate H. (1978), Tereshchenko O. (2008), Matviychuk A. (2006).

Thus, Green D. (1978) used the analysis of financial statements using ratio analysis as a method of testing the financial condition of reporting companies. The American scientist Beaver W. (1966). investigated that the analysis of financial indicators is able to predict the results of the firm's activities.

The Z-score formula was first developed in the 1960s by Edward Altman, a professor at New York University, who proposed it as a solution to the time-consuming and somewhat confusing process investors had to go through to determine how close a company was to bankruptcy. It gave investors an idea of the company's overall financial condition. This model is also called the multiple discriminant analysis (MDA) model. In the first study, he used 66 firms, half of which were bankrupt. After comparing bankrupt and non-bankrupt organizations, the researcher selected only five coefficients for predicting bankruptcy from a large number. The result showed 95% accuracy one year before and 72% two years before the crisis.

Over the years, Altman continued to improve the Z-score. From 1969 to 1975, Altman analyzed 86 companies in distress. From 1976 to 1995, he monitored 110 companies. Finally, from 1997 to 1999, he evaluated another 120 companies. From his findings, it was found that the Z-score had an accuracy of 82% to 94%. In 2012, Altman proposed an updated version of Z-score – Altman Z-score Plus, which can be used to evaluate public and private, manufacturing and non-manufacturing companies, as well as US and non-US companies (Kenton, W., 2022). It should be noted that Collins R. (1980) using many different models to assess bankruptcy in his research, recognized Altman's Z-score as one of the best models. Our research using the above-mentioned foreign and domestic models to determine the probability of bankruptcy of small private enterprises in the confectionery branch of the food industry allowed us to agree with this (Zhukevich, S. and Zhuk, N., 2023).

Therefore, in the proposed study, we will use the above-mentioned models for a large enterprise, namely Roshen confectionery corporation, which is a representative of the large business of the food industry of Ukraine.

5. RESEARCH RESULTS AND APPLICATION OF MODELS FOR DETERMINING THE PROBABILITY OF BANKRUPTCY

Current, critical and supercritical types of solvency are distinguished, which are the primary sign of the probability of a crisis situation and a threat to financial security. The main information base for determining indicators is financial and accounting reporting.

We note that the current solvency (PP) of food industry enterprises arises in the presence of overdue payables and is defined as the difference between the amount of cash equivalents, other highly liquid assets and current liabilities.

If the value of the indicator $PP \leq 0$, then this is a sign of current insolvency.

If there are signs of current insolvency, and the coefficients of self-funding (Kzvoz) and coverage (Kp) are less than their normative values - 1.0 and 0.1, then these are characteristic features of critical insolvency (formula 1).

$$PP < 0, Kp < 1,0, Kzvoz < 0,1 \quad (1)$$

Such inequality characterizes a financial state with a high probability of bankruptcy.

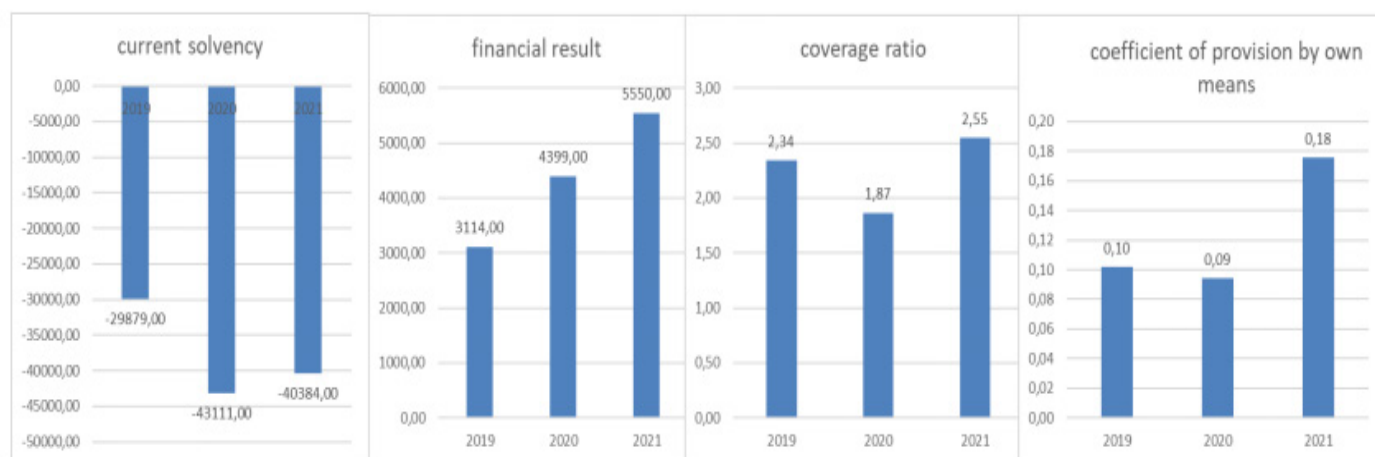
Supercritical insolvency is diagnosed by the presence of the following signs:

$$Kp < 0, FR < 0 \quad (2)$$

where FR is the financial result.

Figure 7 shows the dynamics of the necessary indicators for assessing solvency as a sign of financial condition and a criterion for the probability of bankruptcy of the food industry enterprise Roshen Confectionery Corporation for 2019-2021.

Figure 7. Dynamics of individual financial indicators of Roshen Confectionery Corporation for 2019-2021



Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

The results of the calculations make it possible to conclude that the current solvency is less than zero, which is a sign of insolvency. The growth of the financial result during the researched period is positive. The indicators of the coverage ratio and the ratio of providing with own funds are within the normative values.

To test the models for analyzing the probability of a crisis (bankruptcy), we use data from the financial statements of the Roshen confectionery corporation's food industry enterprise: Balance Sheet (Report on Financial Status) and "Report on Financial Results (Report on Total Income)". Reporting is an information base for assessing the company's financial condition and diagnosing the level of financial security.

The Methodological Recommendations define the structure of the balance sheet and the probability of detecting bankruptcy by conducting a systematic express analysis of the company's financial condition using the Beaver W. ratio, which is the ratio of the difference between net profit and depreciation to liabilities (long-term and current). Calculation data are systematized in Table 1.

Table 1. Indicators of bankruptcy analysis and assessment of the Roshen confectionery corporation using the methodology of Beaver W

№ 3/II	Financial ratio	Data			Indicator criteria		
		2019	2020	2021	Successful activity	5 years before bankruptcy	1 year before bankruptcy
1	Beaver coefficient	-1,049	-0,850	-0,957	0,4–0,45	0,17	-0,15
2	Return on assets	0,007	0,010	0,013	6–8	4	2
3	Financial leverage	0,081	0,106	0,098	≥ 37	≥ 50	≥ 80
4	Asset coverage ratio with net working capital	0,166	0,183	0,233	0,4	$\geq 0,3$	0,06
5	Coverage ratio	2,345	1,865	2,545	$\geq 3,2$	≥ 2	≥ 1

Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

If Beaver's W. coefficient does not exceed 0.2 for 1.5-2 years, then this is a sign of an unsatisfactory balance sheet structure, which is a consequence of a reduction in the share of profit directed to the development of production. The economic entity begins to work in debt, and its leverage factor becomes less than 0.1. The same trend is observed in the researched food industry enterprise, and the calculated data in Table 1 indicate the possibility of a crisis situation and the probability of bankruptcy.

The adapted Z-score formula (Altman Z-score Plus, 2012) for manufacturing companies is calculated according to formula 3, table 2:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5 \quad (3)$$

Table 2. Determining the probability of bankruptcy using the Altman Z-score Plus model for the Roshen confectionery corporation, 2019-2021

Indicator	Algorithm for calculation	Years		
		2019	2020	2021
X_1	working capital/total assets	0,166	0,183	0,233
X_2	retained earnings/total assets	0,078	0,079	0,089
X_3	earnings before interest and taxes/total assets	0,009	0,012	0,015
X_4	market value of equity/total liabilities	0,919	0,894	0,902
X_5	sales/total assets	0,697	0,706	0,773
Z	$Z > 2,99$ Safe zone	1,585	1,612	1,769
Імовірність банкрутства	$1,81 < Z < 2,99$ "Grey" zone $Z < 1,81$ Disaster zone	"Grey" zone	"Grey" zone	"Grey" zone

Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

Altman's two-factor model covers two factors and is calculated according to the following algorithm (table 3) formula 4:

$$Z = 0.3877 + 1.0736X_1 + 0.0579X_2 \dots \quad (4)$$

Table 3. Determining the probability of bankruptcy according to Altman's E. two-factor model for Roshen confectionery corporation

Indicator	Algorithm for calculation	Years		
		2019	2020	2021
X_1	working capital/current liabilities	2,345	1,865	2,545
X_2	current and long-term liabilities/balance currency	0,081	0,106	0,098
Z	$Z > 0$ more than 50%	2,910	2,396	3,126
Probability of bankruptcy	$Z < 0$ is less than 50% $Z = 0 = 50\%$	big	big	big

Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

The next model of discriminant analysis is Springate's K. model, which involves the calculation of four factors focused on the future income of the enterprise with an accuracy of up to 92% (Dobrovolska, O., Dubrova, N., 2021). The longer the forecast period, the less accurate the forecast. This model has the following form - formula 5:

$$Z = 1,03x_1 + 3,07x_2 + 0,66x_3 + 0,4x_4 \quad (5)$$

The algorithm and the result of calculating the penalties are shown in Table 4.

Table 4. Determining the probability of bankruptcy of Roshen confectionery corporation according to the model of Springate K

Indicator	Algorithm for calculation	Years		
		2019	2020	2021
x1	working capital/total value of assets	0,166	0,183	0,233
x2	operating profit/total value of assets	0,009	0,012	0,015
x3	profit before taxes/current liabilities	0,125	0,123	0,168
x4	sales volume/total asset value	0,697	0,706	0,773
Z	$Z > 2,45$ Safe zone	0,560	0,590	0,708
	$0,862 < Z < 2,45$ "Grey" zone	Disaster zone	Disaster zone	Disaster zone
	$Z < 0,862$ Disaster zone	Disaster zone	Disaster zone	Disaster zone

Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

So, according to this model, the enterprise is in a disaster zone, that is, there is a significant probability of becoming bankrupt, which threatens financial security. This indicates an insufficient level of anti-crisis management and the effectiveness of the financial security strategy. However, if the management implements a number of measures to increase working capital, improve the efficiency of operations and use of assets, the company will be able to overcome temporary difficulties.

The application of the model of Lees R., which is calculated according to formula 6, confirmed the low probability of bankruptcy (table 5) (Dobrovolska, O., Dubrova, N., 2021).

$$Z = 0,063X_1 + 0,092X_2 + 0,057X_3 + 0,001X_4 \quad (6)$$

Table 5. Determining the probability of bankruptcy of Roshen confectionery corporation according to the model of Lees R

Indicator	Algorithm for calculation	Years		
		2019	2020	2021
X1	working capital / assets	0,166	0,183	0,233
X2	profit from sale/ assets	0,009	0,012	0,015
X3	retained earnings/ assets	0,078	0,079	0,089
X4	equity / liabilities	11,272	8,427	9,228
Z	$Z > 0,037$ low	0,027	0,026	0,030
Probability of bankruptcy	$Z = 0,037$ marginal	висока	висока	висока
	$Z < 0,037$ high			

Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

The used models for determining the probability of a crisis (bankruptcy) reflect various aspects of the enterprise's economic activity, are easy to calculate, simple and accurate in calculations, and enable their application to external users, which are their positive characteristics. However, they are developed for the enterprises of the USA and Western Europe, that is, they are adapted for the conditions of the developed market. It is clear that these models do not take into account the modern operating conditions of the domestic market, which have their own peculiarities in the accounting entry system, tax legislation, the significant impact of inflation on financial and economic activity, the industry affiliation of the enterprise, etc.

Among the discriminant models for determining the risk of the probability of the occurrence of crisis phenomena developed in Ukraine are the model of [Tereshchenko, O. \(2008\)](#), [Matviychuk, A. \(2006\)](#), a model proposed by the Ministry of Finance of Ukraine.

A characteristic feature and a positive side of Tereshchenko's O. model is the coverage of various determinants of the financial state in the study of a business entity: liquidity, profitability, turnover, structure of property, capital, etc. (formula 7, table 6).

$$Z = 1,5X_1 + 0,08X_2 + 10,0X_3 + 5,0X_4 + 0,3X_5 + 0,1X_6 \quad (7)$$

Table 6. Determining the probability of bankruptcy of Roshen confectionery corporation according to the model of Tereshchenko O

Indicator	Algorithm for calculation	Years		
		2019	2020	2021
X1	cash receipts/ liabilities	0,006	0,003	0,003
X2	balance currency/liabilities	12,272	9,427	10,228
X3	net profit/ average annual amount of assets	0,007	0,010	0,013
X4	profit / income from sales	0,011	0,014	0,016
X5	production stocks/ income from sales	0,106	0,086	0,104
X6	income from sales / fixed capital	0,697	0,706	0,773
Z	$Z > 2$ low	1,156	0,962	1,068
Probability of bankruptcy	$1 < Z < 2$ limit value	limit value	high	limit value
	$0 < Z < 1$ high			

Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

Having studied the application of existing models in the conditions of a transformational economy, Matviychuk A. proposed a "model for assessing the axiological (subjective) probability of bankrupt-

cy” (Savchenko, A., Fisher, N. (2020) of Ukrainian enterprises in the form of a discriminant function, which has the following calculation algorithm (formula 8, table 7).

$$Z = 0,033X_1 + 0,286X_2 + 0,045X_3 + 0,018X_4 + 0,004X_5 + 0,15X_6 + 0,702X_7 \quad (8)$$

Table 7. Determining the probability of bankruptcy of Roshen confectionery corporation according to the model of Matviychuk A

Indicator	Algorithm for calculation	Years		
		2019	2020	2021
X1	current assets/non-current assets	0,199	0,224	0,303
X2	net sales income/current liabilities	9,826	7,197	8,457
X3	net sales income/equity	0,759	0,790	0,857
X4	balance/net income from sales	1,435	1,416	1,293
X5	(current assets - current liabilities)/current assets	0,573	0,464	0,607
X6	(long-term liabilities + current liabilities)/balance sheet	-0,060	-0,090	-0,085
X7	equity/(security of future expenses and payments + long-term liabilities + current liabilities)	11,272	8,427	9,228
Z	Z > 1,104 low probability of bankruptcy	10,614	7,914	8,817
	Z < 1.104 high probability of bankruptcy	low	low	low

Source: constructed by the authors based on the results of official website of Roshen confectionery corporation

Because Matviychuk’s A. model takes into account the peculiarities of the functioning of economic agents in the transformational conditions of the economy, therefore it is considered the most adequate in characterizing the actual financial and economic situation in the context of ensuring the financial security of the enterprise.

Thus, according to Matviychuk’s A. model, it is possible to identify the enterprise of the food industry - the Roshen confectionery corporation as being at risk in 2021. The result of the previous 2019-2020 years is positive, which characterizes the company with a low probability of bankruptcy. The deterioration of the state of affairs during the researched period is the influence not only of internal economic factors, but also of external conditions of conducting financial and economic activities, which today have a significant impact on the efficiency of entrepreneurial activity. It can be argued that the Roshen Confectionery Corporation should pay attention to improving the efficiency of operations and profitability, ensuring absolute liquidity, turnover of working capital and its amount, which are the main determinants of preventing the onset of a crisis and ensuring financial security. During the studied period, the Roshen confectionery corporation does not use its assets enough to accumulate profits. A negative factor for financial security is insufficient profitability of product sales. However, in order to determine the specific factors influencing the probability of bankruptcy and their quantitative measurement, it is necessary to carry out a more detailed analysis for each component of the company’s financial condition.

6.CONCLUSIONS

Management of financial and economic activities of food industry enterprises requires systemic changes and qualitatively new approaches to identifying crisis phenomena at the earliest possible time of their manifestation. Crisis phenomena are equated with the onset of bankruptcy of the enterprise and a high degree of risk in financial activities, the consequence of which is the impossibility of fulfilling obligations and demands to the budget and creditors within the specified period. It is important to detect the signs of a crisis in an enterprise in advance, which is possible by conducting

an analysis using diagnostic research methods that make it possible to determine the probability of bankruptcy with a certain accuracy and predictability.

Analytical methods for determining the financial condition include the methods of assessing the probability of the occurrence of crisis phenomena: vertical and horizontal analysis of reporting, calculation of coefficients, methods of determinant integral analysis.

To diagnose the probability of bankruptcy, the study used deterministic integral analysis using models of foreign and domestic scientists. The official data of the Roshen Confectionery Corporation food industry enterprise became the information base. The applied methods of bankruptcy forecasting have a number of advantages: complexity, but ease of calculation, the possibility of their use by external users with the help of open databases of financial and accounting statements. At the same time, some of their superficiality is noted, which requires a more detailed analysis of individual factor components. It should be noted that the application of foreign methods does not take into account domestic conditions, circumstances and peculiarities of financial and economic activity of various organizational and legal forms of management. Therefore, we consider it expedient to use the models of foreign scientists to diagnose the probability of bankruptcy. However, in our opinion, it is appropriate to combine with the proposed methods, to use other methods that would take into account the specifics of the industry, the size of the enterprise, and the factors of the external, market environment.

Therefore, in order to achieve a high level of financial security of the enterprise in difficult, unpredictable conditions, it is extremely important to implement effective anti-crisis, security-oriented management to forecast and prevent the emergence of threats and take measures to correct the situation. market economy.

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BLENDING ONE-PIECE FLOW AND LAYOUT OPTIMIZATION IN AUTOMOTIVE INDUSTRY. A CASE STUDY.

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Received 23.02.2023.

| Send to review 06.03.2023.

| Accepted 31.05.2023.

Original Article



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JEL Classification:

C61, L16, L23, L62

Doi: 10.61432/CPNE0101234c

UDK: 669.017:[629.3:621.43

ABSTRACT

This paperwork presents a case study from automotive industry, of applying One-Piece Flow methodology, under Layout optimization program with a unique and personalized approach to company needs. A systemic outlook and appropriate involvement support the company's continuous improvement efforts. Layout optimization through One-Piece Flow implementation is an elementary key to efficiencies sand to ensure the success. Should be present in any production industry, but extra attention is paid to the automotive field. The described case study methodology demonstrates the relevance of One-Piece Flow and layout optimization in an automotive company. It offers a practical perspective from an organizational point of view, applying the different theoretical formula of OPF balancing calculation to practice. There is always a concern about improving or reducing overall production costs while being efficient. Hence, the manuscript punctualizes the relevance of production workflow, level of interphasic stocks, time, layout of production lines, balancing the production cells and resource management. The paper demonstrates with a new concept for One Pieces Flow implementation the needed steps in order to have a successful production line optimization. Major findings refer to reducing costs, reducing work in progress, quality improvements, team work benefits and freeing space so the company has room for additional projects.

Keywords: OPF, One-Pieces flow, cycle time, cost rate, layout optimization

1. INTRODUCTION

Lean Management represents a useful streamlining method which focuses on reducing waste. In the last 3 decades, Lean Management has started to be implemented in a wide variety of fields: automotive, governments, information technology, healthcare etc., having effects on the overall results. Lean thinking enables industries to optimize production, foster customer engagement, and maximize service resources to reduce waste and drive business growth (Lermen et al., 2023; Lakshmanan et al., 2023). Lean Management has a broad range of tools, such us Quality Management, Automation, Total Productive Maintenance, Performance Management, Just in Time, Continuous Improvement and many others, out of which we chose to focus on One-Piece Flow.

The One-Piece Flow method is a lean manufacturing approach that involves producing one product unit at a time through a series of continuous and uninterrupted steps. The basic idea for One-Piece Flow, further used as “OPF”, or continuous flow is to maximize value addition and minimize losses, creating a manufacturing process where each product unit flows like a single piece of material, with no interruption or delay. This approach can be applied in various industries, including manufacturing, healthcare, and service businesses, to increase efficiency and productivity while reducing costs and waste.

In other words, OPF is the creation of added value for the customer using fewer resources (Productivity Press Development Team, 2002). Working in OPF is totally opposite to the batch production system (Protzman, McNamara, and Protzman, 2016; Baudin, 2002). Researchers consider that batch production affects productivity. Working in batches generates many negative effects, such as: increase of quality problems, repairs, longer lead-time, more storage space and monitoring efforts needed, more indirect staff required to perform the work etc. (Taylor & Francis Group, 1999).

In the One-Pieces Flow work mode, the operations are placed in sequence next to each other and each part moves smoothly from one process step to another until it is completed (Ghirann, 2012). Parts no longer have to move to different areas, wait hours or even days on the floor of the production area until the entire lot is processed (Rother and Harris, 2001). OPF implementation can only be achieved if the arrangement of machines, people, method and material is done in the cell (Sekine, 2017). Our paperwork describes the relevance and effects of One-Piece Flow and layout optimization in an automotive, offering a practical perspective from the organizational point of view, where there is focus on costs and efficiency. Besides this, a detailed six-steps model of implementing one piece flow is presented in the paperwork.

2. MATERIAL AND METHODS

The implementation of the project was carried out in an automotive company with 1,700 employees, with an available production space of 23,500 . The case study is based on real data.

The most common production model is batch production, where each step of the process is evaluated individually, as an independent island, and the transfer of the semi-finished product is done by handling, most of the time using storage boxes and different transport devices the type of pallet truck, different carts or simply pushing them on the floor. This mode of production was also encountered in the studied company, where the level of interphase stocks far exceeded 8 hours of production, in some cases even several days. The production space used in this case was high and totally inefficient (Soliman, 2022).

Through the conducted case study, the efficiency of the cost per hour of production, called “Cost Rate”, was pursued.

$$C_r = \frac{C_v + C_f}{H_p} \quad (1)$$

Where: C_r = production cost rate [€/hours]

H_p = production hours, booked by the direct personnel [hours]

C_v = variable cost, meaning the salary cost for direct personnel (operators/blue colors) [€]

C_f = fix cost (e.g., salary cost with indirect, personnel transport, facility cost, energy/gas cost, etc.) [€]

In order to succeed in reducing the Cost Rate, there are three directions of work. The most common is increasing the productivity of operators, thus obtaining a lower cost for , the second option is the efficiency of indirect staff activities and the reduction of costs in general, obtaining a lower cost for the fixed cost . The third element with a high potential is the increase in the number of production hours in the same production space, thus the costs of transport, building, heating, electricity has a better distribution and thus achieving a lower production rate cost per production hour.

In order to succeed in increasing the production hours on the same production space, it is necessary to optimize and reduce the production space, thus new projects can be hosted in the newly created free space, thus increasing the production hours. Efficiency is based on the principle that every additional square meter represents a cost, as it must be heated, enlightened, equipped, cared for, cleaned, etc.

The main objectives pursued by the case study were:

- increasing the productivity of direct personnel, that is, reducing variable costs ();

- optimizing the production space, freeing up space for new projects, thus increasing the number of production hours ().

The chosen optimization method of the production lines was One-Pieces Flow, the implementation concept being developed within the case study.

In Figure 1 we have developed a model of implementing the OPF concept, and in the following sub-chapters we will present and detail each stage of this implementation.

Figure 1. One-Piece Flow implementation steps



Source: Developed by the authors

The process started with understanding the OPF method, done through defining the team and ensuring training for it. The second step involves collecting and preparing the data regarding the process to improve. The third step consists of an evaluation of each production line with the product portfolio, by using a special calculation tool, and the spaghetti diagram method to create the process flow. The next step involves developing an optimization layout plan for OPF implementation, using a Gantt diagram, followed by the evaluation and validation of the obtained results, considering specific factors. Finally, the improved situation becomes a standard, which is constantly monitored and improved.

2.1. UNDERSTANDING OPF CONCEPT IN ORGANIZATION

In the first stage of implementation, a standard knowledge and understanding is needed within the organization, especially among the members of the implementation teams, for example for the Process Technology, Production & Quality departments. This was achieved within the case study through:

- defining the Project Manager and the team;
- organizing an opening meeting of the project;
- presenting the objectives and the main time plan;
- staff training on the application of the OPF implementation concept;
- practical and theoretical training of the OPF production method.

2.2. DATA PREPARATION / COLLECTION

As the team was focused on reducing variable costs and optimizing the production space, to improve the indicators they needed to collect and evaluate the following elements:

- List of part numbers on each production line;

- Demand for the next 2 years;
- Identifying High Runners;
- Level of equipment loading capacity;
- Layout evaluation.

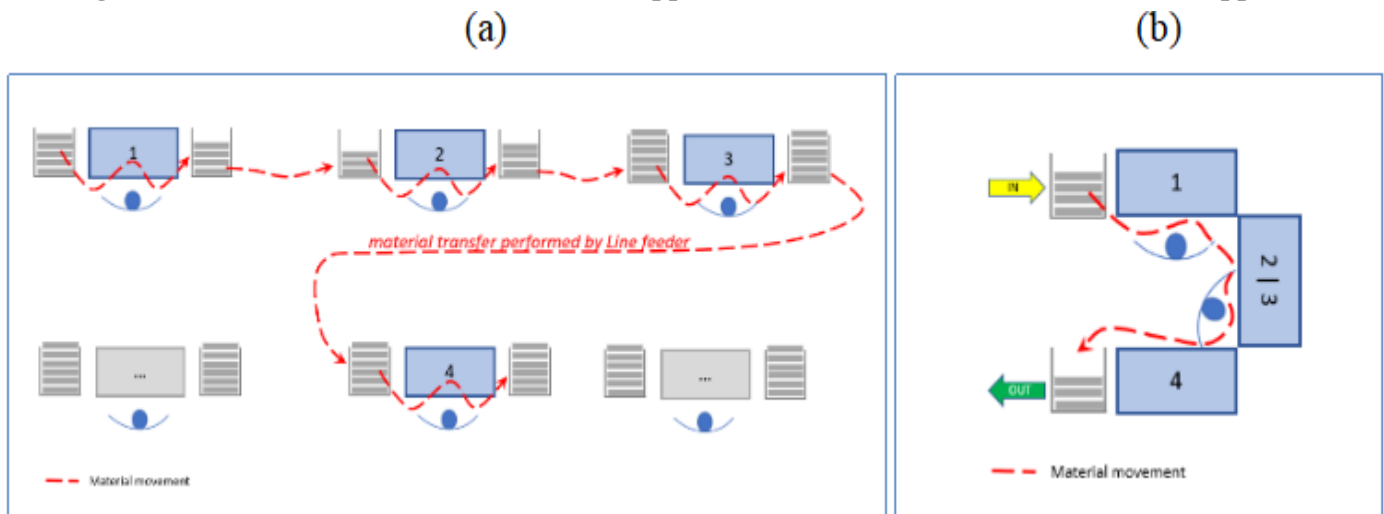
2.3. PRODUCTION LINE POTENTIAL EVALUATION

In order to identify the production lines and process steps where the OPF method can be implemented, the entire production area was evaluated, specifically each production line with the product portfolio. The possibility of implementation is conditioned by few elements, one of which is ensuring a continuous flow of production, thus considering the process steps with the involved equipment, e.g., for injection the OPF cells are more difficult to integrate.

For the implementation of OPF cells, an extra capacity is required among the equipment. In classic production, each machine, workstation has an operator assigned to it for the entire production time, so the degree of loading of the equipment is very high. Instead, in the OPF working mode, the operator moves from one station to another with the product in hand, thus the used capacity of the equipment is much lower (Chiarini, 2013).

Figure 2 (a) describes the way of working in classical batch production, where the operator does not move from one station to another, performing only ergonomic movements at the workstation, for that processing phase. In comparison, in figure 2 (b) we find described the OPF way of working, where the operator or operators move from one station to another with the product in hand so that it can be processed (Takeuchi, 2022). Their movement is streamlined and reduced to a minimum due to the use of U-shape working cell.

Figure 2. (a) Production in a classical Batch approach (b) Production in One-Piece Flow approach



Source: Developed by the authors

In the project, two options were evaluated: moving the operator with only one product in hand or with a bundle of products (approximately 50 pieces). A calculation was performed in this regard, it was found that the most efficient way of working in the detailed case study is moving with a bundle of products, as the achieved cycle time was lower.

In order to identify the areas and the process steps where the OPF cells may be implemented, a calculation tool developed for the case study was used. The methodology implies monitoring and collecting process data in a table. Thus, the sequence of process steps is recorded on the first column, the type of process step (machine, equipment or manual), the number of parts that can be produced in an 8-hour shift, and the tool calculates: the cycle time on the part in seconds, the number of operators per shift required (Liker and Hoseus, 2008).

Figure 3. OPF cell potential - calculation tool

Production line process steps	Type of the process	pcs/shift	C/T [sec]	Nr. of operators needed /shift	pcs/8h	Nr. op allocated	OPF cell potential
Molding Vel grommet 148	machine	1500	19.2	0.09	1500	0.1	
Splitting wires	manual	1700	16.9	0.08	668	0.2	1 OPF cell
Molding verbinden 255	machine	1100	26.2	0.13			
Cleaning long side of the wire	manual	300	96.0	0.47	120	1.0	1 OPF cell
Tube mounting long wire	equipment	400	72.0	0.36			
Tube molding big wire	manual	400	72.0	0.36			
Molding grommet W - schib 113	machine	450	64.0	0.32	450	0.3	
Long wire length adjusting*	equipment	600	48.0	0.24	84	2.0	1 OPF cell
Crimping long wire***	equipment	300	96.0	0.47			
Assembly connect 6 pols**	equipment	250	115.2	0.57			
Assembly safety lock 6 pols	manual	350	82.3	0.41			
Long and big wire length adjusting*	equipment	500	57.6	0.28	143	1.0	1 OPF cell
Assembly safety lock 1 pol	manual	1000	28.8	0.14			
Crimping long and big wire***	equipment	500	57.6	0.28			
Assembly long and big wires**	equipment	500	57.6	0.28			
Molding 6 pols 148/255	machine	1500	19.2	0.09	1500	0.5	
Molding connector 1 pol	machine	750	38.4	0.19	750		
Molding connector 1 pol	machine	750	38.4	0.19	750		
Dismantling short wires	equipment	800	36.0	0.18	70	2.0	1 OPF cell
Cleaning short wires	manual	400	72.0	0.36			
Crimping short wires	equipment	400	72.0	0.36			
Crimping short and big wires	equipment	600	48.0	0.24			
Assembly short wires - 6 pols	manual	350	82.3	0.41			
Shrinking	equipment	850	33.9	0.17			
Leak test	equipment	100	67.0	1.42			
Electrical test	equipment	350	82.3	0.41	350	0.4	
C/T		1498.9					
pcs/8h		19					
Avg order/week		2,000					
Avg order/shift		142					
Calcul op/shift		7.40					

Source: Company's internal documentation

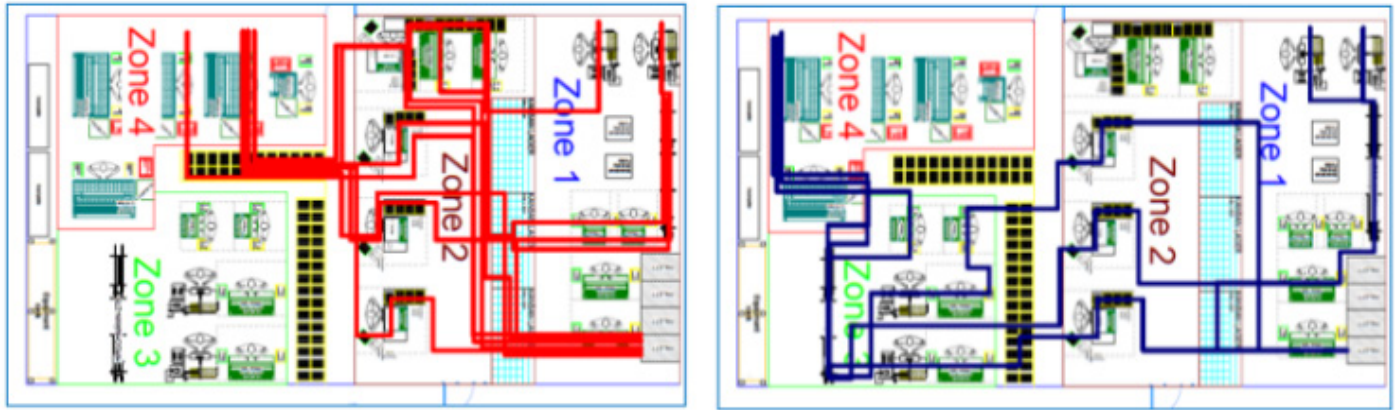
Based on the information available, several areas were identified where the capacity of the equipment was sufficient. As well, the possibility of re-arranging the layout allowed the reconfiguration of the steps and the elimination of several worktables, by placing the equipment on the same table, thus they were implemented 5 OPF cells on the studied pilot line:

1. By merging Splitting wires with Molding;
2. By merging Cleaning long side of the wire with Tube mounting long wire and with Tube molding big wire;
3. By merging 4 process steps: Long wire length adjusting, with Crimping long wire, with Assembly connect and with Assembly safety;
4. By merging 4 process steps: Long and big wire length adjusting, Assembly safety lock 1 pol, Crimping long and big wire and Assembly long and big wires;

5. By merging 7 process steps: Dismantling short wires, Cleaning short wires, Crimping short wires, Crimping short and big wires, Assembly short wires - 6 pols, Shrinking, and Leak test.

In order to correctly integrate the OPF cells within the flow and to reduce the interphase transport as much as possible, the production flow was evaluated using the Spaghetti diagram method. Using the production layout, for a better visualization, the existing routes of the products on the production line were marked, looking within the team for solutions to shorten the routes, by rearranging and or eliminating worktables and by implementing OPF cells (see the last column).

Figure 4. Spaghetti diagram Before & After



Source: Company's internal documentation

Figure 4 presents the routes before and after the implementation of the OPF projects. We can easily notice that the walked distance was reduced, the flow was simplified, which led to the reduction of waste caused by product handling, to increased productivity and shorter production times.

2.4. TIME PLAN AND ROLLOUT

For a good organization of the project and the inclusion of all areas and production lines within the company, a Gantt-type planning was carried out, allocating responsible people and a release deadline. Within the project, 56 areas/lines were evaluated with the objective of optimizing the layout and implementing OPF cells where possible.

Figure 5. OPF cells & Layout optimization planning

Production Area	Production Line	2020										Responsible
		Week 01	W 02	W 03	W 04	W 05	W 06	W 07	W 08	W 09	W 10	
Production 1	1B-Z		c									S.M.
	1B-Z		c									S.M.
	1B-Z		c									S.M.
	1D-Z			o								S.M.
	1E-Z			o								S.M.
	1F-Z			o								S.M.
	1G-Z			o								S.M.
	1H-Z			o								S.M.
	1J-Z			o								S.M.
	1L-Z	c										S.M.
	1M-Z	c										S.M.
Production 4	4A-Z				p							C.D.
	4A-Z	c										C.D.
	4B-Z	c										C.D.
	4C-Z	c										C.D.
	4D-Z	c										C.D.
	4E-Z	c										C.D.
	4G-Z	c										C.D.
	4J-Z	c										C.D.
Production 5	5A-Z							p				S.H.

Source: Company's internal documentation

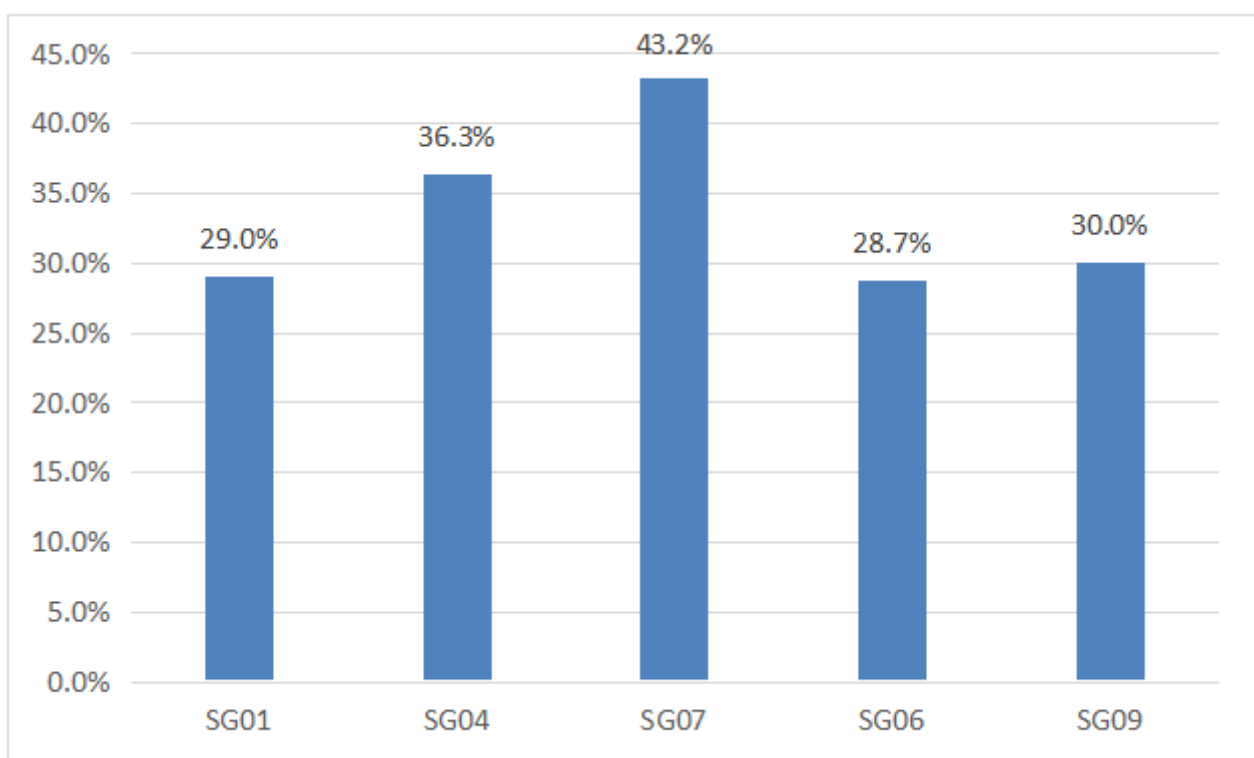
The Layout optimization planning lasted 10 weeks. A responsible has been appointed for each segment of the production area (please see figure 5).

2.5. RESULTS EVALUATION & VALIDATION

In this stage, the obtained results were monitored and evaluated by comparing them with the initial situation. The Controlling Department together with the Lean Department were coordinating this activity by evaluating the following factors: the number of operators on each line before and after optimization, the number of workstations before and after, production output releases before and after, growth potential identified in the framework of the workshops and the actual achievements (out-put) after implementation.

The team calculated productivity increases on each production segment and working stations, from 7% up to 87%. Figure 6 presents the average increase of productivity in each of the segments 01, 04, 07, 06 and 09, which mean 43 working stations.

Figure 6. One-Piece Flow Evaluation Sheet



Source: Company's internal documentation

Besides the productivity increase, the company saved space for other projects and decreased the mobility of the employees, also decreasing the stocks in progress and reducing waste, safety risks, cost rate and production lead-time.

2.6. NEW WORKING STANDARDS MONITORING

In order to ensure continuity in compliance with the new working methods, it was necessary to update the production documentation, through which the work instructions describe the way of working in the OPF cells, and also regulate the level of work in progress stocks. In addition to these aspects, a weekly audit on compliance with work instructions in the OPF cells was implemented.

This last phase ensures continuous monitoring and improvement of the One-Piece flow process, by also looking for opportunities to eliminate waste and improve efficiency. This involves regularly reviewing the production process, collecting feedback from employees, and using data to identify areas for improvement.

Within the studied project, a number of 43 OPF cells were implemented in 15 production lines, as a result of which an average of 33,4 % increase in productivity was reached strictly on these process steps and at the factory level the overall productivity increased by approx. 5%.

Following the layout optimization project and the implementation of OPF cells, a free space was obtained within the production of 3.450 , available space for attracting new projects and additional investments.

Following the improvement activities carried out, a reduction of 0.8% in the Cost Rate in 2021 compared to the previous year was reached. This means, in the event of a salary increase, through the increases in productivity, it would be possible to absorb the salary increases without a negative impact on the financial results of the company.

3.DISCUSSION

As a result of the layout optimization activities and the implementation of the cells, several positive effects were obtained.

An important to mention improvement of the project was the fact that implementing the team work, the shift manager no longer had to manage approximately 40 operators, but only 10 cells and 20 individual operators, the management in the case of cells being at team level and not individual. As well, related to the activities within the team in the OPF cells, it was observed that people with performance problems were much more supported by their colleagues, thus ensuring a high-performance result for the team.

At the beginning of the project, a high reluctance was observed in the employees' behavior, to make changes and be open to understand the benefits of the OPF concept. This is a natural phenomenon, as any new activities or procedures are accepted with reluctance in the first phase, and later, by practicing the new standards, the benefits are identified and the change is accepted.

A distinct element of the case study is the implementation of the calculation tool for identifying the potential for the implementation of OPF cells. The development of this tool was carried out within the project studied and adapted to the given conditions. By applying the described tool, a standard evaluation was obtained within the factory, being able to significantly reduce the project implementation time.

In similar cost rate reduction studies, the increase in performance and the reduction of costs were addressed. In addition to the effects listed in the scientific works, in our case study another element was addressed, too, namely the optimization of the production space. Thus, by reducing the used space, it was possible to release approximately 3,500 , space that in two years was occupied with new projects, in this way increasing the production hours on the same surface, having approximately the same fixed costs, which consisted a significant gain for the production company.

The company realized that their old /classic way of working brought several disadvantages, such us:

- High level of work in progress;
- Excessive handling of stock between workstations;
- Additional handling of the product at each workstation;
- By handling the stock, there is a higher risk of damage;
- Higher probability of having serial defects in high quantities;
- More space used in the production area;
- Static, non-ergonomic working mode of the operator;
- The work carried out is not team-based, the workstations and phases are individual;
- Increase number of safety incidents etc.

4.CONCLUSIONS

Blending one-piece flow and layout optimization in automotive industry has shown in our case study an average growth of 33,4 % in employees' productivity, by also freeing up a space of 3.450 m². The distance traveled by the operators was significantly reduced. Moving waste lead to a reduction of waste caused by product handling, to increased productivity and shorter production times.

The OPF production method is an instrument that simplifies the way of working, eliminates manipulations and unnecessary movements, obtaining a much clearer and easier to manage production flow. Through the very low interphase stocks, a very short feedback loop between operators was obtained, so in the case of any identified quality problem, feedback to the upstream personnel is possible to be obtained immediately, resulting in an improvement in quality and productivity as effects of this new way of working.

The calculation tool developed within the project can be adapted and used in any production area, helping to evaluate and implement OPF cells.

An important element revealed in the study refers to the six-step implementation concept that helps the efficient development of the project and ensures continuity through continuous improvement activities.

In future we intend to deepen the research by measuring the long-term impact of OPF cells on productivity.

5.ACKNOWLEDGEMENT

We are very grateful to Manuela Rozalia GABOR, our professor, coordinator and colleague, for her invaluable patience and feedback. We also could not have undertaken this journey without the members from the Lean and Technology team, who generously provided knowledge and expertise.

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LEGAL STATUS AND PECULIARITIES OF TAXATION OF E-RESIDENTS IN UKRAINE

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Received 24.03.2023.

| Send to review 03.04.2023.

| Accepted 14.06.2023.

Original Article



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JEL Classification:

K16, K23, K25, K34

Doi: 10.61432/CPNE0101244p

UDK: 355.4:338.14]:339.545(477)

ABSTRACT

Even in times of war, Ukraine is introducing new, unconventional ways of doing business. The article will deal with one of them, namely doing business in Ukraine without the physical presence of the entrepreneur, i. e. by a so-called e-resident. The Ukrainian government expects to attract a wider range of foreign entrepreneurs in this way. First of all, foreign IT-specialists may act in this capacity. Certainly, such a way of doing business is best suited to such crisis stages in the state's history as an armed conflict or a pandemic. The legal regulation of the status and peculiarities of taxation of e-residents appeared in Ukrainian legislation only at the end of 2022, so the practice of its application is small and certainly may cause some problems, for example in the area of double taxation. However, the results of the study of the specifics of legal regulation of these aspects in Ukraine may provide a basis for understanding new approaches that can be used for the international organisation of work of small entrepreneurs, who are the most affected by economic crises.

Keywords: *e-resident, taxation of e-residents, avoidance of double taxation, small entrepreneurs*

1. INTRODUCTION

One of the consequences of the Russian-Ukrainian war will indisputably be a complete change in the directions of development of quite a few areas of social relations, the most obvious one occurring in international relations. After all, as early as now already we can follow the process of China transforming into a separate, powerful pole of global political influence, with total simultaneous negation of Russia's authority both in the world overall and in the Eurasian region in particular; and this, of course, will significantly affect the global balance of geopolitical forces in the near future.

Undoubtedly, the international law will also be subject to significant reforms, because Russia's audacious violation of its basic principles, despite its status as a permanent member of the UN Security Council, puts a yet stronger emphasis on the inefficiency of a number of the leading universal and regional international organizations (UN, OSCE, Council of Europe etc.) in peace maintenance, as well as on the invalidity of provisions of its specific areas like the law of international responsibility. This, in turn, has prompted and continues to prompt the forward-looking countries of the world to get to large-scale restrictive measures (economic sanctions) aimed at forcing Russia to stop its internationally illegal behavior, which, however, go against the liberalization course established in international economic law and do not contribute to the sustainable development of the world as a whole. Therefore, we are standing on the threshold of global reforms of international legal regulation of specific areas of interstate relations, which should introduce effective tools for prevention and avoidance of violations of the basic principles and norms of international law in future.

Against the background of these geopolitical, geoeconomic and international law developments, the Russian-Ukrainian war is also opening new horizons in applying information technologies. Yet, it is not only the defense industry or military operations, but also using these technologies in civilian areas. For example, “Diia” uniform state web portal of electronic services introduced in Ukraine in 2019, which also operates as a mobile application, has made it possible for many citizens of Ukraine who lost their identity documents as a result of Russia’s military aggression to confirm their citizenship and taxpayer ID, get the status of internally displaced persons and apply for the appropriate payments and benefits, submit information about the damaged/destroyed property, etc. Furthermore, after the Ukrainian armed forces achieved significant advantages at the front line, the parliament and the government began to develop measures aimed at strengthening the national economy, and information technologies, which, for example, help create new opportunities to attract foreign investment, have turned out to be invaluable for achieving these goals during the war.

On 06.10.2022, the Verkhovna Rada of Ukraine adopted Law of Ukraine No. 2654-IX “On Amendments to the Tax Code of Ukraine and to Some Other Laws of Ukraine Regarding the Peculiarities of Taxation of Business of Electronic Residents” (hereinafter, “Law No. 2654-IX”), which entered into force on 01.04.2023. This law has been developed to implement the pre-war initiatives of the Cabinet of Ministers of Ukraine, namely its Resolution “On implementing an experimental project on the introduction and implementation of electronic residency in Ukraine” dated 25.06.2020, and, as we can see, the war has not hampered this process. It should be mentioned right away that Europe has already the experience of introducing electronic residency (hereinafter, “e-residency”), which can be well used by Ukraine. We are talking, for example, about the experience of Estonia in this area, which specific legislative acts were amended back in 2009 to initiate legal regulation of the status and operations of electronic residents in the state; and, by the way, according to the Estonian official web resource, on which e-residency is administered, “Estonia has become the first country to offer e-residency starting from 2014. It remains the most popular program of its kind for ambitious entrepreneurs”(<https://www.e-resident.gov.ee/>). As a result, from December 2014 to April 2023, Estonia has witnessed registration of 101,372 electronic residents who subsequently founded 25,591 Estonian companies (<https://www.e-resident.gov.ee/dashboard>).

The disclosure of peculiarities of the legal regulation of electronic residents (hereinafter, “e-residents”) in Ukraine in comparison with the relevant experience of Estonia will allow making valuable conclusions about the ways of introducing this form of doing business and of overcoming the problems that arise along the journey, which can be further used by other world countries.

2.METHODS

In the course of the research, the following methods were used: the method of analysis (when identifying individual segments (specific questions) of the subject of research, namely: the goals of introducing e-residency; areas of the economy in which e-residency can be used; procedures for acquiring the legal status of an e-resident; system taxation of e-residents); methods of analysis and comparative jurisprudence (when studying the legislation of Ukraine and Estonia, which regulates the legal status and taxation system of e-residents); critical method (when assessing the advantages and disadvantages of e-residency organization in Ukraine and Estonia).

3.RESULTS

The difference between the Ukrainian and Estonian approaches to the legal regulation of e-residency is first of all seen from the legislative acts that enshrine this legal regulation. In both cases, involved are the laws related to finance and taxation. However, in Estonia, the e-resident status fundamentals are laid down in the Identity Documents Act 1999, while in Ukraine, the main part of them is contained in the Tax Code of Ukraine of 2010 (hereinafter, the “TCU”), i.e. it is the TCU that defines the qualities people should possess to become e-residents, outlines the general rules for acquiring and losing the e-resident status, and, of course, describes the specifics of taxation. Although, in our opinion, the grounds and procedure for obtaining and losing the e-resident status, that is, the provisions of Art. 70¹ TCU, could be included in Law of Ukraine “On State Registration of Legal Entities, Individual Entrepreneurs and Public Organisations”. This approach of Ukraine gives grounds

for the conclusion that the Ukrainian law-maker was considering e-residency mainly as one of the sources to contribute to the state budget. While the Estonian law-maker clearly followed the legislative technique and placed the regulation of various issues of the e-residency status and operations among them, according to the subject they regulate.

To understand the essence of any law initiative, it is also vitally important to understand the goals of its implementation. The goals of introducing e-residency in Ukraine were outlined in the Explanatory Note to the Draft Law of Ukraine “On Amendments to the Tax Code of Ukraine and to Some Other Laws of Ukraine Regarding the Peculiarities of Taxation of Business of Electronic Residents” made by the bill promoters, namely several people’s deputies of Ukraine, on 22.03.2021 (hereinafter, the “Explanatory Note”). According to this Explanatory Note, e-residency “will have a positive effect on the state’s investment climate overall, will trigger the activation and further development of the national economy, will stimulate the increase in the gross domestic product and inflows to the state budget, etc.”. So, conditionally, these goals can be divided into those aimed at improving the national investment climate (because doing business with no individual’s physical presence required in the state is a comfortable form of entrepreneurship not only during war, but also in the environment of volatile international economic relations) and the ones intended to improve Ukraine’s economic performance (which will primarily be achieved through payment of taxes by e-residents).

Alongside, we should emphasize that in Estonia, the goals of introducing e-residency are, first, enshrined at the statutory level, namely in the already mentioned Identity Documents Act, and, second, they are somewhat broader than simply attracting investments and, in particular, include stimulating the development of the economy, science, education or culture of Estonia by creating the possibility of using electronic services with an Estonian digital document (Part 2 of Article 20⁵ of the Identity Documents Act). It should be added that the above-mentioned goals are not declarative and have legal nature, i.e. the e-resident status may be denied if its obtaining does not pursue the achievement of these goals, the issued document being declared invalid for the same reasons (Part 3-4 of Article 20⁶ of the Identity Documents Act).

Speaking again about Ukraine, we should touch upon the question of economic sectors to which e-residents were expected to be attracted. Some clarifications on this issue have been provided in the Explanatory Note. According to them, the area of e-residency application was primarily the IT business done by those representing the developing countries or the states with an unstable political situation. The choice of this economy segment is obvious given a high demand for Ukrainian IT specialists in this market. Furthermore, according to Yulia Svyrydenko, First Vice Prime Minister of Ukraine – Minister of Economy of Ukraine, “the IT sector has suffered the least losses from the war – it has kept 95% of its contract volumes, i.e. they have adapted successfully to the extremely difficult ongoing conditions. The investments will allow us to move from IT outsourcing to product development. This will increase capitalization and make the information technology sector even more competitive on world markets”(Svyrydenko, Y. 2022).

At the same time, it still remains unclear to us why the Explanatory Note offers so much narrowed geography of attracting e-residents only from developing countries and the states with an unstable political situation, especially if we take into account the lack of clear criteria for assigning states to the last group? If we take as a basis for understanding this concept the approaches used by The Fund for Peace in determining The Fragile States Index, the top places in this ranking are traditionally occupied by economically weak states with permanent civil and armed conflicts on their territory, such as Somalia, Sudan, South Sudan, Afghanistan, Yemen, Congo, Syria, South Africa, Chad, Haiti, etc. (<https://fragilestatesindex.org/>), and it is unlikely that entrepreneurs from these countries will be able to make a significant contribution to the development of Ukraine’s economy. Any bona fide entrepreneurs who do not plan to abuse their position and commit financial crimes are important for Ukraine, regardless of the political and economic system of the state with which they are connected, unless of course it’s Russia. It’s good that this approach that has been presented in Law No. 2654-IX, which among other aims to prevent the involvement of e-residency in committing such serious financial crimes as money laundering, financing of terrorism and proliferation of weapons of mass destruction. Therefore, eligible for e-residency are only 18-year-old foreign individuals who have

no citizenship or residency of: a state recognized as the aggressor state and/or the occupying power in relation to Ukraine; a state included in FATF's "black" and "gray" lists and a state classified by the European Commission as one of the countries with weak regimes for preventing and combating the legalization (laundering) of proceeds of crime, the financing of terrorism, and the financing of proliferation of weapons of mass destruction (Article 70^{1.2} of the TCU). It is important to note that FATF's "black" list currently includes the Democratic People's Republic of Korea, Iran and Myanmar (<https://www.fatf-gafi.org/en/countries/black-and-grey-lists.html>), each, by the way, being easily classified as a state with an unstable political situation. FATF's "gray list" is more extensive, and in 2023 it included: Albania, Barbados, Burkina Faso, Gibraltar, Haiti, Democratic Republic of the Congo, Yemen, Jordan, Cayman Islands, Mali, Mozambique, Nigeria, United Arab Emirates, Panama, South African Republic, South Sudan, Senegal, Syria, Tanzania, Turkey, Uganda, the Philippines, Jamaica (<https://www.fatf-gafi.org/en/countries/black-and-grey-lists.html>). So, as we can see, these lists include, among other, the developing countries whose citizens and residents were considered by the Explanatory Note developers as applicants for e-residency in Ukraine. At the same time, it is worth noting that citizens and residents of such countries as Turkey, the United Arab Emirates, and the Republic of South Africa will not be able to acquire e-resident status in Ukraine, since the listed countries are included in the "gray list" of the FATF. However, these states, although according to the ratings of a number of international financial organizations (for example, the IMF (<https://www.imf.org/ru/Publications/WEO/Issues/2023/04/11/world-economic-outlook-april-2023#Projections>), and are considered developing countries, at the same time, according to UN data, they are states with a very high human development index (Turkey, UAE) and states with a high human development index (South Africa) (https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22pdf_1.pdf), which indicates their significant economic potential. Thus, citizens and residents of these states will implement their entrepreneurial initiatives in Estonia. It is also worth noting separately that the inclusion of a state that is not currently included in these lists will lead to the cancellation of the e-resident status of a person related to this state in Ukraine (Article 70^{1.4} of the TCU).

It should be stressed that Estonia does not single out the involvement of individuals in committing the above-mentioned financial crimes as a separate reason for e-resident status denial or cancellation. The Estonian law-maker has described these reasons more generally: a threat to public order or national security, an intention to engage in prohibited business operations, etc. At the same time, since March 2022, citizens of Russia and Belarus are no longer able to obtain e-resident status in Estonia, as this method of doing business can be used to arrange the financing of Russia's armed aggression against Ukraine or circumvent the economic sanctions introduced by the European Union (<https://www.politsei.ee/en/>), and the adoption of this measure has been legally allowed by Part 3-4 of Article 20⁶ of the Identity Documents Act.

Also, we should remember that for Estonia, as a member of the European Union, binding is Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC. It is this Directive that the European Commission refers to when making a list of third countries with a high degree of risk that have strategic deficiencies in their regimes for combating money laundering and terrorist financing, which was described in Article 70^{1.2} of the TCU. At the end of 2022, this list was updated by the European Commission, and among other it includes: Afghanistan, Barbados, Burkina Faso, Cambodia, Cayman Islands, Democratic Republic of the Congo, Democratic People's Republic of Korea, Gibraltar, Haiti, Iran, Jamaica, Jordan, Mali, Morocco, Mozambique, Myanmar, Panama, the Philippines, Senegal, South Sudan, Syria, Tanzania, Trinidad and Tobago, Uganda, United Arab Emirates, Vanuatu, Yemen. However, it should be noted that according to Directive (EU) 2015/849, in case with the individuals related to these states and intending to do business in the Union, the EU member states are solely required to carry out enhanced financial checks of these individuals, and this approach is presented in the Money Laundering and Terrorist Financing Prevention Act 2017, in particular para. 3 of Part 1 § 31, which concerns e-residents.

In our opinion, the Estonian approach to qualifying the individuals as eligible for e-resident status is more flexible than the Ukrainian one, since the latter completely cuts off the possibility for bona fide entrepreneurs from the states included in FATF's "gray list" or European Commission's list to be involved in doing business in Ukraine. Also, the popularization of Ukrainian e-residency will be undermined by the possibility of losing the e-resident status if a state gets included in the lists of FATF or European Commission, even if the entrepreneurs who belong to this state and have become e-residents of Ukraine fulfill all their duties and do their business transparently and in good faith. In connection with the above, we should note that in Estonia, e-residents from Russia and Belarus who had got this status before 2022 did not automatically lose it, and they could extend their status in future. Additionally, in Estonia, 3,883 citizens of Turkey were registered as e-residents who founded 1,453 companies; 258 citizens of Syria became e-residents of Estonia and founded 48 companies; 20 citizens of the United Arab Emirates acquired e-resident status there and founded 1 company. Even 992 citizens of Iran got registered in Estonia as e-residents and created 329 companies (); however, Ukraine, during the war, should have increased protection measures in place to cut off any possibility of being involved in financing Russia's military aggression, and as such, any cooperation is excluded with Iran, which supplies weapons, in particular "Shahed" drones, to the aggressor state, as well as as with Syria, and with Iranian and Syrian citizens.

At the same time, Ukraine should study the geography of individuals who have acquired the e-resident status in Estonia, to better understand the circle of states whose entrepreneurs may show interest in this method of doing business. It is also important to develop measures to attract businessmen from a wider range of countries. Now, the top ten countries whose citizens have acquired the e-resident status in Estonia are as follows: Ukraine, Germany, Russia, Finland, China, Spain, United Kingdom, France, India, Italy (<https://www.e-resident.gov.ee/dashboard>). It is significant that, in addition to European states, this list includes such economically powerful countries as India and China, and their potential gives hope that citizens of these countries will be interested in the e-resident status to be granted in Ukraine.

Back to the economic sectors to which e-residents may be attracted, it should be mentioned that the Ukrainian Explanatory Note promoters were going to "link" this method of doing business to IT, and in particular to provide that an e-resident could only carry out the following types of economic activity: publishing of computer games; publishing of other software; computer programming; other activities in the area of information technology and computer systems; data processing, posting of information on web sites and related activities. However, this idea has not been implemented in Law No. 2654-IX, and thus the scope of the e-resident's entrepreneurial initiative is not so strictly limited. Based on subpara. 3 of para. 291.4 of Article 291 of the TCU, e-residents registered in Ukraine may carry out economic activities in the provision of services, manufacture and/or sale of goods, however, this should be done solely in favor of non-residents of Ukraine.

The experience of Estonia, in its turn, shows that the IT sector is indeed a leader in the implementation of entrepreneurial initiatives by e-residents: 6,878 Estonian companies founded by e-residents work in computer programming, consultancy and related activities. However, the second place is taken by activities of head offices; management consultancy activities. The following industries are also popular: Retail and Wholesale trade, except motor vehicles and motorcycles; Information service activities; Publishing activities; Financial service activities, except insurance and pension funding, etc. (<https://www.e-resident.gov.ee/dashboard>)

However, the legislation of Ukraine has a number of provisions that restrict considerably the areas in which the prospective e-residents can implement their entrepreneurial initiative. The analysis of Law No. 2654-IX allows a conclusion that e-residents will be able to register in Ukraine only as individual entrepreneurs, payers of a single tax (which is 5% of income) and will be required to do their business solely in favor of non-residents of Ukraine. Their income should not exceed 1,167 times the minimum wage amount (which is about UAH 8 million, or approximately EUR 200,000); in case of the exceeded income amount, the tax rate is to increase to 15% of the excess amount, with the additional obligation to pay all other taxes and fees provided for by the TCU. At the same time, e-residents cannot use the labor of hired individuals – citizens or residents of Ukraine, nor can they

receive income with the source of origin from Ukraine (other than passive income). E-residents may open a current account in one bank using the dedicated electronic system called “E-resident”, which is part of the “Diia” uniform state web portal of electronic services; the bank should be chosen from the list offered by this system. This bank will act as the e-resident’s tax agent, i.e. will be obliged to withhold the applicable tax when the money is credited to the account, as well as transfer this tax to the state budget no later than within the subsequent two working days.

The system of registration of an individual as an e-resident is expected to be as simple as possible. To get the status, an individual will be required to submit an application form signed by a qualified electronic signature through the “E-resident” electronic system, and after that, the individual will be registered as an individual entrepreneur in the Unified State Register of Legal Entities, Individual Entrepreneurs and Public Organizations. Prospective e-residents will use their passports for traveling abroad as their identity documents (Part 8 of Article 14 of the Law of Ukraine “On State Registration of Legal Entities, Individual Entrepreneurs and Public Organisations”). The submission of this application form will be considered equivalent to personal submission to the tax authority of the individual taxpayer ID card and application form for registration in the State Register of Individual Taxpayers (Article 70.5 of the TCU). Still, it should be noted that the Ministry of Justice of Ukraine and the Ministry of Digital Transformation of Ukraine should better regulate the procedure for submitting such an application form and address a number of procedural issues; yet, it is clear that the registration process will be prompt enough.

So, it is clear that the e-resident status only implies small entrepreneur business, which e-residents are to do independently and at the same time with the least possible physical connection with Ukraine. A bank account and paid taxes will be nearly the only “material” sign of the e-resident’s presence in Ukraine. Therefore, in our opinion, the main thing that can encourage foreigners to this way of doing their business is the tax amount and simplicity of its payment. Ukraine, in its turn, should take measures to popularize e-residency so that this method of doing business gets widespread and brings significant income to the state budget. After all, the tax, which maximum amount can be around EUR 10,000, will not cover the needs of such a large country as Ukraine, which is also anticipating its post-war recovery.

At the same time, e-residents in Estonia may organize larger forms of entrepreneurship, because they are granted the right to establish a company. Although, according to the official data of the website of Estonia dedicated to e-residents, “The majority of companies established by e-residents have 1-2 employees. Quite often these companies are “one-person companies”, where an e-resident is the single shareholder and the only director/management board member ... By far the most commonly used form of business and most likely the most suitable for e-residents is a private limited company” (<https://www.e-resident.gov.ee/>). Especially that according to the Estonian Commercial Code (hereinafter, the “CC”), such companies can also be founded by one individual (§ 137 of the CC), and in this case the incorporation agreement is replaced by a notarized foundation decision signed by the founder (Part 5, § 138 of the CC), however, the articles of association and the authorized capital are required to be in place. That is, in case of sole foundation of a private limited company, e-residents are still required to make constituent documents; the difference is that these documents are simpler (i.e. a decision instead of an agreement). According to the Estonian Commercial Code, “A private limited company is a company which has share capital divided into private limited company shares. A shareholder shall not be personally liable for the obligations of the private limited company. A private limited company shall be liable for performance of its obligations with all of its assets” (§ 135 of the CC).

Therefore, an individual who intends to get e-residency in Estonia should first register as an e-resident and then register their company. Integral to the e-resident status acquiring process in this country is getting an e-resident card, which is not virtual but rather issued physically. We consider it to be a significant weakness compared to the procedure for obtaining e-resident status in Ukraine, which takes place online only.

Individuals who intend to become e-residents of Estonia, after they have done a number of administrative actions online, should get a special card at one of the service centers located in various

Estonian cities or at the Estonian diplomatic mission offices abroad. So, the advantage is that an individual does not necessarily have to go to Estonia, but the disadvantage is that this card can only be obtained in 45 Estonian diplomatic mission offices (<https://www.e-resident.gov.ee/pick-up-locations/>); for example, in South America, such mission office is only available in Brazil; in Africa, it can only be found in Egypt and in the South African Republic. But, say, Indonesia, which is the country with powerful economic potential and a huge territory, does not have a diplomatic mission of Estonia at all; no Estonian diplomatic mission in Israel, too. There are also not many diplomatic missions of Estonia in Arab countries. As such, say, a citizen of Chile, in order to become an e-resident of Estonia and establish a company there, should have a flight to Brazil and comply with the Brazil entry requirements, i.e. do additional administrative actions and incur additional costs. We believe that it does not contribute to the popularization of this way of doing business. Although, the opportunity to establish a company in a member state of the European Union and receive all the related benefits is probably worth the candle.

Because e-residents establish companies in Estonia, the system of taxation of their business differs considerably from the one introduced in Ukraine, namely: it is more variable and, accordingly, the tax amounts depend on quite a few factors like incorporation form and place of company management. Thus, in Estonia, the tax status of an individual who has acquired the status of e-resident and the company created by him is split. The individual who is an e-resident pays taxes in the state in which he is a tax resident; in Estonia, she is not a tax resident, in particular, because citizens of Estonia, as well as foreigners who received a residence permit in Estonia or applied for one, cannot acquire the status of e-resident (Part 2, § 20⁵ of the Identity Documents Act 1999). Instead, a company created by an e-resident is a tax resident of Estonia, and must pay, first of all, income tax, the usual amount of which is 20% (Part 1 of § 4 of the Income Tax Act 1999 (ITA)), however, under certain conditions provided by this law, in particular, §§ 50, 50¹, etc., may be significantly reduced (up to 14%) or not at all charge; Chapter 6 of the ITA also provides for the possibility of deducting certain amounts from taxable income.

It is clear that for an e-resident, the issue of taxation of dividends to be paid to him by the company he created is of great interest. This issue is regulated, first of all, by § 50 of the ITA, according to which dividends or other profits are subject to taxation at the time of their payment in monetary or non-monetary forms, and therefore the profit reinvested in the company is not subject to tax and this circumstance is assessed by experts as a significant advantage, which promotes the development of entrepreneurship (Liivamägi, E. 2017). In addition, the said Article 50 of the ITA provides for numerous cases of non-payment of tax. Additionally, according to § 50¹ of the ITA, the profit distributed in a calendar year, which is smaller than or equal to the average distributed profit of the previous three calendar years on which a resident company has paid income tax shall be subject to taxation at the rate 14 %. Along with this, the Estonian legislator provides measures aimed at preventing tax evasion, in particular, a resident company shall pay income tax on a loan granted to a shareholder, partner or member of the company if the circumstances of the transaction refer that this may constitute a hidden profit distribution (§ 50² ITA).

Goods and services that will be sold by a company created by an e-resident will be subject to such an indirect tax as value-added tax (VAT) according to the Value-Added Tax Act 2003 (VATA) (<https://www.riigiteataja.ee/en/eli/531082022001/consolide>) in the amount of 20% of the taxable value, however, numerous exceptions are provided here, when the tax rate can be reduced to 9%, 5% or 0% (§ 15 VATA), or goods and services will be exempt from taxation altogether (§§ 16-18 VATA). In particular, it is of undoubted interest for companies created by e-residents that the VAT rate for the sale of books and educational literature in electronic form is 9% of their taxable value (Clause 1, Part 2, § 15 VATA). In turn, the VAT rate of 5% of the taxable value applies to printed publications in electronic form, which can also be an interesting business for e-residents (clause 2¹ § 15 VATA). Of course, preferential VAT rates are provided for goods and services sold within the European Union according to Directive 2006/112/EC on the common system of value added tax.

Excise duties on Alcohol, Tobacco, Fuel and Electricity may also be charged as indirect taxes from e-resident companies in accordance with the Alcohol, Tobacco, Fuel and Electricity Excise Duty Act

2003 and Packaging according to the Packaging Excise Duty Act 1998, if these companies will deal with their implementation.

If a company founded by an e-resident will invite employees to work, it, according to the Social Tax Act 2002 (STA) must pay a social tax, the amount of which is 33% of the wages and other benefits paid to each employee (Part 1 § 7 STA). In certain cases, this rate can be reduced to 20% and 13%, but this mainly applies to public employees institutions, legal entities under public law and crew members of sea vessels, as well as those payments made in connection with unemployment (Part 2¹-4 § 7 STA). The paid social tax is divided into pension insurance and state health insurance.

Together with the social tax, an unemployment insurance premium in the amount of 0.5 to 2.8% of the employee's salary and in the amount of 0.25 to 1.4% of the wage fund must be paid (§§ 40, 41, 42 Unemployment Insurance Act 2002 (UIA)). Unemployment insurance premium rates are set by the Government of Estonia once every four years (Part 3, 4 § 41 UIA).

If the activities of the company founded by the e-resident will be related to the use of natural resources, namely: their extraction from the natural state, emissions of pollutants into the environment, placement of waste (for which an appropriate permit should be obtained), then it must pay environmental charges according to Environmental Charges Act 2006.

In Estonia, there is also a Land tax, the amount and payment rules of which are regulated by the Land Tax Act 1993. However, a company founded by an e-resident will have to pay it only if it acquires ownership of the land, because according to the Land Tax Act 1993, only the owners of the land, with some specific exceptions provided for in Article 10 of this law, are Land tax payers.

Depending on the type of business activity of the company established by the e-resident, it may also be obliged to pay Gambling Tax, according to the Gambling Tax Act 2010, Heavy Goods Vehicles Tax, according to the Heavy Goods Vehicles Tax Act 2003 and customs duty, according to the requirements of EU law.

It should be added that e-residents registered in Estonia sometimes also choose sole proprietorship as a form of organization of their business, at least 173 sole proprietors were registered in this capacity (Havam, H. 2022). However, due to the complexity of the tax system and high tax rates, this form of business organization is not ideal for e-residents, even according to the Estonian state executive authorities (Havam, H. 2022; <https://learn.e-resident.gov.ee/hc/en-us/articles/360001388857-Is-e-Residency-a-good-solution-for-me>). A sole proprietor must pay almost all the same taxes as legal entities registered in Estonia (except unemployment insurance premium for himself (Part 2 § 3 UIA)). That is, for them, for example, Income Tax will be the same size as for companies and will be 20%, Social Tax will also be deducted from the company's profit, but on the amount not less than the 12-fold monthly rate, which is established in the state budget for a budgetary year, with some exceptions, but not more than ten times the sum of the minimum monthly wages for the taxable period (clause 5 part 1, part 5 § 2, § 21 STA), etc. For our part, we would like to add that individual entrepreneurship: provides opportunities for organizing and running only a small business; according to § 78 CC, an individual entrepreneur is liable for his obligations with all his property, which is a significant disadvantage compared to a private limited company, which is liable for obligations with all his property, and not with all the property of its members (§ 135 CC); An e-resident registered as an individual entrepreneur automatically becomes a tax resident of two states: the state of citizenship or permanent residence of the e-resident and Estonia.

4.DISCUSSION

In order to increase the interest of foreign citizens in the e-resident status, the state offering such status should take measures to avoid double taxation by concluding relevant international treaties. It should be noted that in Estonia, due to the need for an e-resident to establish another private legal entity, namely a company, the tax status of the e-resident and the company is split: the former is not a tax resident of Estonia, while the company established by him/her has such status. As a result, the e-resident pays taxes in the country where he is a tax resident, while the company he establishes must pay taxes in Estonia. It is clear that this situation may result in the company's profits being taxed in several countries, and therefore international double taxation treaties play an important role for Es-

tonia, allowing it not to pay taxes in one country if they are paid in another or to pay them in the part that was not covered by the tax paid in another country. Thus, according to the official website of the Ministry of Finance of the Republic of Estonia, this country has concluded bilateral international treaties for the avoidance of double taxation with 62 countries, including Ukraine (<https://www.fin.ee/en/double-taxation-agreements>). And E. Liivamägi, Head of the Tax Department at the Estonian Tax and Customs Board, described the range of states with which such agreements were concluded as follows: “all EU member states and most OECD member states, as well as key countries where e-Residency is growing the fastest such as Ukraine and Turkey” (Liivamägi, E. 2017).

The established system of avoiding double taxation, regulated by the TCU and 72 relevant international treaties (https://mof.gov.ua/uk/international_agreements_of_ukraine_on_avoidance_double_taxation-543), will contribute to the development of e-residency in Ukraine as well. However, due to the fact that e-residents and their businesses are not physically present in the country, and that they are not tax residents of Ukraine under the TCU, there is a debatable question of whether the relevant international treaties should apply to these entities and the single tax they pay. The answer to this question is best given on the example of a particular international treaty on the avoidance of double taxation, for example, the Convention between the Government of Ukraine and the Government of the Republic of Estonia for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with respect to Taxes on Income and on Capital of 1996.

Thus, when it comes to the range of entities covered by such international treaties, they usually provide their own definition of a resident. In particular, according to the said Convention, a resident of a Contracting State is a person who, in accordance with its legislation, is subject to taxation therein on the basis of residence, domicile, place of management, place of registration or other similar criterion. Moreover, if an individual is a resident of both contracting states, he or she is considered a resident of the state where he or she has a permanent residence. Thus, an individual who is permanently resident in Estonia and has an e-resident status in Ukraine and pays taxes here will still be considered a resident of Estonia. If we talk about the subject matter covered by the Convention, i.e. taxes, it refers to taxes on income and property. In Ukraine, this includes, in particular, corporate income tax, and, as you know, the single tax includes such a tax. In addition, the Convention shall also apply to any identical or substantially similar taxes that will be levied by a Contracting State after the date of signature of the Convention, in addition to or instead of existing taxes. Therefore, we believe that international treaties on the avoidance of double taxation may apply to e-residents who have obtained such status in Ukraine, but the state needs to establish an online procedure for issuing certificates of payment of such taxes in Ukraine to these entities.

It should be noted that double taxation is not the only issue that should be addressed by the Government of Ukraine to attract e-residents. In our view, discussions may arise regarding their perception as foreign investors and the extension of international treaties on mutual protection of investments to them. As is well known, these international treaties are concluded on a bilateral basis to ensure a favourable investment climate for investors of the participating states and each of them contains its own package of privileges granted to the respective investors. The most important privileges include protection from nationalisation; compensation for losses incurred by foreign investors in the event of war, armed conflict, etc.; and the right to transfer funds to the country of residence without hindrance. It is clear that e-residents cannot be considered foreign investors, as they do not invest in the Ukrainian economy, however, they may also be interested in the privileges granted to foreign investors and Ukraine should provide them with at least the right to transfer funds to their country of residence without hindrance.

Undoubtedly, further practice will reveal many more problems in the status and activities of e-residents registered in Ukraine, which will need to be resolved quickly. For now, the state needs to focus on solving common problems, such as increasing trust in the judiciary, overcoming corruption, ensuring a stable Internet connection and reliable storage of personal data. With regard to the latter issue, it is imperative to study the experience of Estonia. By the way, Estonia is constantly concerned about this problem, but there are still problems in this area, as written, for example, by A. Rull, T. Kerikmäe (Rull & Kerikmäe, 2016).

5. CONCLUSION

Thus, e-residency is a new way for a foreign citizen to organise a business that requires a minimum physical presence in the country where he or she intends to implement his or her business initiative. The experience of Ukraine and Estonia shows that the introduction of e-residency may be subject to different algorithms, the specifics of which will be determined by a number of factors. In particular, the level of complexity of the procedure for obtaining e-residency status depends on the volume and capacity of the business that the state will allow them to organise: the more powerful the business, the more formalities the e-resident will have to complete. For example, the fact that in Estonia an e-resident can only implement his or her entrepreneurial initiative by establishing a company results in a more complicated procedure for obtaining such status, which, in addition to online actions, also requires obtaining a special e-resident card from the Estonian state authorities or its diplomatic missions and, subsequently, taking a number of steps to establish a company. In Ukraine, however, the procedure for obtaining e-residency status is quite simple and can be completed entirely online, as persons with this status will be able to engage in small businesses that will generate small profits. By the way, the online procedure for registering an e-resident and paying taxes allows us to overcome such a traditional problem for Ukraine as corruption.

When assessing the various procedures for obtaining e-residency status, it should also be noted that today's realities impose new restrictions on the freedom of entrepreneurship. Modern states, assuming international legal obligations to combat money laundering and the financing of international terrorism, are taking enhanced measures to verify that a future e-resident is not involved in the commission of these financial crimes, which, of course, complicates the procedure for obtaining such status. In addition, due to the Russian-Ukrainian war and economic sanctions imposed by many countries against Russia, Ukraine and Estonia are taking measures to prevent citizens of the aggressor state from entering their economies. In turn, states that offer foreign citizens to obtain e-residency status must provide them with a secure business environment, including, above all, reliable protection of their personal data.

Therefore, if an individual wants to organize a business without going through additional procedures related to the registration of a private enterprise or the creation of a legal entity, it is appropriate for him to register as an e-resident in Ukraine. This will make it possible to open a bank account in Ukraine, through which she will be able to conduct those financial transactions that will be related to her business activities, as well as pay a small tax in Ukraine. This way of organizing business will certainly not create prerequisites for setting up a medium- or large-scale production of goods or provision of services; it is more suitable for small business, for freelancers. In addition, the rather inflexible system of combating money laundering and the financing of international terrorism introduced in Ukraine may lead to the fact that an honest person will be denied the status of e-resident in the territory of Ukraine.

The e-residency registration procedure in Estonia is more complicated and lengthy, compared to the procedure introduced in Ukraine, as it requires the physical receipt of a special card certifying the e-resident status. In addition, an e-resident cannot independently engage in business activities in Estonia. To do this, he must either acquire the status of an independent entrepreneur, or create a legal entity, which entails the obligation to pay numerous taxes, the amount of which is significantly different from those introduced in Ukraine for e-residents. These physical and material costs are justified by the fact that an e-resident can organize any business in terms of turnover: from small to large; the companies created by him can hire employees, take loans from the bank and, most importantly, enjoy the advantages that are provided to companies registered in the EU member states within the framework of the freedom of movement of goods, services, and capital.

At the same time, the introduction by Ukraine and Estonia of different algorithms for obtaining e-resident status has undoubted advantages, since the states will not compete with each other in attracting potential acquirers of this status.

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