SCIENTIA FRUCTUOSA

Scientific journal

Established: 1998

№ 1 (159) 2025

To October 2000 had been published under the title"Herald of Kyiv State University of Trade and Economics"
To February 2022 had been published under the title"Herald of Kyiv National University of Trade and Economics"
From March 2022 it will be published under the title "Scientia fructuosa"
It is published six times a year

The journal is recognized by the Ministry of Education and Science of Ukraine as the professional edition in economic sciences of Category "B"

Founder, edition,
publisher and manufacturer
State University of Trade and Economics

Director of periodicals – KRYVYTSKA I.

Editors: KYRYCHENKO E., KRYVENKO O.,
DUBKO M.
Artistic and Technical Editor
PSHENICHNA T.

Entered into the Register of entities in the field of print media by decision of the National Council of Ukraine on Television and Radio Broadcasting
No. 798 dated August 31, 2023
and assigned the identifier R30-01229

Index of the magazine in Catalogue of publications in Ukraine in 2025 – 21910

Signed 05.02.2025.
Conventional print. pages. 11
Circulation 250. Order 34

Address of the Editorial board, publisher, manufacturer:
st. Kyoto, 19, Kyiv-156, Ukraine 02156.
Contact us at 531-31-16
visnik@knute.edu.ua
http://journals.knute.edu.ua/scientia-fructuosa/pro_journal

Printed on equipment of SUTE.

Certificate of subject of publishing industry series DK № 7656 of 05.09.2022

Published on the recommendation of the Academic Council of SUTE
(minutes № 5 of 18.01.2025)

The journal is represented in international scientometric databases, repositories and search engines, such as Index Copernicus, Register of Scientific Publications of Ukraine, Vernadsky National Library of Ukraine, Crossref, Dimensions, Research Bible
.

C O N T E N T

GLOBAL ECONOMY

З М І С Т

ГЛОБАЛЬНА ЕКОНОМІКА

DOI: 10.31617/1.2025(159)01
UDC 339.92:338.02=111

MAZARAKI Anatolii,
Doctor of Science (Economics),
Professor, Rector of the State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID:0000-0003-1817-0510
rector@knute.edu.ua

UMANTSIV Yurii,
Doctor of Science (Economics),
Professor, Head of the Department of Economics and Competition Policy
State University of Trade and Economic
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0003-0788-7110
y.umantsiv@knute.edu.ua

ECONOMIC POLICY IN THE CONTEXT OF GLOBAL INSTABILITY

Global macroeconomic instability determines the vectors of social development and determines the format of market participants' activities. A new methodological approach to substantiating the directions of economic policy modification in the context of the latest imbalances is presenred. In the course of the study, two hypotheses were put forward: the first is that global economic instability has reached a level at which the state should respond more actively to the course of macroeconomic processes; the second is that almost in all countries of the world a revision of the paradigmatic foundations of the place and role of the state in the economy is being carried out in order to strengthen its regulatory functions. The key feature of the study is the identification of the most significant factors in improving the economic policy of the State. The conceptual foundations of economic policy in the context of the complexity of world economic relations are identified and on this basis, approaches to the application of incentive measures in Ukraine are formulated. The directions of economic policy implementation aimed at preventing and eliminating manifestations of deformation of the competitive environment are substantiated. The theoretical and methodological foundations

МАЗАРАКІ Анатолій,
д. е. н., професор, ректор
Державного торговельно-економічного університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID:0000-0003-1817-0510
rector@knute.edu.ua

УМАНЦІВ Юрій,
д. е. н., професор, завідувач кафедри економічної теорії та конкурентної політики
Державного торговельно-економічного університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0003-0788-7110
y.umantsiv@knute.edu.ua

ЕКОНОМІЧНА ПОЛІТИКА В УМОВАХ ГЛОБАЛЬНОЇ НЕСТАБІЛЬНОСТІ

Глобальна макроекономічна нестабільність детермінує вектори суспільного розвитку та визначає формат діяльності суб'єктів ринку. Представлено новий методологічний підхід до обґрунтування напрямів модифікації економічної політики в умовах новітніх дисбалансів. У ході дослідження висунуто дві гіпотези: перша – глобальна економічна нестабільність досягла рівня, за якого державі слід активніше реагувати на перебіг макроекономічних процесів; друга – практично в усіх країнах світу здійснюється перегляд парадигмальних засад місця та ролі держави в економіці щодо посилення її регулюючих функцій. Ключовою особливістю дослідження є визначення найзначущих чинників вдосконалення економічної політики держави. Визначено концептуальні засади економічної політики в умовах ускладнення світогосподарських зв'язків і на цій основі сформульовано підходи до застосування заходів стимулювального характеру в Україні. Обґрунтовано напрями реалізації економічної політики, спрямованої на недопущення та усунення проявів деформації конкурентного середовища. Удосконалено теоретико-методологічні засади дослідження

of economic policy research using the tools of the systemic and institutional approach have been improved. The directions of increasing the competitiveness of the national economy in the context of globalization threats have been studied. The vectors of modernization of the national economy in the context of post-war recovery have been proposed.

Keywords: economic policy, global instability, state, market, competitiveness.

економічної політики з використанням інструментарію системно-інституційного підходу. Досліджено напрями підвищення конкурентоспроможності національної економіки за умов глобалізаційних загроз. Запропоновано вектори модернізації національної економіки в умовах повоєнного відновлення.

Ключові слова: економічна політика, глобальна нестабільність, держава, ринок, конкурентоспроможність.

JEL Classification: E61, E66, F01, H10, O10.

Introduction

The formation of a conceptual vision of the post-war development of Ukraine is an important theoretical, methodological and practical task of economic science. The justification of strategic guidelines for post-war recovery is closely related to the formulation of the basic characteristics of the post-war model of economic development of Ukraine. At the same time, globalization determinants that determined the development of the world economy at the beginning of the 21st century led to some limitation of the regulatory functions of the state. As a result, the ability of national states to properly protect the economy from imbalances and asymmetric shocks has also decreased. Under the influence of globalization, national governments have lost the ability to effectively use a number of macroeconomic instruments. States are forced to take into account the interests of multinational enterprises, and in this regard, the search for directions for balancing the interests of the state and the most influential market actors is becoming more urgent.

Globalization largely determines the deformation of market-competitive mechanisms based on the modification of the nature of competition. Under such conditions, there is a transit of institutional equilibrium from the market dimension and subjects of international entrepreneurship to the institutions of the state, which has a fundamental role in the processes of socio-economic transformation, since the market is not able to fully solve such problems. It is quite obvious that neither market self-regulation nor state influence in a separate format is able to ensure stable and balanced progress of the economy. It is advisable not to oppose these mechanisms to each other, but to use them on the basis of interaction and mutual complementarity. This is what Harvard Business School professors Pisano and Shea (2024, p. 143) accentuate on, emphasizing that in the USA, which has "the most market-oriented economy in the world", the government plays a decisive role in supporting technological innovations. However, this process is carried out together with the market. Therefore, "state policy, if developed effectively, can work as a supplement, not a replacement, for market forces". At the same time, "the state as an institution that has historically developed and embodies

the value foundations of society plays an exceptionally important role in the emergence and development of the phenomenon of economic freedom" (Yaremenko, 2010, p. 6).

The current stage of socio-economic development has shown that the undeniable advantages of the neoliberal economic model have not formed the basis for sustainable development, which is due to a number of deep contradictions. Despite the undeniable advantages of the open economy model, by the end of the twentieth century it was clear that these approaches did not produce symmetrical results for both developed and emerging market countries. Asymmetry began to accelerate the processes of differentiation, when obvious disparities in the industrial base, productivity and wages, institutional capacity to protect the domestic market and maintain the exchange rate led to significant imbalances in the incomes of different groups of countries (Banerjee & Duflo, 2021; Nair, 2020).

Scientists are in the process of constantly searching for the ideal combination and finding a balance between market self-regulation and state influence on economic processes. However, such a balance is inherent in the specifics of each individual country and certain stages of economic development (Sidenko, 2021). In view of this, Ha-Jun Chang from the University of Cambridge notes that "even within the neoclassical mainstream, which most fully protects the interests of the free market, there are theories that explain why free markets will not bring the best results. These are the theories of "market failures" or "welfare economics", which were first proposed in the early twentieth century by Cambridge University professor Arthur Pigou, and later developed by modern economists Amartya Sen, William Baumol and Joseph Stiglitz" (Chang, 2020, p. 273).

Generalizing the experience of global development allows us to reveal that in the world economy, contradictions are becoming more acute between the multinational dimension of capital and the sovereignty of the state as a form of organization of socio-economic relations at the national level. A profound consequence of such processes is the limitation of the regulatory functions of the state. It is obvious that state institutions are not always able to properly protect the national economy from imbalances and asymmetric shocks, and governments lose the ability to effectively use a number of regulatory instruments (Fukuyama, 2023). Under such conditions, "social transformations mean a change in the roles of the main meta-regulators (the state and the market), a redistribution of their functions and areas of responsibility, a restructuring of the relationships between the elements of the institutional structure and the mechanisms of motivation and coordination of the activities of economic entities" (Nebrat et al., 2024, p. 12).

A wide range of problems of macroeconomic instability occupies one of the leading places in modern economic theory, since diagnosing and identifying the cause-and-effect relationships of such instability is a decisive prerequisite for substantiating economic policy aimed at eliminating and

preventing a wide variety of imbalances in the future. The relevance of activating economic policy in the conditions of post-war recovery is increasing, since to solve a complex set of tasks it is necessary to substantiate the strategic vector of economic development. That is why "to develop a scientific basis for economic policy to protect the national interests of Ukraine in the post-industrial global socio-economic space, it is appropriate and necessary to rethink the long-term trajectory of the formation and main characteristics of national economic models that have historically confirmed their effectiveness and stability" (Nebrat et al., 2024, p. 8).

Taking into consideration the wide range of state activities, we note that the institutionalization and coordination of the economic policy dimension determine a rather autonomous and specific format of social relations. It is worth pointing out, first of all, the substantiation of concepts and strategies of state activity, their adoption and control over their implementation into reality. Economic policy is implemented on the basis of the authority of state institutions and is largely determined within the rules established in the normative dimension (Mazaraki, Lagutin et al., 2021).

Grytsenko (2022) points out that Ukraine needs to realize its own interests based on national characteristics and taking into account objective trends in the socio-economic, political and technological development of the world, finding on this basis a vector of integration with the global world. The scientist notes that the center of state influence on the economy should be structural policy with its focus on building such economic architectonics, which will ensure the modern dimension of socio-economic development. Structural policy should be associated not only with fiscal, monetary and investment policy, but also with all other types and directions of state influence on the economy. At the same time, under these conditions, it is structural policy that is able to be implemented on the basis of a synthesis of strategic planning and market self-organization. Gumeniuk (2023) justifies the need to introduce state strategic planning in Ukraine. The scientist outlines the author’s approach to building a model of state strategic planning, which is designed to ensure the achievement of certain development goals on the basis of regulatory and administrative ones. The team of authors of the article in the journal "Econometrics" analyzed how exogenous changes in conditions of macroeconomic uncertainty affect the economic decisions of business entities. Scientists found that macroeconomic instability affects price dynamics, employment, investments and company income (Coibion et al., 2023).

Scientists from the Institute of Economics and Forecasting of the National Academy of Sciences of Ukraine, through institutional analysis, in a collective monograph, considered the directions of state policy for stimulating investment activity of the business sector in the context of post-war recovery (Bobukh et al., 2023). For his part, Koroshchenko (2024) analyzes the modern complex model of economic relations through the prism of interaction between the state, business structures and society, noting that

the aforementioned interaction should not take place on a clear demarcation of functions, but on a focus on producing a single platform and joint responsibility for results. The scientist suggests directions for the practical application of the model of "good governance", according to which the basis for decision-making should be the achievement of general well-being based on both efficiency and political and moral criteria.

Heiets quite reasonably notes that effective and productive socio-economic reforms in Ukraine should be carried out on the basis of the development of high-tech activities capable of ensuring the production of products with a high share of added value, the integration of the economy into global chains, the use of national resources with the involvement of scientific, technical and production potential. It is extremely important in the implementation of the above-mentioned approach that the state adopts a number of necessary decisions on the implementation of the Recovery Plan of Ukraine. The author draws attention to the principle of pragmatism, which is characterized by "conscious economic, social and ethical action, which allows to strengthen competitiveness and equality on the path to ensuring the development of the Ukrainian economy, realizing opportunities and overcoming challenges that occur in the conditions of the received status of a candidate for accession to the EU and carrying out relevant socio-economic transformations" (Heiets, 2024, p. 27).

He argues the position that only a deeply grounded economic policy based on the experience of developed countries, the use of a comprehensive consistent approach to solving economic problems and the consistent implementation of transformations taking into account the social orientation of the specified measures can lead Ukraine onto the trajectory of sustainable development, Zveriakov (2023). Kisterskyi (2023) analyzes the strategic principles of post-war reconstruction of Ukraine and the rational use of resources, as well as the dimensions of the value approach to recovery processes taking into account the education and training of specialists with high ethical value orientations. The scientist indicates that the balanced application of the principles of post-war high-tech recovery will allow Ukraine to reach the level of developed countries.

The monograph of scientists from the Research center for industrial development problems of the NAS of Ukraine presents the results of research on the prospects for the post-war recovery of the Ukrainian economy. The authors reveal the problems of developing critical infrastructure, creating value chains both globally and in our country, restoring regions and spatial development of territories in the context of post-war modernization of the economy (Bielikova et al., 2023).

Scientists from the Institute of Industrial Economics of the NAS of Ukraine point out that the EU economic policy is based on the principles of competitiveness, sustainability and innovation, and can become an effective factor in the recovery and development of Ukraine. Scientists quite reasonably

point out that it is the experience of the European Union in reforming industrial sectors that can be used in Ukraine to increase the efficiency of the economy and reduce the negative impact on the environment. In addition, thanks to the integration of Ukrainian enterprises into European value chains and the use of EU standards, labor productivity and the quality of goods can increase in the Ukrainian economy (Omelianenko et al., 2024).

The conclusion that under martial law market principles of economic management are deformed and because of this, the role of the state in ensuring the reliable functioning of the economy is actualized, is substantiated by Danylyshyn (2023). New realities require a review of the macroeconomic role of the state in the event of martial law shocks. The author emphasizes that the fundamental principle of changing monetary policy under martial law is the use of tools that expand the money supply in the market.

Gerasymenko (2020) explores the origins of the emergence of approaches to the search for a "new normality" in economic science, which contributes to the identification of development vectors of the economy in the 21st century, adequate to the processes of the spread of information and communication technologies, the growth of the number of network communities and the increase in the intensity of the global movement of material and financial, information and human capital. The "new normality" involves the acceptance of a new dimension of reality by the scientific community, which is formed after certain radical crisis changes. For his part, Taleb (2022) notes that in the 21st century the effect of the so-called "black swans" will be manifested more often and more fully – events, the occurrence of which is practically impossible to predict. They will arise more and more unexpectedly, and their destructive consequences will manifest themselves simultaneously with the manifestation of the problem. This will create significant risks for the global economy, which is quite difficult to respond quickly and adequately to such unexpected events.

The national report "Preservation and Development of Ukraine in the Conditions of War and Peace" attempts to find an answer to the question of ensuring the modernization of Ukraine, while drawing attention to the fact that the process of post-war recovery should take place on the basis of coordination of structural, fiscal, monetary and investment policies. Such recovery should be implemented on the basis of a balanced combination of strategic planning and market self-organization (Pyrozhkov, 2024).

Ukrainian scholars Mazaraki, Melnyk and Kudyrko (2021) deeply analyze the content and components of the confrontation between the conceptual approaches of neoliberalism and economic nationalism in the context of defining national development strategies. Based on the generalization of the experience of individual countries, the authors identify the implementation features of national models of economic policy in the context of global competition in the 20th–21st centuries. The scholars reveal the

development issues of institutional foundations of economic policy aimed at neo-industrial import substitution in the economy. At the same time, the problems of implementing the state's economic policy in the context of the latest global challenges require further thorough analysis.

The purpose of the article is to reveal the latest trends in the implementation of economic policy under conditions of global uncertainty and to outline directions for improving the state's influence on the course of economic processes.

In the course of the study, two hypotheses were put forward: the first – global economic instability has reached a level at which the state should respond more actively to the vectors and dynamics of macroeconomic processes; the second – practically in all countries of the world there is a transit of paradigmatic principles of conceptualizing the place and role of the state in the economy in the direction of strengthening its regulatory functions. To verify them, the content and instruments of economic policy, the principles of its implementation were analyzed, and based on the results, measures were proposed aimed at further improving the levers of state influence on the course of economic processes in conditions of global instability.

The basis of the study is the scientific works of foreign and Ukrainian scientists on the issues of the state's economic policy. The article uses a set of methods and approaches that made it possible to ensure the conceptual and methodological integrity of the study, namely: dialectical, synthesis and comparative, systemic and institutional approaches.

The scientific study, the main part of which consists of three sections, focuses on analyzing the features and identifying areas for improving the state's economic policy, which provides an opportunity to deepen the understanding of the tools of its influence on the course of economic processes.

1. Globalization dimension of state functions

The market in the global dimension fixes a certain state of the economy, and the effective economic policy of the state creates the basis for the multiplicative increase of the creative potential of the market. Firstly, by contributing to the dynamization of development, such a policy leads to an increase in incomes, which causes the growth and diversification of domestic demand. Secondly, by carrying out a kind of "depreciation" of the pressure of global competition and providing financial support to business entities, the state forms the basis for the emergence and development of new types of economic activity. One of the features of the current stage of globalization is that various forms of institutional organization of the economy are developing in the planetary dimension (Kyzym et al., 2023; Heiets et al., 2022). Under such circumstances, technological interdependence increases, markets are united and unified, and prerequisites are created for the dynamic growth of trade and the capital movement between different countries (*Figure 1*).

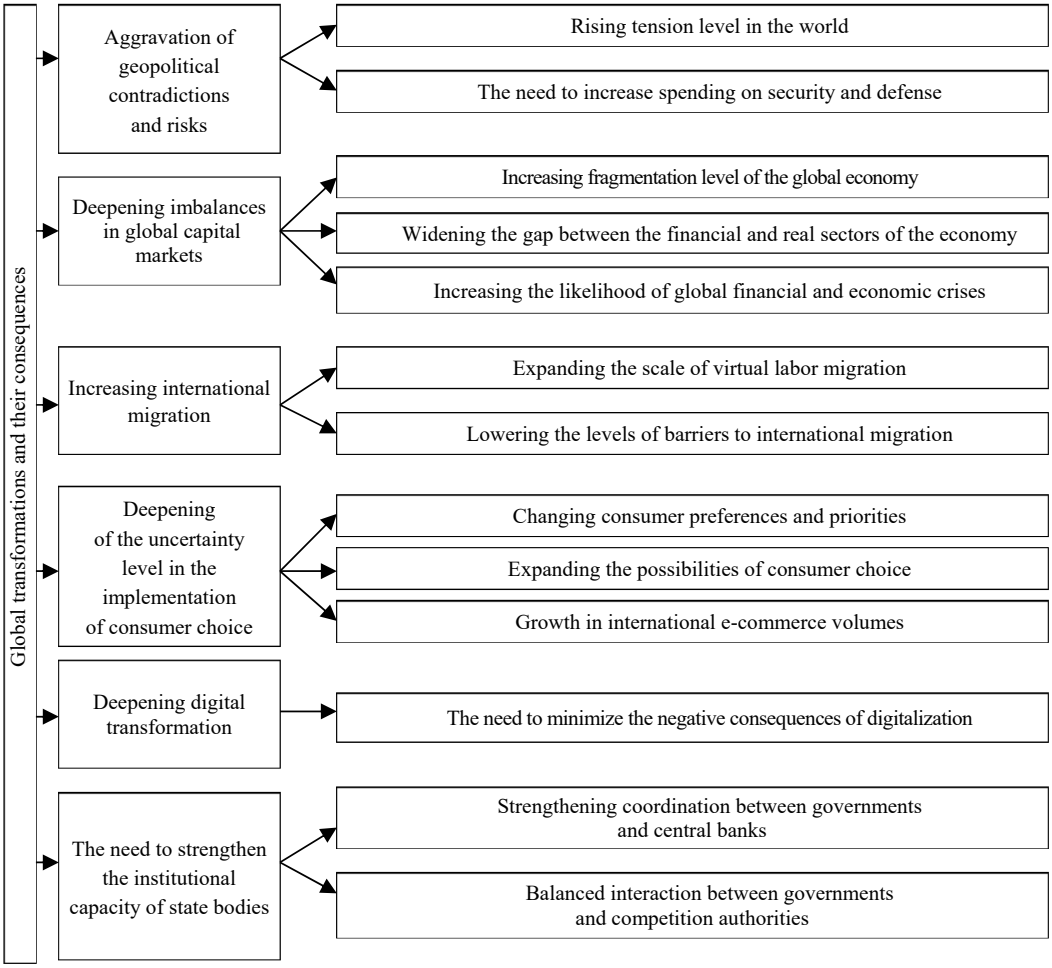

Figure 1. Dimensions of global transformations in the functioning of the economy

Source: compiled by the authors based on their own research and generalizations.

That is why the current stage of development of the world economy is characterized by "on the one hand… its geo-economic fragmentation remains, and on the other hand, new tasks have been put on the agenda to stabilize environmental and, in particular, climate change on the basis of the "Green Transition" and energy security. These processes have a global scale and have been formed within the framework of the confrontation of mechanisms that are offered, on the one hand, by the market, and on the other, by the state, competing for dominance and at the same time combining their efforts" (Heiets, 2024, p. 29).

The functioning and development of the economy are designed to ensure a standard of living for households that ensures the comprehensive and harmonious development of both the individual and society as a whole. The economic development model should be based on mechanisms for balanced distribution and redistribution of GDP. At the same time, the well-being of the population is the main guideline for the development of the economy and depends on the parameters of its dynamics and structure. For effective economic

policy, it is necessary to determine what the economy is at the current stage and what its state is most desirable in the future, as well as find answers to the question of how the desired state of the economy can be achieved (Kvasniy & Voloshanska, 2025; Panchenko, 2018; Skrypnychenko et al., 2023).

The innovative approach in the research of the 2024 Nobel Prize laureates in Economics is extremely relevant, which consists primarily in the fact that scientists were able to reveal the relationship between political and economic constraints and incentives. According to scientists, if the political elite builds a system of extraction (withdrawal) of resources and income in their narrow clan interests, then neither development nor a high level of well-being of the population are possible in such a country. Under these conditions, the government, using restrictions and coercion, forms an economic model in which the economic potential of the nation is depleted and does not provide long-term growth oriented to the internal dimension. Therefore, there are no internal development upsurges, as well as prerequisites for revealing the innovative and creative potential of the economy and society as a whole (Acemoglu & Johnson, 2023; Acemoglu & Robinson, 2017).

In order to activate economic development, the state should identify existing imbalances in the economy. Analyzing the state and dynamics of the functioning of the national economy, it is necessary to outline the prospects for its further development and determine the desired changes. Therefore, it is the state that is called upon to actively use the tools with which it is possible to implement an effective economic policy. A balanced economic policy should be based on the scientific identification of strategic priorities for economic development and on this basis, the definition of conceptual principles and tools for harmonizing the interests of the entire society (*Figure 2*).

Figure 2. Strategic goals of economic policy

Source: compiled by the authors based on their own research and generalizations.

Analysis and systematization of world experience make it possible to note that from the standpoint of a systemic approach, maximum dynamics of economic development can be achieved when all subsystems and regulatory institutions are oriented towards the ultimate goal of social development. The experience of transforming the economy of Ukraine actualizes the issue of choosing and substantiating the directions of its further development. The multidimensionality, scale and complexity of this problem necessitate its comprehensive analysis based on the multi-vector nature of scientific research. In Ukraine, in the context of the large-scale tasks of post-war modernization and the practical implementation of the policy of activating economic development, it is necessary to specify priorities, clarify resource provision and improve the mechanisms for implementing economic policy (Kirkegaard et al., 2022; Gorodnichenko, 2022).

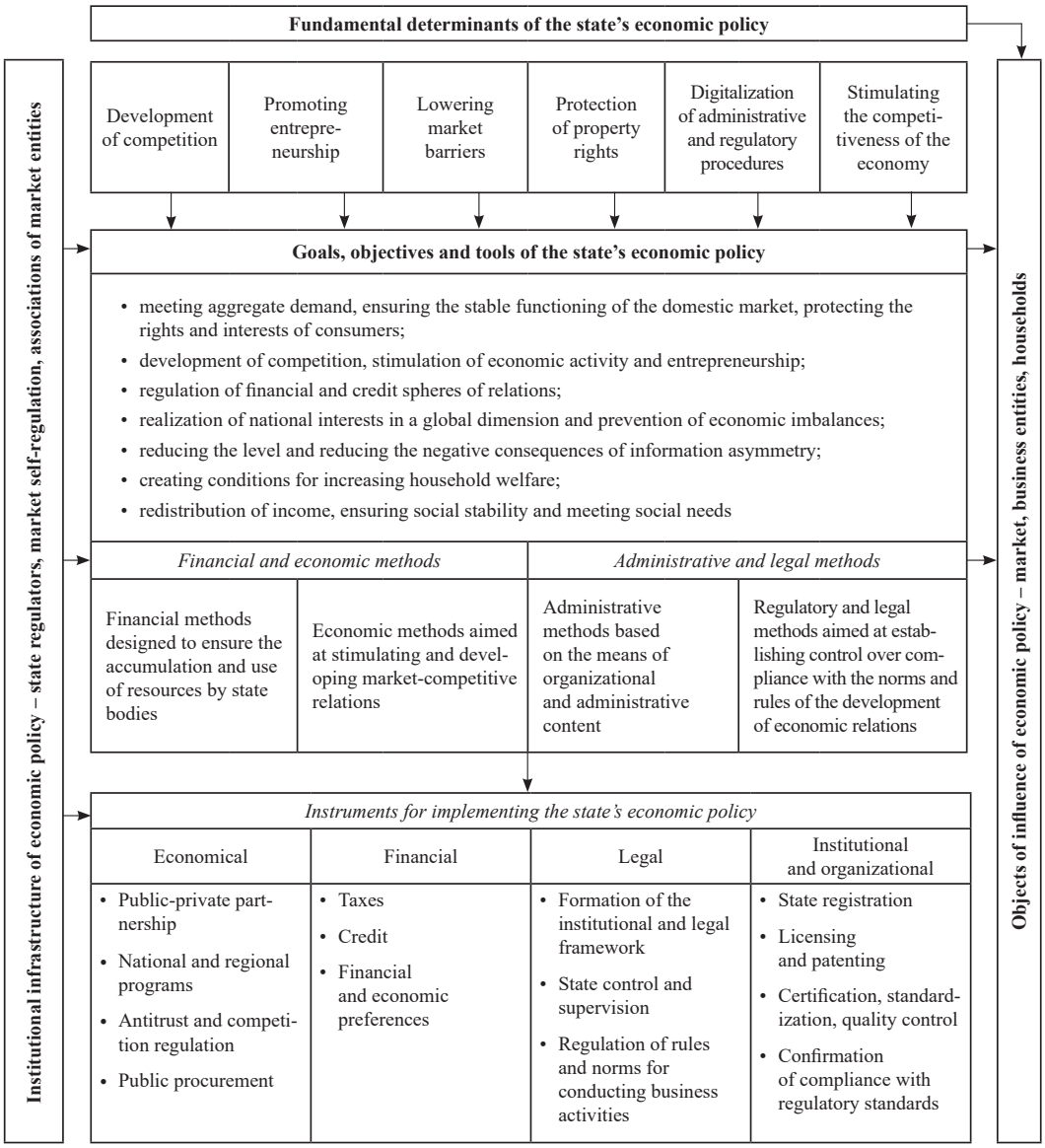

Figure 3. Institutional determinants of the state's economic policy

Source: compiled by the authors based on their own research and generalizations.

For Ukraine, the implementation of economic policy in the context of the latest geopolitical threats should contribute to ensuring innovative development, increasing the competitiveness of national entities, increasing the standard and quality of life, and also lay the foundation for sustainable economic growth in the post-war period (Reznikova & Panchenko, 2023; Christensen et al., 2024). At the same time, the implementation of a certain model of economic policy is not a schematic reflection of a theoretical concept, but the result of the implementation of principles that are determined by national characteristics and traditions based on the use of the country's competitive advantages. The issues of the economic policy toolkit in the context of revealing the most important levers of state influence on the economy in conditions of global instability also remain relevant (see *Figure 3*).

Ensuring the proper dynamics of economic development in modern conditions is a complex and contradictory process with its own objective properties and regularities. The role of the state in the conditions of current global transformations is determined primarily by the fact that it is considered as an entity designed to ensure the institutional design and balanced functioning of all elements of the socio-economic system. Empowered to perform the most important functions on behalf of society, it is the state that establishes the rules for the functioning and interaction of subjects of economic relations within a certain format and carries out control over compliance with rules and norms (Mazaraki, Lagutin et al., 2021).

The effectiveness of the functioning of the national economy and the ability to withstand a variety of shocks are determined by its ability to respond appropriately to the negative phenomena that arise. Under modern conditions, various threats and negative phenomena caused by the deployment of technological dynamics, the intensification of competition in global markets, the need to meet a variety of constantly growing needs, the search for new approaches to ensuring sustainable development, the strengthening of requirements for the balance of national interests in the context of global progress, the need for a balance between new opportunities and threats in conditions of the rapid spread of crisis phenomena are particularly acute (Mazaraki, Melnyk, Kudyrko, 2021; Reznikova, 2018; Korsunskyi, 2023; Putera et al., 2023; Bolton & Ockenfels, 2012).

Since the justification of directions for the activation of economic development occupies a significant place in scientific research, scientists offer new ways to solve problems. In this regard, attention should be paid to economic engineering, which determines the directions of designing vectors of economic development. Research in the field of economic engineering is increasingly focusing on the macroeconomic level and acquiring an interdisciplinary dimension. Economic engineering is designed to determine the directions of achieving macroeconomic goals. Markets need active design, since "market incapability and market failures" may arise. Due to the fact that market self-regulation cannot ensure sustainable balanced

development, it is economic engineering that becomes extremely necessary, since it forms promising directions of influence on economic processes. Within the framework of economic engineering, market design is carried out, which focuses on determining the vectors of economic development based on improved institutional norms and rules. The implementation of market design affects both the formation of theoretical provisions of economic engineering and the practical implementation of economic policy. The use of economic engineering tools makes it possible to analyze industry markets more deeply (Bolton & Ockenfels, 2012).

2. Macroeconomic dimension of economic policy implementation

In the context of global competition, including for human capital, for countries with emerging markets, it is important to ensure stable GDP growth rates as a prerequisite for raising the standard of living of the population, as well as choosing a balanced model of economic policy. The catalyst for growth is industrialization, the basis of which is formed by the active development of industry. A number of studies have substantiated the provision that the expansion of the scale of industrial capacities is the basis for the formation of aggregate demand and aggregate supply, as well as the industrialization of the economy. In addition, under these conditions, new high-tech jobs are created, household incomes grow, which forms the necessary demand, which can be satisfied through the production of competitive goods by national producers (Kindzerskyi, 2021; Omelianenko et al., 2024).

National industry can become an active stimulator of the development of the educational and scientific sphere, the latest technologies, as well as an incentive for the modernization of infrastructure. The production of national products stimulates the growth of labor productivity, income, employment, and the emergence of new types of activity, which is due to the inherent ability of industry to generate and maintain a wide range of economic relations. In the case when all of the listed relations arise and are mutually supported, industrialization by its nature can become comprehensive, since its result is an increase in the fundamental determinants of the functioning of the economy along a number of parameters, which allows countries to escape the low- and middle-income trap (Kindzerskyi, 2021).

Deepening globalization accelerates technological and innovative development. Based on the introduction of innovations, most countries have developed technological capabilities and were able to integrate into global value chains. That is why governments, under the influence of globalization, stimulate the innovation process, which opens up opportunities for increasing national competitiveness. In this context, it is worth mentioning the Global Innovation Index, which is formed to determine the innovative potential of countries (Global Innovation Index, n. d., 2024, 2023, 2020, 2015). The *table* shows Ukraine's indicators in the aforementioned rating for 2015–2024.

However, in 2024, Ukraine ranked 60th out of 133 countries included in the rating. The lowest indicators in 2024 were demonstrated by Ukraine in the subindex "Institutional environment" – 107th place.

At the same time, the innovation stimulus toolkit plays a significant role in the system of economic policy levers, including in the context of post-war modernization of Ukraine. For our country, important areas of development should be improving the quality of public administration, strengthening the rule of law, and a real and effective fight against corruption. These steps will positively affect the improvement of the investment climate, which in turn will contribute to attracting both national and foreign investments.

Table

Ukraine in the Global Innovation Index for 2015–2024.

Indicator	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Global Innovation Index	64	56	50	43	47	45	49	57	55	60
Institutional environment	98	101	101	107	96	93	91	97	100	107
Human capital and research	36	40	41	43	51	39	44	49	47	54
Infrastructure	112	99	90	89	97	94	94	82	77	82
Development of the domestic market	89	75	81	89	90	99	88	102	104	85
Business development	78	73	51	46	47	54	53	48	48	45
Development of technologies and the knowledge economy	34	33	32	27	28	25	33	36	45	34
Creativity	75	58	49	45	42	44	48	63	37	68

Source: compiled by the authors based on data (Global Innovation Index, n. d.).

Industrial development transforms the institutional and sectoral structure of the economy and is implemented on the basis of active economic policy. Institutional and structural changes are conditioned by active industrial policy, which determines the improvement of qualitative determinants and fundamental factors of long-term development. Sectoral and structural changes are based on the transformation of the production structure and ensuring the dynamic development of priority types of economic activity, which ensures the transition to a higher technological level and diversification of business areas.

After several global crises in recent decades, including the 2020 crisis, national governments have become convinced of the leading role of industry in increasing living standards and employment. In forming strategic priorities, the EU and the USA set the task of strengthening their global technological dominance based on the development and implementation of the latest technologies. Developed countries have significantly changed their economic policy against the backdrop of intensifying international competition and the emergence of new industrial economies. Thus, in the USA, the state directly influences the development directions of economic entities. Such action is aimed at reindustrializing the national economy, ensuring its

sustainability and global technological dominance. Policy vectors determine national strategies, programs and initiatives to support traditional and develop new sectors of the economy (Kindzerskyi, 2021).

Economic policy has also undergone significant changes under the influence of the new global reality. In particular, in Japan, against the backdrop of growing demand for microchips for artificial intelligence and aggravating geopolitical risks, pilot lines and the start of production of advanced semiconductors are being prepared in 2025, with plans to establish mass production. The Japanese government continues to provide large-scale support to the industry. By 2030, more than JPY 10 trillion (USD 63 billion) will be allocated for the development of the semiconductor industry. The country's budget for 2025 includes JPY 332.8 billion (USD 2.1 billion) to support the mass production of new-generation semiconductors. It is 2025 that could become a turning point in the history of the revival of the Japanese semiconductor industry, on which the state and the private sector are working together (Japanese Chip Industry Poised for a Comeback, 2024).

The economic policy of stimulating industrial development in the European Union also deserves a detailed analysis. In general, it can be argued that such a policy aims to increase the competitiveness of the EU economy on the basis of innovative and technological development and on the basis of adaptation to internal threats and structural transformations of a global nature. At the same time, the use of sectoral policy instruments in the EU is allowed as an exception in certain cases. This concerns selective state aid provided to such industries as agriculture, forestry, fisheries, transport, as well as the restructuring and closure of metallurgical and coal mining enterprises (Omelianenko et al., 2024; Kindzerskyi, 2021).

However, the level of sectoral support significantly exceeds that officially declared. To expand this support, the EU uses various large-scale initiatives presented as potential threats, to overcome which the state and business entities need to act together. The implementation of such initiatives is always based on improving technological characteristics. For this purpose, significant financial resources are allocated to enterprises and industries as direct financial assistance, provided that it is further directed at technological modernization. Among the most significant initiatives is the European Green Deal, the goal of which is to transform EU production into climate-neutral by 2050. An important place in the European Green Deal belongs to the EU industrial sector (Omelianenko et al., 2024; Reznikova & Panchenko, 2023).

3. Improving economic policy in the context of ensuring sustainable development

In the context of finding directions for revitalizing economic development, attention should be paid to the Report on the EU's Global Economic Challenges and Ways to Solve Them (hereinafter referred to as the Report),

published on September 9, 2024. The Report is compared to the Marshall Plan for post-war Europe and the New Deal in the USA in the 1930s. For more than a year, former President of the European Central Bank and former Prime Minister of Italy Mario Draghi, at the request of the European Commission leadership, investigated the determining reasons why the EU has significantly lagged behind other countries of the world in the economic dimension. One of the recipes for solving the problem is to increase investment in innovation and increase labor productivity in Europe by up to 800 billion euros annually. This is an important document in the medium-term future of the EU. The Report is capable of contributing to the growth of investment in the EU economy in the medium term up to 5% of GDP (The Future of European Competitiveness, 2024).

The first of the three main challenges identified by M. Draghi is the lack of innovations. The second is decarbonization, the third is the challenge to Europe's ability to ensure its own national security. This issue has become more pressing due to the Russian aggression against Ukraine. These problems are united by the cumulative effect of the problems faced by the EU. The importance of the problem is not that Europe lacks innovative entrepreneurs, but that Europe is extremely slow to commercialize such innovations. Most innovative European companies are re-registering in the USA. As the internal market in the EU is actively transforming, it is much easier for companies to scale their own entrepreneurial projects in the much more integrated and capacious market of the United States of America. (The Future of European Competitiveness, 2024).

According to Draghi, if we are talking about creating a truly large integrated market, where a company based in, for example, France could easily expand to Germany, Sweden, Italy and other countries, we need more than just investment, but also joint action at the EU level. However, there are differences in technological sophistication and productivity across countries. For example, Sweden and Denmark have, although not as high as in the US, a significant level of venture capital funding. These countries have many successful startups, as well as a significant number of large global companies. In particular, the Danish pharmaceutical giant Novo Nordisk is now the largest company in Europe by capitalization. In Sweden, it is worth mentioning a number of technology startups, for example, the payment service Klarna and Skype (The Future of European Competitiveness, 2024).

However, for example, in Italy, with its large economy and being part of the G7, there are a significant number of small companies and family businesses that find it difficult to invest in increasing labor productivity. In addition, Italy has additional levels of regulation of company activities. Therefore, the overall level of productivity and financing of venture capital and innovation, and spending on scientific research and development in Italy is significantly lower than in the countries of Northern Europe. Draghi recommended increasing investment in the technology sector and increasing

productivity in the EU to 800 billion euros per year. The Report indicates that such an increase should be based on a combination of public and private resources. On the state side, the source should be the common resources of the EU member states. In addition, a separate issue is how to ensure a sufficient amount of investments at the level of individual countries. When national governments are faced with budget deficit problems, they often cut back on budget investment programs. Private financial resources can also be mobilized, for example by more actively attracting household savings through capital markets. (The Future of European Competitiveness, 2024).

One of the key themes of the Report is reducing the cost of resources with an emphasis on green energy. The main issue is that Europe will never be able to compete on energy costs as long as it uses fossil fuels. Therefore, the EU needs to decarbonize its economy and fully switch to renewable energy sources. In the short term, it will not be possible to achieve the recommended level of investment of 800 billion euros per year. Also, the political discourse in the EU is now largely focused not on increasing productivity but on limiting migration. At the same time, the budgetary process in the EU will also undergo changes. Already in 2025, it will be possible to review priorities in accordance with M. Draghi's recommend-dations. In particular, this concerns decarbonization, reducing dependence on the supply of critical minerals and strengthening the defense sector (The Future of European Competitiveness, 2024).

The Report also discusses the creation of a European defense industry. In the medium term, this will be one of the most pressing tasks. Ukraine, where enterprises for the production of such products can be located, can play an important role in this. In addition to the emphasis on innovation, which is a challenge for all European countries, decarbonization should also be noted, which means that during the reconstruction of the energy sector after the russian attacks, in order to meet EU requirements, Ukraine needs to focus on renewable energy sources.

At the same time, Ukraine will become a critically important component of European security. It is extremely important that not only our country needs to join the EU, but the European Union should also become interested in our country's membership in order to realize the long-term goals of the Report (The Future of European Competitiveness, 2024). In addition, according to European experts, a number of sectors of the Ukrainian economy have great potential in the context of integration with the EU. These include, first of all, trade, transport, energy, mechanical engineering, the high-tech sector, agro-industrial complex, metallurgy, and mining. However, for this integration to be successful, the EU and Ukraine must develop a balanced trade policy (Oslund & Kubilius, 2024).

In the context of searching for directions to intensify the development of the economy in Ukraine, attention should be paid to the possibilities of balanced protectionism, which is closely related to fiscal, monetary and

foreign trade policies, which together are able to stimulate economic growth. The key when choosing vectors of influence is to ensure the conditions when the national economy, receiving competitive advantages based on the formation of a certain structure, determines the necessary level of competitiveness of the foreign economic sector. Protectionist measures that affect the domestic market contribute to the efficiency of the foreign economic sector as well.

It is precisely such balanced protectionism that opens up opportunities for providing support to national business entities in competitive confrontation on world markets. In addition, rational protectionist measures are aimed at achieving a dual goal. Firstly, it is about the fact that state institutions contribute to the growth of the competition intensity in those sectors and types of economic activity in which the capabilities of national companies are commensurate with the capabilities of foreign entities, or in situations where further dynamics of the development of national production are impossible without the use of technological solutions and resources of foreign agents. Secondly, the state resorts to blocking access to those spheres and industries that are either not ready for open competition, or whose activities are directly related to the need to ensure national economic security. It is precisely this dialectic that is designed to ensure the process of sustainable economic growth (Mazaraki, Melnyk, & Kudyrko, 2021). It is also indicative that in the context of digitalization of economic development, a significant number of countries are using sophisticated tools of digital neoprotectionism, which involves using the capabilities of the world wide web to control e-commerce transactions, influence consumer preferences of buyers, etc. It is obvious that in the near future both national governments and international institutions will be forced to solve the aforementioned problem (Reznikova & Panchenko, 2023).

In the context of searching for internal reserves to boost the development of the Ukrainian economy, it should be noted that in world practice it is considered inappropriate and irrational to give preference in public procurement to goods of foreign production if similar products are manufactured by national entities. Under these conditions, the requirement for the presence of a local component in goods during public procurement of products of mechanical engineering, transport, energy, communications, municipal equipment, etc., is important. A similar procurement practice operates in all developed countries. Thus, in particular, in the USA, the protection of jobs in the economy through public procurement can be carried out in a number of areas of support for local producers, which include closing opportunities to circumvent requirements for the purchase of products of national production, increasing price preferences for local entities, and increasing requirements for the share of the local component in procurement (Panchenko, 2018; Kindzerskyi, 2021).

Stimulation of industrialization should be based on a rational combination of structural and fundamental factors of development. In

Ukraine, for a long period, neither the first nor the second ones were practically not paid attention to in economic policy. In this regard, it is worth moving away from the orientation towards using only current competitive advantages based on cheap resources, the focus on which largely led to the deindustrialization of the economy and contributed to the consolidation of irrational specialization in the international division of labor in the country (Heiets, 2023; Kindzerskyi, 2021).

The development of structural and fundamental principles of economic development should be focused on the formation of promising competitive advantages based on knowledge and technologies, which will allow transforming the structure of national production and overcoming its technological lag. In the context of stimulating structural factors, industrial sectors should be highlighted as accelerators of rapid growth, providing them with state support, using the tools of national competition legislation and international agreements to create legal grounds for their application. In contrast, in Ukraine, the views that the development of the national economy should be carried out mainly on the basis of small business are quite often defended. However, its subjects are far from always able to fully compete with multinational global corporations. Therefore, taking into account the concentration of market power in individual countries, as well as the effects of political influence, on the one hand, and the spread of innovations in conditions of instability and uncertainty, on the other, in Ukraine, leading positions in priority sectors can be occupied by national corporations based on the principles of vertical integration. Such corporations are able to form positive effects of concentration of market power in the context of a strategic long-term perspective (Kindzerskyi, 2021; Umantsiv, 2021). In this regard, J. Studwell from the University of Cambridge draws attention to the fact that "huge investments are needed to finance industrial development over a long period of time, and this means that big business plays a leading role in economic development". The researcher is convinced that "the role of large companies is more important than the role of large countries – there are many rich small or sparsely populated countries with large companies, such as Belgium or Sweden, but there are no large countries that have become wealthy with the help of small companies" (Studwell, 2022, p. 225).

In the process of implementing economic policy by the state, the active use of innovative principles for activating the technological development of the national economy should be carried out. Innovative factors are designed to influence the economy on the basis of coordinating innovation policy with fiscal, monetary, industrial, scientific and technical and foreign economic policies and on the condition of achieving unity of interests and harmonious relations between the state, the business sector and civil society institutions. The innovative ecosystem is based on dynamic relationships between economic agents and should be embodied in innovative activity and technological modernization of the economy.

With the increasing dependence of household living standards on the further increase in the scale of production and consumption of goods and services, state institutions have to find a balance between inflation and stagnation, make efforts to stimulate production and reduce unemployment, social protection of the population and widespread abuses and unemployment benefits. That is why the problem of finding ways to maintain a high standard of living, as well as the sufficiency of resources and cheap energy in the period of green transformation and digitalization arises.

Critics of neoliberalism note that a significant part of technological products in the world appeared thanks to state investments. This includes, in particular, the World Wide Web, Wi-Fi, GPS, etc. In the USA, the source of technological development was an effective system of technology transfer and the implementation of scientific research results into production. These examples serve to substantiate the vectors of the formation of a new global world order, the determination of directions for supporting certain sectors of the economy in the interests of the whole society, the need for a more balanced distribution of income. On the basis of finding such a consensus, programs for the further activities of international institutions can be formed (Cohen & Delong, 2023).

Conclusions

The results of the study confirmed the hypotheses that global economic instability has reached a level at which the state needs to respond more actively to the course of macroeconomic processes, as well as that most countries in the world are reviewing the paradigmatic principles of the role of the state in economic processes in the direction of strengthening its influence on the economy. The deep dimension of socio-economic transformations in the 21st century is due to the awareness of the need for state intervention in the operation of the market mechanism, changes in the social structure of society and a number of technological factors. These changes have led to a steady accumulation of global imbalances, which have manifested themselves in the failure of the traditional tools for regulating economic processes in the 21st century.

The economic policy of the state in the context of global transformations is designed to exert a balanced influence on the balanced functioning and development of all components of the national economic system. The state, as an institution representing the interests of all social groups, determines the requirements for the activities and interaction of economic actors within a certain economic and legal order and exercises its powers.

A reliable fundamental basis for the implementation of a balanced economic policy should be the theoretical and methodological interpretation of strategic guidelines for economic development and justification based on this conceptual and fundamental approaches and tools for the purpose of forming systemic indicators for identifying the approach of global macroeconomic imbalances in the future. At the same time, it is an

undeniable fact that the achievement of the established priorities of socio-economic development can be ensured by combining the potential of the market with its competitive and entrepreneurial upsurges and the regulatory and stimulating capabilities of the state.

Ukraine needs an economic strategy, supported by resources and implementation tools, which will create the basis for the emergence of competitive national companies and a breakthrough in a number of promising areas, such as high-tech mechanical engineering, the military-industrial complex, agricultural processing, green energy, the creative economy industry, digital transformation, etc. At the same time, it is necessary to develop our own production not through bans on the import of goods, but on the basis of improving the quality of national ones. In the context of global competition, the country's economic self-sufficiency cannot be absolute, but it is necessary for types of economic activity that ensure food, military and energy security based on the realization of national potential. In the context of the above, the prospect of further scientific exploration is the study of directions for modifying the state's economic policy in Ukraine under the conditions of accelerating European integration processes and post-war modernization.

REFERENCES/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Acemoglu, D., & Johnson, S. (2023). Power and progress: our thousand-year struggle over technology and prosperity. New York: *John Murray Press*. 560.	
Acemoglu, D., & Robinson, J. (2017). Why Nations Decline (translated from English by O. Demianchuk. Kyiv: *Nash format*. 440.	Аджемоглу, Д., & Робінсон, Дж. (2017). Чому нації занепадають (пер. з англ. О. Дем'янчука. Київ: Наш формат, 440.
Banerjee, A., & Duflo, E. (2021). *Effective Economics for Hard Times* (translated from English by R. Klochko (Ed.). Kyiv: *Nash format*. 416.	Банерджі, А., & Дюфло, Е. (2021). Дієва економіка для важких часів (пер. з англ. Р. Клочко (Ред.).. Київ: *Наш формат*. 416.
Bielikova, N., Gubarieva, I., Zinchenko, V., Ivanov, Yu., Ivanova, O., Kyzym, M., Kotliarov, Ye., Kriachko, Ye., Laptiev, V., Marushchenko, O., Poliakova, O., Reshetniak, O., Semygulina, I., Trushkina, N., Khaustova, V., Khaustov, M., Shlykova, V., & Yaroshenko, I. (2023).*Post-war recovery of the Ukrainian economy: problems and directions of solution*. (edited by V. Khaustova). Kharkiv: PE Liburkina L. M., 2023. 240.	Бєлікова, Н., Губарєва, І., Зінченко, В., Іванов, Ю., Іванова, О., Кизим, М., Котляров, Є., Крячко, Є., Лаптєв, В., Марущенко, О., Полякова, О., Решетняк, О., Семигуліна, І., Трушкіна, Н., Хаустова, В., Хаустов, М., Шликова, В., & Ярошенко, І. (2023). *Повоєнне відновлення економіки України: проблеми та напрямки вирішення*. (В. Хаустова, Ред.). Харків: ФОП Лібуркіна Л. М., 240.
Bobukh, I., Kindzerskyi, Yu., & Fashchevska, O. (et al.). (2023). *Inclusive institutions for ensuring the development of the Ukrainian economy*. Institute of Economics and Forecasting. National Academy of Sciences of Ukraine. 360	Бобух, І., Кіндзерський, Ю., & Фащевська, О. (та ін.). (2023). *Інклюзивні інститути забезпечення розвитку економіки України.* Ін-т екон. та прогнозув. НАН України. 360.
Bolton, G., & Ockenfels, A. (2012). Behavioral Economic Engineering. *Journal of Economic Psychology*, *33*(3), 665–676. https://doi.10.1016/j.joep.2011.09.003	
Chang, Ha-J. (2020). 23 Hidden Facts about Capitalism (translated from English by O. Kupriianchuk (Ed.). Kyiv: *Nash format*. 288.	Чанґ, Ха-Дж. (2020). 23 прихованих факти про капіталізм (пер. з англ. О. Купріянчук (Ред.). Київ: *Наш формат*. 288.
Christensen, K. M., Ojomo, E., & Dillon, K. (2024). The Paradox of Prosperity. How innovations can lead nations out of poverty (translated from English by O. Zamoiska (Ed.). *Old Lion Publishing House*. 416.	Крістенсен, К. М., Оджомо, Е., & Діллон, К. (2024). Парадокс процвітання. Як інновації можуть вивести нації з бідності. (пер. з англ. О. Замойська (Ред.). *Видавництво Старого Лева.* 416.

Cohen, S., Delong, B. (2023). The American Economic Miracle and Alexander Hamilton (translated from English by R. Klochko (Ed.). *Nash format*, 192.	Коен, С., & Делонг, Б. (2023). Американське економічне диво і Александер Гамільтон (пер. з англ. Р. Клочко (Ред.). *Наш формат*, 192.
Coibion, O., Gorodnichenko, Y., & Kumar, S. (2023). The Effect of Macroeconomic Uncertainty on Firm Decisions. *Econometrica,* (91), 1297–1332. https://doi.org/10.3982/ECTA21004	
Danylyshyn, B. (2023). Ensuring Macroeconomic Stability under the Martial Law. *Science and innovation*, *19*(1), 3–19. https://doi.org/10.15407/scine19.01.003	
Fukuyama, F. (2023). Liberalism and its contradictions (translated from English by K. Disa (Ed.). *Nash format*, 152.	Фукуяма, Ф. (2023). Лібералізм і його протиріччя (пер. з англ. К. Диса (Ред.). *Наш формат*, 152.
Gerasymenko, A. (2024). The new normality of the economy of the 21st century. *Herald of the Kyiv National University of Trade and Economics*, (3), 5–26. https://doi.org/10.31617/visnik.knute.2020(131)01	Герасименко, А. (2020). Нова нормальність економіки XXI ст. *Вісник Київського національного торговельно-економічного університету*, (3), 5–26. https://doi.org/10.31617/visnik.knute.2020(131)01
Global Innovation Index. (n. d.). https://www.wipo.int/en/web/global-innovation-index	
Gorodnichenko Yu., Sologub I., & Weber di Mauro B. (2022). *Reconstruction of Ukraine: Principles and Policy*. 507.	Городніченко Ю., Сологуб І., & Вебер ді Мауро Б. (2022). *Відбудова України: принципи та політика*. 507.
Grytsenko, A. (2022). Economic contradictions of globalization and localization and their modern manifestations. *Economic theory*, (4), 5–29. https://doi.org/10.15407/etet2022.04.005	Гриценко, А. (2022). Економічні суперечності глобалізації і локалізації та їх сучасні прояви. *Економічна теорія*, (4), 5–29. https://doi.org/10.15407/etet2022.04.005
Heiets, V. (2023). Formation of the profile of strategically important types of industrial activity in Ukraine (perspective). *Economy of Ukraine*, (9), 3–29. https://doi.org/10.15407/economyukr.2023.09.003	Геєць, В. (2023). Формування профілю стратегічно важливих видів промислової діяльності в Україні (погляд на перспективу). *Економіка України*, (9), 3–29. https://doi.org/10.15407/economyukr.2023.09.003
Heiets, V. (2024). Economic socialization on the way to solidary construction of reality. *Sociology: theory, methods, marketing*, (4), 27–50. https://doi.org/10.15407/sociology2024.04.27	Геєць, В. (2024). Економічна соціалізація на шляху до солідарного конструювання реальності. *Соціологія: теорія, методи, маркетинг*, (4), 27–50. https://doi.org/10.15407/sociology 2024.04.27
Heyets, V., Podolets, R., & Diachuk, O. (2022). Post-War Economic Recovery of Ukraine in the Imperatives of Low-Carbon Development. *Science and innovation*, *18*(6), 3–16. https://doi.org/10.15407/scine18.06.003	
Humeniuk, V. (2023). Strategic planning as a way to implement public administration. *Economic theory*, (4), 45–71. https://doi.org/10.15407/etet2023.04.049	Гуменюк, В. (2023). Стратегічне планування як спосіб здійснення державного управління. *Економічна теорія*, (4), 45–71. https://doi.org/10.15407/etet2023.04.049
Japanese Chip Industry Poised for a Comeback. (n. d.). https://www.japantimes.co.jp/business/2025/01/03/tech/japan-chipmakers-stage-comeback	
Kindzerskyi, Yu. (2021). Inclusive industrialization for sustainable development: towards the principles of theory and policy of formation. *Economy of Ukraine*, (5), 3–39. https://doi.org/10.15407/economyukr.2021.05.003	Кіндзерський, Ю. (2021). Інклюзивна індустріалізація для сталого розвитку: до засад теорії та політики формування. *Економіка України*, (5), 3–39. https://doi.org/10.15407/economyukr.2021.05.003
Kirkegaard, J., Kleine-Brockhoff, T., Stokes, B., & Ganster, R. (2022). Designing Ukraine's Recovery in Spirit of the Marshall Plan. *Principles, Architecture, Financing, Accountability: Recommendations for Donor Countries*. GMF. Washington. 44.	
Kisterskyi, L. (2023). Strategic principles of post-war recovery of Ukraine. *Economy of Ukraine*, (2), 3–16. https://doi.org/10.15407/economyukr.2023.02.003	Кістерський, Л. (2023). Стратегічні принципи повоєнного відновлення України. *Економіка України*, (2), 3–16. https://doi.org/10.15407/economyukr.2023.02.003
Koroshchenko, M. (2024). The model of "good governance" as a way to reform public policy in Ukraine. *Economy of Ukraine*, (4), 57–67. https://doi.org/10.15407/economyukr.2024.04.057	Корощенко, М. (2024). Модель "належного урядування" як шлях реформування публічної політики в Україні. *Економіка України*, (4), 57–67. https://doi.org/10.15407/economyukr.2024.04.057

Korsunskyi, S. (2023). *How nations recover: the experience of East Asi*a. Vivat. 192.	Корсунський, С. (2023). *Як нації відновлюються: досвід Східної Азії*. Віват. 192.
Kvasniy, L., & Voloshanska, A. (2025). Transformation of the industrial sector of Ukraine in the context of overcoming deindustrialization. *Academy review*, (1), 175–192. https://doi.org/10.32342/3041-2137-2025-1-62-13	Квасній, Л., & Волошанська, А. (2025). Трансформація промислового сектора України в умовах подолання деіндустріалізації. *Academy review*, (1), 175–192. https://doi.org/10.32342/3041-2137-2025-1-62-13
Kyzym, M., Khaustova, V., Bielikova, N., Poliakova, O., Zinchenko, V., Petrykiva, O., Levanda, O., Khaustov, M., & Lutsenko, N. (2023). *Theoretical aspects of Ukraine's exit from the "trap of backwardness*". PE Liburkina L. M. 402.	Кизим, М., Хаустова, В., Бєлікова, Н., Полякова, О., Зінченко, В., Петриківа, О., Леванда, О., Хаустов, М., & Луценко, Н. (2023). *Теоретичні аспекти виходу України з "пастки відсталості"*. ФОП Лібуркіна Л. М. 402.
Mazaraki, A., Lagutin, V., & Gerasymenko, A. (et al.). (2021). *Conceptual and methodological transformations of economic theory in the 21st century,* Kyiv National University of Trade and Economics. 344.	Мазаракі, А., Лагутін, В., & Герасименко, А. (та ін.) (2021). *Концептуально-методологічні трансформації економічної теорії XXI століття*. Київ. нац. торг.-екон. ун-т. 344.
Mazaraki, A., Melnyk, T., & Kudyrko, L. (2021). Economy of Ukraine: import substitution vs import dependence. (A. Mazaraki Ed.). Kyiv National University of Trade and Economics. 272.	Мазаракі, А., Мельник, Т., & Кудирко, Л. (2021). Економіка України: імпортозаміщення vs імпортозалежність. (А. Мазаракі Ред.). Київ. нац. торг.-екон. ун-т. 272.
Nair, Ch. (2020). *The State of Sustainable Development. The future of governance, economy and society* (translated from English by I. Hnatkovska (Ed.). Kyiv: *Nash format*. 288.	Наїр, Ч. (2020). *Держава сталого розвитку. Майбутнє урядування, економіки та суспільства* (пер. з англ. І. Гнатковська (Ред.). Київ: *Наш формат*. 288.
Nebrat, V., & Suprun N. (et al.). (2024). *State and market in economic development and post-war recovery: foreign experience*. Institute of Economics and Forecasting. National Academy of Sciences of Ukraine. 416.	Небрат, В., Супрун, Н. (та ін.). (2024). *Держава і ринок в економічному розвитку та у повоєнному відновленні: зарубіжний досвід.* Інститут економіки та прогнозування НАН України. 416.
Omelianenko, V. (et al.). (2024). *From Crisis to Growth: EU Lessons for Ukraine's Industrial Recovery* (V. Omelianenko (Ed.). Institute of Economic Industry of the National Academy of Sciences of Ukraine. 198.	Омельяненко, В. та ін. (2024). *Від кризи до зростання: уроки ЄС для промислового відновлення України*. (В. Омельяненко, Ред.). Ін-т екон. пром-сті НАН України. 198.
Oslund, A., & Kubilius, A. (2024). Reconstruction, Reform and Ukraine's Accession to the EU. (translated from English by A. Kovalchuk (Ed.). *Old Lion Publishing House*. 144.	Ослунд, А., & Кубілюс, А. (2024). Відбудова, реформування та вступ України до ЄС. (перекл. з англ. А. Ковальчука (Ред.). *Видавництво Старого Лева*, 144 с.
Panchenko, V. (2018). *Global Dimensions of Neo-Protectionism: Theory and Practice.* Agrarian Media Group. 618.	Панченко, В. (2018). *Глобальні виміри неопротекціонізму: теорія і практика*. Аграр Медіа Груп. 618.
Pisano, G., & Shea, W. (2024). The Industrial Renaissance of America. The path to national prosperity (translated from English by A. Morozovsky (Ed.). Kyiv: *Nash format*. 176.	Пізано, Г., & Ші, В. (2024). Індустріальний ренесанс Америки. Шлях до національного процвітання (пер. з англ. А. Морозовський (Ред.). Київ: *Наш формат*. 176.
Putera, P. B., Widianingsih, I., Ningrum, S., Suryanto, S., & Rianto, Y. (2023). Policy Dynamics in Contemporary Public Administration Studies: A Conceptual Analysis. *Public Policy and Administration*, *22*(1). 74–90. https://doi.org/10.5755/j01.ppaa.22.1.31435	
Pyrozhkov, S., Khamitov, N., Holovakha, Ye., Dembitskyi, S., Libanova, E., Skrypniuk, O., & Stoietskyi, S. (2024). Preservation and development of Ukraine in war and peace. *Naukova Dumka*, 220.	Пирожков, С., Хамітов, Н., Головаха, Є., Дембіцький, С., Лібанова, Е., Скрипнюк, О., & Стоєцький, С. (2024). Збереження і розвиток України в умовах війни та миру. *Наукова думка*, 220.
Reznikova, N. V. (2018). *Economic independence of countries in the context of global transformations.* Agrarian Media Group. 460.	Резнікова, Н. В. (2018). *Економічна неозалежність країн в умовах глобальних трансформацій.* Аграр Медіа Груп. 460.

Reznikova, N., & Panchenko, V. (2023). Reports from civilizational fronts. At the forefront of international economic policy. *Agrarian Media Group.* 234.	Резнікова, Н., & Панченко, В. (2023). Репортажі із цивілізаційних фронтів. На передовій міжнародної економічної політики. *Аграр Медіа Груп*. 234.
Sidenko, V. (2021). The ratio of globalization and localization of economic processes in the context of increasing global risks. *Economic Theory*, (3), 72–90.	Сіденко, В. (2021). Співвідношення глобалізації та локалізації економічних процесів в умовах зростання глобальних ризиків. *Економічна теорія*, (3), 72–90.
Skrypnychenko, M., Shumska, S., & Yatsenko, G. (et al.). (2023). *Trajectories of development of the post-war economy of Ukraine in the coordinate system of the post-pandemic world.* Institute of Economics and Forecasting. National Academy of Sciences of Ukraine, 202.	Скрипниченко, М., Шумська, С., & Яценко, Г. (та ін.). (2023). *Траєкторії розвитку повоєнної економіки України в системі координат постпандемічного світу*. Ін-т екон. та прогнозув. НАН України. 202.
Studwell, J. (2022). Why Asia succeeded. The successes and failures of the world's most dynamic region (translated from English by O. Tsekhanovska (Ed.). *Nash format*, 448.	Стадвел, Дж. (2022). Чому Азії вдалося. Успіхи і невдачі найдинамічнішого регіону світу (пер. з англ. О. Цехановська (Ред.). *Наш формат*, 448.
Taleb, N. (2022). Fooled by chance. The invisible role of chance in life and business (translated from English A. Kalyniuk (Ed.). *Nash format*. 320.	Талеб, Н. Н. (2022). Обдурені випадковістю. Незрима роль шансу в житті та бізнесі (пер. з англ. А. Калинюк (Ред.). *Наш формат*. 320.
The Future of European Competitiveness. (2024). *In-depth Analysis and Recommendations*. Part B. https://commission.europa.eu/document/download/ec1409c1-d4b4-4882-8bdd-3519f86bbb92_en?filename=The%20future%20of%20European%20competitiveness_%20In-depth%20analysis%20and%20recommendations_0.pdf	
Umantsiv, Yu. (2021). Theoretical discourse on the development of corporations in the 21st century. *Herald of the Kyiv National University of Trade and Economics*, (3), 33–51. https://doi.org/10.31617/visnik.knute.2021(137)03	Уманців, Ю. (2021). Теоретичний дискурс розвитку корпорацій у XXI ст. *Вісник Київського національного торговельно-економічного університету*, (3), 33–51. https://doi.org/10.31617/visnik.knute.2021(137)03
Yaremenko, O. (2010). Liberalism, economic freedom and the state. *Economy of Ukraine*, (12), 4–15.	Яременко, О. (2010). Лібералізм, економічна свобода і держава. *Економіка України*, (12), 4–15.
Zveriakov, M. (2023). The concept of social market economy in the post-war recovery of Ukraine. *Economy of Ukraine*, (3), 3–23. https://doi.org/10.15407/economyukr.2023.03.003	Звєряков, М. (2023). Концепція соціального ринкового господарства в повоєнному відновленні України. *Економіка України*, (3), 3–23. https://doi.org/10.15407/economyukr.2023.03.003

Conflict of interest. The authors certify that they have no financial or non-financial conflict of interest with respect to this publication; the authors have no relations with state bodies, commercial or non-profit organizations that might be interested in presenting this point of view. Taking into account that the authors are affiliated with the institution that is the publisher of this journal, which may cause potential conflict or suspicion of bias, the final decision to publish this article (including the selection of reviewers and editors) was made by those members of the Editorial Board who are not affiliated with this institution.

The authors received no direct funding for this study.

Mazaraki A., Umantsiv Yu. Economic policy in the context of global instability. *Scientia fructuosa*. 2025. № 1. P. 4–26. https://doi.org/10.31617/1.2025(159)01

Received by the editorial office 13.01.2025.
Accepted for printing 21.01.2025.
Published online 17.02.2025.

DOI: 10.31617/1.2025(159)02
UDC 339.97:336.72=111

CHUGUNOV Igor,
Doctor of Sciences (Economics),
Professor, Head of the Department of Finance
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

i.chugunov@knute.edu.ua
ORCID: 0000-0002-3612-7236

KUCHER Galyna,
Doctor of Sciences (Economics), Associate Professor, Professor of the Department of Finance
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

h.kucher@knute.edu.ua
ORCID: 0000-0002-1714-5623

IBRD IN SHAPING THE ARCHITECTONICS OF THE GLOBAL FINANCIAL SYSTEM

The relevance of the research is due to the need to ensure sustainable development and global stability in the context of modern globalization challenges by strengthening the financial influence of international institutions. The research is based on the hypothesis of the architectonic formation of the world financial system based on the strengthening of the regulatory influence and financial potential of global financial and credit institutions. A system of scientific methods and approaches was used in the research process. Methods of scientific abstraction, systematicity, and generalization were used to reveal the place and role of the International Bank for Reconstruction and Development (IBRD) in ensuring international stability and financing sustainable development. Methods of analysis and synthesis were used to assess the indicators of the financial activity, the effectiveness of project implementation, the size of the financial flows in terms of their impact on international financial stability and ensuring the implementation of sustainable development goals.

The historical features of the creation, adaptive transformations of the development, and IBRD functioning influence on the effectiveness of the accumulation and use of its finances. The structure of the Bank's share capital

ЧУГУНОВ Ігор,
д. е. н., професор, завідувач кафедри фінансів
Державного торговельно-економічного університету
вул. Кіото, 19, м. Київ, 02156, Україна

i.chugunov@knute.edu.ua
ORCID: 0000-0002-3612-7236

КУЧЕР Галина,
д. е. н., доцент, професор кафедри фінансів
Державного торговельно-економічного університету
вул. Кіото, 19, м. Київ, 02156, Україна

h.kucher@knute.edu.ua
ORCID: 0000-0002-1714-5623

МБРР У ФОРМУВАННІ АРХІТЕКТОНІКИ СВІТОВОЇ ФІНАНСОВОЇ СИСТЕМИ

Актуальність дослідження зумовлена необхідністю забезпечення сталого розвитку та світової стабільності в умовах сучасних глобалізаційних викликів шляхом посилення фінансового впливу міжнародних інституцій. В основу дослідження покладено гіпотезу про формування архітектоніки світової фінансової системи шляхом посилення регуляторного впливу та фінансового потенціалу глобальних фінансово-кредитних інститутів. У ході дослідження застосовано систему наукових методів і підходів. Методи наукової абстракції, системності та узагальнення використано для розкриття місця та ролі Міжнародного банку реконструкції та розвитку (МБРР) у забезпеченні міжнародної стабільності та фінансуванні сталого розвитку. Завдяки методам аналізу та синтезу проведено оцінку показників фінансової діяльності, ефективності реалізації проєктів, розмірів фінансових потоків щодо їх впливу на міжнародну фінансову стабільність та забезпечення реалізації цілей сталого розвитку.

Історичні особливості створення, адаптаційні трансформації розвитку та функціонування МБРР впливають на результативність акумулювання та використання його фінансів. Досліджено структуру акціонерного

was studied. An analysis of its financial resources concerning the Bank's lending activities was conducted. A general trend towards an increase in the indicators of gross and net disbursements after 2020 was identified. Factors that influenced the indicator of the profit before distribution during 2016–2023 were identified. The enhancement of the IBRD's financial potential has allowed for funding allocations to support the activities of the International Development Association (IDA), and the formation of general reserve and surplus funds. Analysis of the dynamics and structure of the IBRD balance sheet showed a trend towards growth in total assets, a significant positive impact of investment policy on financial results, and the dynamics of the net investment portfolio indicators. The implementation of the IBRD mission is ensured by lending activity and the redistribution of financial resources from international markets to member countries. The loan portfolio indicators, a gradual decrease in the ratio of equity to loans provided correspond to the Bank's policy. As part of the World Bank Group (WBG), the IBRD is actively implementing measures for the adaptive development of the institution in the face of globalization challenges, which led to the formation of a new vision of the mission and initiatives to strengthen international influence institution, improve approaches to providing financial assistance and increase financial capacity following the adopted Strategy for 2020–2025.

Keywords: international finance, international financial and credit institutions, World Bank Group, International Bank for Reconstruction and Development, financial assistance, global financial stability, international financial regulation, credit programs, government debt.

капіталу Банку. Проаналізовано використання його фінансових ресурсів у частині кредитної діяльності. Визначено загальну тенденцію до зростання показників валових і чистих виплат після 2020 р. Виявлено фактори, що впливали на показник прибутку до розподілу протягом 2016–2023 рр. Нарощування фінансового потенціалу МБРР дало змогу виділити кошти на підтримку заходів Міжнародної Асоціації Розвитку (МАР), а також сформувати загальний резерв і надлишок коштів. Аналіз динаміки та структури балансу МБРР показав тенденцію до зростання загальних активів, значний позитивний вплив інвестиційної політики на фінансові результати та динаміку показників портфеля чистих інвестицій. Реалізація місії МБРР забезпечується кредитною діяльністю та перерозподілом фінансових ресурсів з міжнародних ринків країнам-членам. Показники кредитного портфеля, поступове зниження співвідношення власного капіталу до наданих кредитів відповідають політиці Банку. У складі Групи Світового банку (WBG) МБРР активно впроваджує заходи щодо адаптивного розвитку інституції в умовах глобалізаційних викликів, що призвело до формування нового бачення місії та ініціатив щодо посилення міжнародного впливу, удосконалення підходів до надання фінансової допомоги та підвищення фінансової спроможності відповідно до прийнятої Стратегії на 2020–2025 рр.

Ключові слова: міжнародні фінанси, міжнародні фінансово-кредитні інституції, Група Світового банку, Міжнародний банк реконструкції та розвитку, фінансова допомога, світова фінансова стабільність, міжнародне фінансове регулювання, кредитні програми, державний борг.

JEL Classification: F34, H63, O19.

Introduction

The intensification of global financial and security instability, the growth of risks and threats, integration and disintegration processes encourage participants in the global financial environment to strengthen international cooperation at the level of governments and international organizations. This allows for the formation of coordinated approaches, common policies, and legal frameworks for the sustainable development of the global financial system, which is extremely important in conditions of international instability.

For understanding the features of global development, work of Lessambo (2015) is important, which attempts to disclose information about

the activities of international financial organizations, in particular in the context of challenges affecting their activities and the role of the latter in the global economy. Analysis of foreign scientific sources allows us to draw conclusions about the attention of scientists and international experts to the activities of international organizations and their impact on national development and global transformations, the most important of which are the relevant reviews and annual reports of international institutions. Camdessus (2005, November), in his speech on the long-term prospects for the functioning of international financial institutions and the importance of their initiation of further reforms for the development of humanity, outlined the directions and needs for adapting resources to fulfill new missions. Emphasizing the challenges of a global nature, he noted the possibility of overcoming them by institutions with global competence in coordination with national authorities. Broome et al. (2018, September), studying international organizations, argue that the production of transnational knowledge is the main source of influence on international organizations, which is further used by the latter to develop global benchmarks of national productivity. According to the authors, global benchmarking of international organizations acts as a source of indirect power in world politics, and the legitimacy of some of their indicators is questionable, therefore some norms and requirements for compliance with the latter are considered as means of indirect influence on state policy priorities. Blom (2021), studying international financial institutions, notes their significance in managing global finances due to a significant number of participants, a combination of interests and functions of market management; emphasizes the interconnection of the market, the interests of participants and the relationship with the development of state policy. He argues that the development of international financial institutions contributes to the formation of an information environment for the interaction of the state and business, as well as the formation of market structures, contributes to the establishment of standards for transparency and the resolution of sovereign debt crises.

Fernandes (2024, November) justifies the need to activate civil society to form public pressure on the G20 countries to support reforms of the international financial architecture, starting from 2025. Given that the IMF and the World Bank were created to shape the international financial architecture of the post-war era and have already celebrated their 80th anniversary, the author recognizes that in the current context of the escalation of the global crisis and threats to the multilateral order, the time has come for significant changes in the financial architecture, starting with the Bretton Woods institutions. We agree with the author's position on the leading role of the Bretton Woods institutions in ensuring global sustainable development, but we believe that these institutions have acquired the status of global institutions in

the course of evolutionary development and ensure the formation of the architectonics of the global financial system. Separate provisions on this issue have been disclosed earlier (Chugunov & Kucher, 2022).

The experience accumulated by international organizations allows solving individual problems, but in the conditions of a changing environment, the formation of new global challenges and the growing need to finance stabilization measures of sovereign countries, the issue of the adequacy of the financial potential of international organizations and the strengthening of their influence on ensuring the stability of world finances is important. The disclosure of the specifics of the finances of the International Bank for Reconstruction and Development as a Bretton Woods institution and their impact on sustainable development and global stability remains relevant, which requires further research in today's conditions.

Among national scientists who have studied issues of global development and international financial and credit institutions, in particular the World Bank Group and its structural institutions, the use of international credit instruments, financial assistance, and cooperation mechanisms with Ukraine, it is worth noting the following: Klymenko (2017), Kozhukhova (2016), Kolosova (2016; 2023), Severina (2017), Sidenko and Kulbida (2020), Slozhko (2015), Tereshchenko (2018), and others.

The research conducted by national and foreign scientists is important, but scientific developments on the finances of international institutions, in particular the Bretton Woods institutions and their adaptive transformations have not been carried out. In the context of increasing globalization and national challenges and threats, the interdependence of global financial stability and sustainable development in individual countries and regions of the world, it is important to conduct further research on the impact of the financial potential of the World Bank Group (WBG), in particular the International Bank for Reconstruction and Development (IBRD), on ensuring international stability and global development.

The aim of the research is to reveal the features of the IBRD finance functioning, the importance of their adaptive development for ensuring international financial stability. The research is based on the hypothesis of the architectonic formation of the global financial system on the basis of strengthening the regulatory influence and financial potential of global financial and credit institutions. To achieve the aim, the task of determining the features of the IBRD evolution through the prism of the development of the World Bank Group is provided; conducting an analysis of the formation of the IBRD authorized capital; revealing the features of the formation and the IBRD's financial resource use; generalizing the prospects for the IBRD development as a component of the World Bank. The research applied a system of scientific methods and approaches. The following methods were considered to be more

important, as: methods of scientific abstraction; system and generalization: to determine the IBRD place and role as a component of the World Bank in ensuring international stability and financing sustainable development goals; methods of analysis and synthesis: to assess the indicators of the IBRD's financial activity, the effectiveness of project implementation, the size of the IBRD's financial flows, which affect international financial stability and ensure the implementation of sustainable development goals. Legal documents, reporting materials, and publications of the World Bank experts were of great importance in revealing the features of the functioning of the World Bank Group.

Structurally, the article is divided into three sections. The first reveals the IBRD historical development through the content of the goals and features of the World Bank Group development, an analysis of the formation of its authorized capital is carried out, the top 10 countries by the largest amounts of invested funds are identified. The second is devoted to revealing the features of the use of IBRD financial resources in the context of projects being implemented, financial indicators of the bank's lending activities, and an analysis of financial reporting indicators. The third section considers the prospects for the IBRD development as a component of the World Bank in terms of introducing new approaches to implement a new vision of the World Bank's mission, improving activities to accelerate the implementation of sustainable development goals, and introduce a new financing model of the World Bank development.

1. The evolution of the International Bank for Reconstruction and Development

The prophetic theses of Camdessus (2005, November) about the vital role of the IMF and the World Bank in shaping sustainable and stable growth in the global environment, solving two key problems related to providing support to developing countries in their desire to become developed and to reduce poverty for the poorest countries, that is, to reduce the gaps between them, and to reduce security and terrorist threats, are relevant under the current conditions. The national and global financial environment is changing; interstate relations are strengthening on a bilateral and multilateral basis; the role of international organizations in resolving security issues is increasing, but at the same time adaptive transformations of all entities operating in the international arena is taking place. Constant changes in the financial environment create new challenges and tasks, risks and threats. National governments and central regulators, as well as international institutions, whose activities are aimed at ensuring the development and stability of the global financial system, are engaged in their solution. The most powerful, influential, and global of them are the IMF and the World Bank

Group. The recent result study of IMF finances (Chugunov & Kucher, 2022), in addition to the features of the formation, use, and redistribution of financial resources in the IMF system, also revealed the important role of cooperation between these organizations.

The financial relations and system of the World Bank Group are determined by the peculiarities of its evolutionary development. The International Bank for Reconstruction and Development (IBRD) as the Bretton Woods institution was established in December 1945 with the aim of restoring the economies of countries destroyed by war and increasing the economic development of developing countries. In his welcome letter to the meeting of the IMF and the IBRD representatives in 1946, Harry S. Truman used the address: "Inaugural meeting World Fund and Bank", which determined the further future of the Bank.

According to the IBRD Articles of Agreement (as amended in 2012) in Article 1, five bank objectives are specified, which determine the focus of its activities on the reconstruction and development of territories through productive investment, restoration of the post-war economy, promotion of foreign investment through guarantees or participation in loans, balanced development of international trade and maintenance of balance of payments equilibrium; increasing "productivity, living standards and working conditions in their territories"; organizing channels for receiving loans from international sources for the accelerated implementation of useful and urgent projects; carrying out activities taking into account the impact of international projects on national business and ensuring a smooth transition "from a wartime economy to a peacetime economy".

The IBRD's activities began with financing the post-war reconstruction of European countries, the implementation of the Marshall Plan of 1947 by expanding the financing of infrastructure projects in the world and introducing training for government officials of member countries. In official documents, the name "World Bank Group" began to be used in 1966 in a statement by S. Noel McIvor, Deputy Director of the South Asia Department, ECAFE, which described the activities of the World Bank Group in South Asia. And already on September 30, 1968, McNamara (1973, September 24), speaking before the Board of Governors as President of the World Bank, outlined measures aimed at the development of member countries and the assistance of the UN in this direction. Gradually, new international institutions were created within the WBG: the International Finance Corporation (The International Finance Corporation, IFC), which provided the possibility of financing projects in the private sector. An important role in the formation of the international financial environment was played by the creation of the International Development Association (IDA), designed to provide financial support to the most creditworthy countries, in particular financial and technical assistance Explore History (2024), and the creation of an

international institution for guaranteeing and insurance against non-commercial risks – the Multilateral Investment Guarantee Agency (MIGA).

The Group formed in modern conditions ensures the implementation of the set goals and objectives with the allocation of the necessary financing for the implementation of the Sustainable Development Goals, where the IMF and the WBG (IBRD, IFC and IDA) received the status of specialized UN agencies (Relationship Agreement with UN and IMF (1947); Specialized Agency relationship agreement IBRD and UN (1947); United Nations and International Bank for Reconstruction, and Development (Acting for and on behalf of the International Finance Corporation) (1957); United Nations and International Development Association (1957). Each constituent institution of the WBG has the status of legally separate and financially independent institutions owned by the governments of the member countries. The IBRD uses the following approach to determine the number of votes: the number of votes within the share capital (one vote for each share of share capital) and additionally basic votes when applying additional capital subscription. They provide that the sum of all basic votes should be equal to 5.55% of the sum of the basic votes and the share of votes for all members (World Bank Group, n. d.).

According to Article 2 of the IBRD Agreement Articles (as amended in 2012), "the authorized capital of the Bank shall be USD 10 000 million, as of July 1, 1944. The authorized capital shall be divided into 100 000 shares of par value USD 100 000 each, which shall be open for subscription by members only". It may be increased by a three-quarters majority vote of the total number of member countries. The subscribed capital is divided into two parts: paid-in – 20% and 80% – unpaid subscription, which shall be paid upon application by the bank and shall be the same for all.

The formation of the IBRD share capital is carried out taking into account the defined basic principles and the bank's capital subscriptions implemented in subsequent periods. *Figure 1* shows the top 10 leading member countries of the Bank with the largest volumes of invested funds. These data indicate that the USA, Japan and China have the greatest influence. The average price of one percent is USD 2 677 87801 million. The IBRD data indicate that the expansion of share capital occurs with a reference to the value of the USD in 1944. An important role in financing the Bank is played by countries from the top 10 countries, taking into account the influence of the size of their capital (only 45.68% of the total capital of the IBRD was formed at the expense of the other 179 member countries of the bank). The volume of invested assets affects the number of votes of member countries. The USA has 439.308 votes, which is 15.49% of their total number; Japan – 200.718 (7.08% of the total); China – 167.692 (5.91% of the total). As for Ukraine, the amount of invested funds is USD 1436 1 million in 1944 (0.54%), and the number of votes is 15.194, i.e. 0.54% of their total.

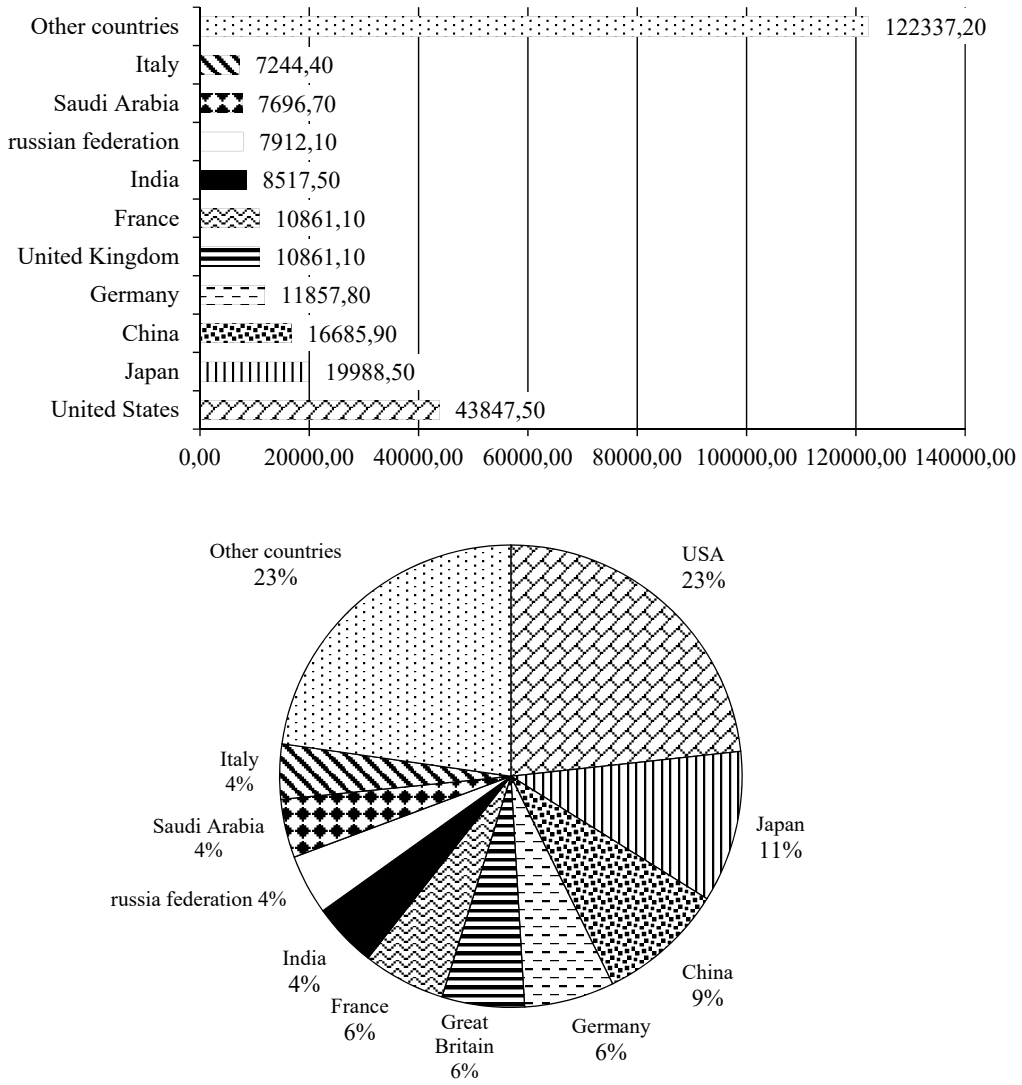

Figure 1. Indicators of participation of the top 10 IBRD member countries in the Bank's share capital (in % and USD million), as of 17.05.2024

Source: (World Bank Group, 2025, January 2).

Since 2020, the Bank has been operating under a new operating model aimed at achieving the goal of "enhancing growth and development", which is based on strengthening the Bank's leadership on these issues and applying a model of assistance managed by its recipient countries. The IBRD Management's Discussion & Analysis (2020) documents indicate that the introduction of two positions of Vice Prime Ministers, whose activities are focused on the African continent, is aimed at solving a wide range of problems on the continent. In particular, in 2020, the IBRD, in order to overcome the consequences of COVID-19, announced the provision of USD" 50–55 billion to member countries to support efforts to combat the pandemic, to support health and social programs implemented by other institutions within the WBG (IDA, IFC, BAGI, ICSID).

2. Peculiarities of the IBRD's financial resources management

While analyzing the use of the IBRD's financial resources, it is important to take into account the Bank's lending activities using the indicators of net liabilities, gross disbursements, and net disbursements. According to the data presented in *Figure 2*, there is a tendency to reduce the indicator of net liabilities in 2016–2017 by USD 7.118 billion and increase in subsequent years, the level of which was 1.7 times and USD 15.961 billion. As for the indicators of gross disbursements and net disbursements, which determine the overall results of IBRD operations, they had a common downward trend in 2016–2018 (due to a decrease in the volume of development policy financing operations). This was reflected in their reduction by USD 5.143 billion and USD 7.559 billion, respectively. In the future, their growth is observed by 1 and 2.3 times, or USD 8.115 billion and USD 7.098 billion respectively.

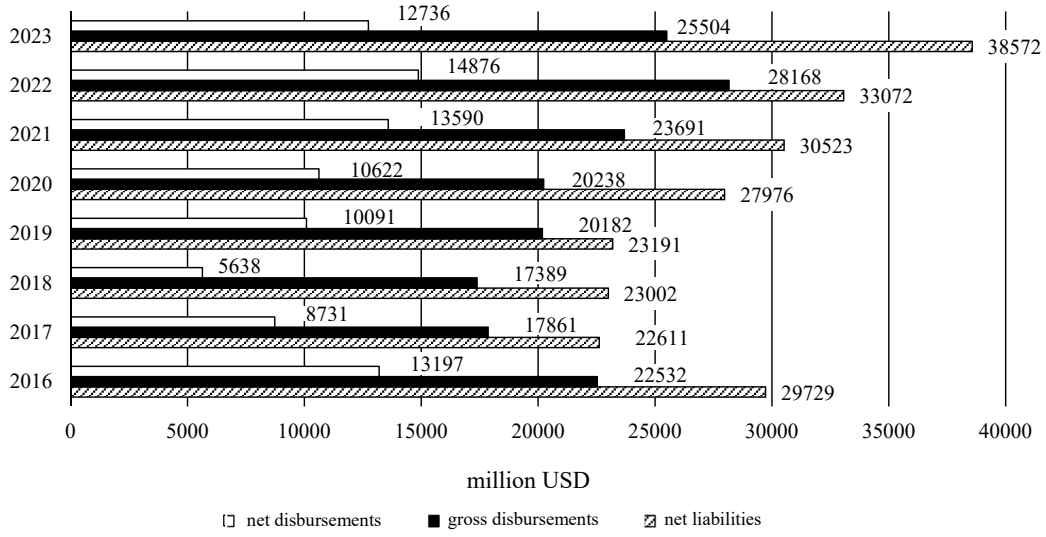

Figure 2. Indicators of the IBRD lending activity in 2016–2023

Source: (Management's Discussion & Analysis, 2020; Management's Discussion & Analysis, 2023).

It is worth considering that, despite the general trend towards an increase in gross payments and net payments after 2020, their largest volumes were in 2022, and the net liabilities indicator in 2023 increased by 1.16 times, i.e. by USD 5500 million. The growth of net payments on loans directly affects the increase in the net debt indicator.

Such dynamics of the IBRD's performance indicators are associated with the impact of measures implemented by the Bank in previous years regarding the formation and use of reserves that were accumulated from income before their distribution within the financial year. The data in *Figure 3* clearly demonstrate a significant increase in profit before distribution during 2016–2020. Its average growth rate for the specified period was 125%, and

the highest indicator was in 2018 and was equal to 146% compared to 2017. In 2021–2022, its growth rate decreased and the average indicator for two years was 0.77%. A positive impact was played by a significant increase in the profit before distribution indicator in 2023, which was equal to 163% of the 2022 indicator. Thus, the growth rate of the indicator in 2023 by 2016 was 221.25%, or USD 719 million.

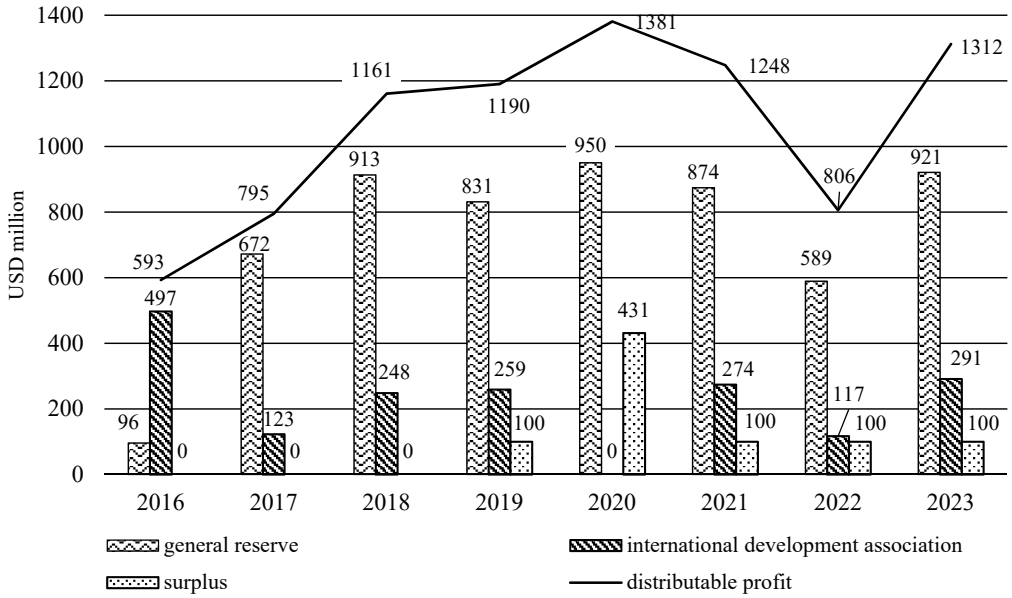

Figure 3. Net profit and distributable profit of the IBRD in 2016–2023, USD million

Source: (Management's Discussion & Analysis, 2020; Management's Discussion & Analysis, 2023).

The IBRD general policy, which contributed to the increase in the financial potential of the Bank, made it possible to finance the allocation of funds to support the activities of the International Development Association (IDA), as well as the general reserve and to form, starting from 2019, a surplus of funds. The average annual growth rate of the general reserve for eight years was 169.62%, with its maximum value recorded in 2017 – 700% and the minimum – 69% in 2022. The best indicators of the formation and distribution of the IBRD's profit are shown in the graph data by the indicator of profit before distribution in 2020 (this occurred through an increase in net interest income), which allowed to increase the volumes of the general reserve and surplus resources. It is worth noting important points that influenced the IBRD financial indicators: firstly, the Board of Governors of the Bank during 2016–2023. approved transfers in the amount of USD 3 044 million, which resulted in a net loss of the bank in 2017 of USD 237 million and in 2020 of USD 42 million, respectively; secondly, the IBRD's unrealized net gains (losses) from the revaluation at market value of the bank's non-trading portfolios are not included in the IBRD's distributable

income; thirdly, no funds were reallocated to the IDA in 2020. The allocation of IDA funds since 2017 is carried out using a formula approach, which takes into account the need to increase the IBRD's reserves at the expense of part of the distributed income and the bank's financial condition.

The IBRD forms its balance sheet as part of the financial statements, the indicators of which are shown in *Figure 4*. Its main items are: total assets; net investment portfolio; net debt on loans; loan portfolio. According to the results of the analysis of the dynamics of the IBRD's total assets based on its balance sheet; we can conclude that they are growing. The average annual growth rate in 2017–2020 was 16.48%, but in 2021–2023 it is 103.91%. At the same time, the price of one percent in 2020 is USD 358.37 million less than the price of one percent in 2023. In general, over the entire period under study, total assets increased by USD 101 233 million. The IBRD's finances are significantly influenced by its investment policy and the dynamics of the net investment portfolio. During 2016–2021 There was a stable positive dynamics of the latter, and the average annual growth rate in the specified period was 111.43%, while the largest size of this indicator was recorded in 2017 – 138.46%.

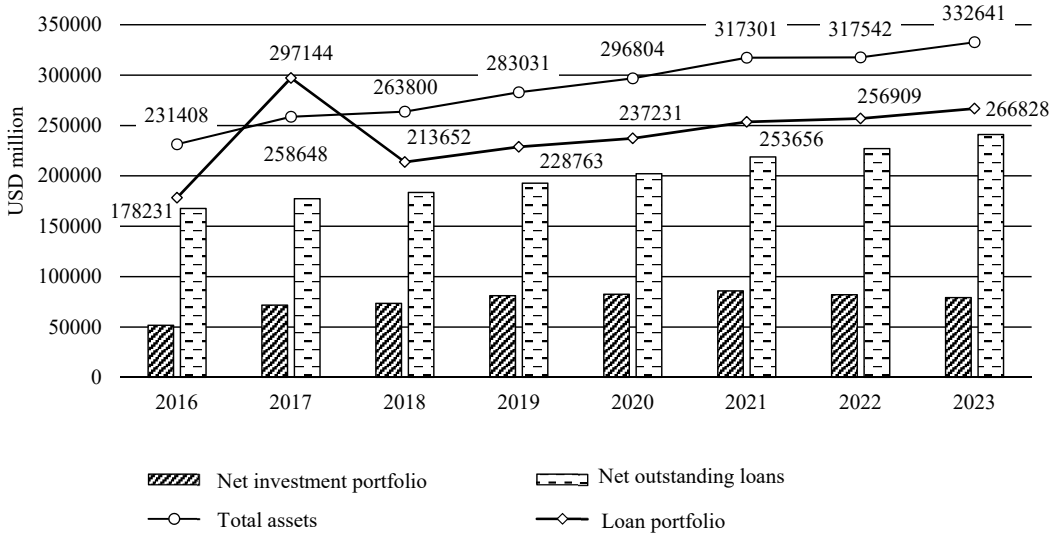

Figure 4. IBRD balance sheet for 2016–2023 financial years, USD million

Source: (Management's Discussion & Analysis, 2020; Management's Discussion & Analysis, 2023).

This was due to an increase of USD 60 million in unrealized gains from the revaluation of the investment portfolio compared to the previous year and improved market conditions in 2017 (Management's Discussion & Analysis, 2017). In 2022–2023, the average annual growth rates were 96.06%, and the size of the net investment portfolio decreased by USD 6 636 million compared to 2021.

The implementation of medium-term and long-term borrowings allows the Bank to increase its financial potential, lend to development

projects, and meet liquidity needs. Given that the bank has high credit ratings and gives preference to high-quality investments; it can actively use both financial support from shareholders and borrow on financial markets. An important role is played by activities aimed at fulfilling debt obligations by borrowing countries to the IBRD. The bank's loan portfolio shows unstable dynamics. During the period under review, the average annual growth rate was 108.78%, but, for example, in 2017 this figure was 166.72% and was the maximum in both absolute and relative terms, and in 2018 it was 71.90%. In 2023, the size of the IBRD loan portfolio was USD 30 316 million less than in 2017. It should be noted that the ratio of equity to loans issued is decreasing from 22.9% in 2018 to 22% in the 2023 fiscal year, and its further reduction to 19% is foreseen in the future (A New Era in Development, 2023; Supporting Countries in Unprecedented Times: Main Report, 2020).

The research determined the significance of the IBRD in the WBG projects by comparing the Bank's share in financing the WBG partner countries. In terms of reserved funds during 2016–2023, the bank's share decreased from 46.32% in 2016 to 30.06% in 2023. Over the entire period under study, it averaged 34.69%. In terms of resources provided the IBRD's share in WBG financing averaged 38.95% and had a general trend towards a reduction in the volume of resource provision. It is also worth taking into account the financial support provided to the IBRD by the IDA for the implementation of projects in the poorest WBG member countries. In the period under study, the average IDA indicators were 32.57% and 32.70%, respectively. According to the IBRD Annual Report for the 2023 fiscal year, out of the ten countries identified as the Bank's largest borrowers, Ukraine ranks fourth after India, Turkey, and Indonesia with a reserved funds indicator of USD 3 133 million.

3. The IBRD development prospects as a part of the World Bank Group

The transformations taking place in the WBG and the current challenges facing humanity have shaped a new vision of the World Bank's mission to "end poverty and create shared prosperity on a livable planet – people, prosperity, planet" (World Bank, 2024). Changes in the global environment also affect global financial and credit institutions, as already noted. The WBG Board of Governors is actively working towards the adaptive development of the institution to the challenges of globalization. This has contributed to the formation of a new vision, mission and initiatives to strengthen the institution's impact, improve approaches to providing assistance and build financial capacity.

Differentiation of financing from the IBRD, IDA and IFC allows taking into account the capabilities of countries with different levels of economic development in terms of the ability to accumulate national resources, attract borrowed funds and activate private capital to ensure recovery and sustainable development. The creation of financial anti-crisis

reserves and their accumulation in the IBRD allows financing urgent measures aimed not only at responding to, but also at preventing crises. Important for improving the WBG activities was the adoption of a new strategy, the World Bank Group Strategy for Fragility, Conflict, and Violence 2020–2025 (WBG, 2020, February 27), which is aimed at achieving progress in countries characterized by instability, conflict and violence.

Given the significant regulatory impact of the WBG on the global and national development of its member countries and the need for adaptive changes in its activities in accordance with global challenges, risks and threats, the institution implemented measures to increase capital in 2018. Forward Look a Vision for the World Bank Group in 2030 (WBG. DC2016-0008, 2016, September 20) and the development roadmap of the Group of institutions to 2030 Forward Look a Vision ... Main Messages (WBG. DC2016-0009, 2016, September 20). The initiated activity has significant long-term consequences not only for the WBG, but also for the global financial environment and development in general. Although its activities and implemented projects contribute to the implementation of sustainable development goals, the practices and mechanisms implemented have a positive impact on institutional development in the financial sector and are innovations in international cooperation, which contributes to the stability of the global financial architecture, the combination of public, private, and inter-institutional solutions, the resolution of issues of instability, pandemics, conflicts, which ensures the coherence of interests, decisions, and actions, etc.

Strengthening the scale, scope, and instruments of the WBG's influence on the global community requires strengthening and "...strengthening internal coordination mechanisms, aligning incentives, exploring new and strengthening existing instruments; and fostering relationships with a broader group of institutional and private investors… improve its efficiency and internal operating model…". Among the basic factors of change that will contribute to strengthening the WBG's financial potential were identified, in particular, replenishing IDA18, improving approaches to IDA financial support from the IBRD and IFC, increasing the IBRD's efficiency and IFC's ability to contribute to the formation of national markets, stimulate the attraction of private investment to potentially important projects, as well as strengthening the limits of the MIGA portfolio, which contributes to attracting additional foreign direct investment (WBG. DC2016-0009, 2016, September 20).

The achievements made in implementing the 2016 Roadmap have contributed to enhancing the effectiveness and speed of the WBG's response to global challenges and addressing the problems of member countries. Important achievements are related to increasing effectiveness, developing new indicators, improving operational efficiency, optimizing environmental and social policies, developing programs to respond to global challenges, introducing WBG guarantees, etc.

The new Development Roadmap (WBG, 2023, January 13) and the proposals of the Development Committee (WBG, DC2024-0002, 2024, March 29) have identified changes to the WBG development in terms of improving the financial model, mechanisms, instruments, and issues related to the formation of new platforms for cooperation between the WBG and member countries, other international institutions, and partners (*Figure 5*).

The model of financing	Action plan/development methodology
• Reduction of the IBRG Equity-to-Loan (E/L) Share. • IBRG Hybrid Capital. • IBRG Portfolio Guarantee Platform. • Financial Incentive Framework for IBRG Countries. • Incentives and Cofinancing Platform. • IDA Crisis Response Window Plus (CRW+) Financing. • Launch of IDA 21. • IDA Capital Adequacy Review and Balance Sheet Optimization. • Capital Expansion Prior to IBRD Withdrawal. Living Planet Fund. • New IFC and MIGA Instruments to Mobilize Private Capital.	• Crisis Preparedness and Response Toolkit and Climate Change Debt Provisions. • Global Emerging Market Risk Database. • Knowledge Quality. • Expanded Data Bank. • World Bank Group Academy. • Private Sector Country Diagnostics and Public Finance Reviews. • One World Bank Group Country Office. • Private Sector Investment Lab. • Strengthening and Streamlining ESF Implementation. • World Bank Group Guarantee Platform. • Operational Efficiency and Effectiveness Measures. • Reformed Country Engagement Model and Implementation Support. • Repository-Backed Securitization Platform. Global Challenge Programs. • Budget Amendments

Figure 5. New approach to the financing model and the World Bank Group's development action plan

Source: compiled by the authors from (WBG, DC2024-0002, 2024, March 29).

The above changes and the approaches being introduced determine the prospects for the development of the WBG institutions, provide a systematic approach to strengthening the overall financial potential and regulatory influence on the development of the global financial architecture and sustainable development.

Conclusions

The conducted research confirms the hypothesis of the architectonic formation of the world financial system on the basis of strengthening the regulatory influence and financial potential of global financial and credit institutions using the example of the International Bank for Reconstruction and Development. In the context of the aim, it is revealed how the historical features of the creation and adaptive transformations in the process of the IBRD development and activity, which influenced the volumes, effectiveness and introduction of accumulation models and use of its finances, determined the features of the implementation of the mission, policy and projects.

The analysis results of the IBRD financial potential allowed us to determine the main factors of its formation and growth: share capital,

implemented subscriptions to capital among member countries and borrowing by the Bank on international markets. A study of the structure of the Bank's share capital and the top 10 member countries by the largest amounts of invested funds showed that the USA, Japan and China have the largest volumes of capital and the number of votes in decision-making. The global impact of the Bank on the financial environment is shown, the importance of increasing the IBRD financial potential to ensure the stability of the global financial system and individual countries, in particular in terms of providing assistance and supporting efforts to combat the pandemic, overcome the consequences of COVID-19, and finance growth and development projects. The features of the IBRD financial resources' use are revealed, in particular in terms of the Bank's lending activities based on indicators of net liabilities, gross and net payments. The general trend towards an increase in gross payments and net payments after 2020 is identified. The factors that influenced the dynamics of the profit before distribution indicator during 2016–2023 and the positive impact of measures to form and use reserves that accumulate from income before their distribution within the financial year are revealed. The important role of a new operating activity model aimed at improving financing of growth and development in the context of the Bank's adaptive development is shown. This contributed to the increase in the IBRD financial potential and allowed it to finance the allocation of funds to support the activities of the International Development Association, as well as the formation of the general reserve and surplus funds of the Bank since 2019. The analysis of the dynamics and structure of the IBRD Balance Sheet made it possible to determine the trend towards growth in total assets, the implemented investment policy and the dynamics of the net investment portfolio indicators had a significant positive impact on its financial results. The impact of the Bank's medium-term and long-term borrowings on increasing its own financial potential, lending to development projects implemented by the IBRD to ensure global financial stability and, in accordance with signed international agreements, in particular with the UN, to meet liquidity needs, is revealed. The implementation of the IBRD's mission is ensured by its lending activities, which allows for the redistribution of financial resources from international markets, attracted on the best terms, to member countries in need of the IBRD financial assistance. The gradual decrease in the ratio of equity to loans issued corresponds to the Bank's policy of further reducing it. The generalization of the prospects for the development of the IBRD as a component of the World Bank has shown the active implementation of measures for the adaptive development of the institution to the globalization challenges. This provided the formation of a new vision for the mission and implemented initiatives to strengthen the institution's impact, improve approaches to providing financial assistance to member countries, and build financial capacity in accordance with the adopted Strategy for Fragility,

Conflict and Violence (2020–2025). Given the level of relations between the WBG member countries and their number, it can be assumed that such changes are the beginning of a new stage in the development of the global financial system in terms of interstate cooperation to achieve sustainable development goals and taking into account national needs, characteristics and global challenges. Future scientific research should determine models for the architectonic formation of the global financial system, taking into account the priorities of sustainable development.

REFERENCE/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Articles of Agreement. (2012). *IBRD.* https://www.worldbank.org/en/about/articles-of-agreement/ibrd-articles-of-agreement

Blom, J. (2021). The Institute of International Finance: From Poacher to Gamekeeper? *Business and Politics*, *23*(1), 178. https://www.cambridge.org/core/journals/business-and-politics/article/institute-of-international-finance-from-poacher-to-gamekeeper/FC4CA1B46C080E756B84DA693A34771B

Broome, A., Homolar, A., & Kranke, M. (2018, *September*). Bad science: International organizations and the indirect power of global benchmarking. *European Journal of International Relations*. https://journals.sagepub.com/doi/epub/10.1177/1354066117719320

Camdessus, M. (2005, *November*). International Financial Institutions: Dealing with New Global Challenges. *International Monetary Fund.* https://www.elibrary.imf.org/display/book/9781451950199/ch02.xml?tabs=fulltext l

Chugunov, I. & Kucher G. (2022). Finance of the International Monetary Fund. *Foreign trade: economics, finance, law*, (2), 77–95. http://zt.knute.edu.ua/index.php?lang=en&Itemid=791	Чугунов, І. Я. & Кучер, Г. В. (2022). Фінанси Міжнародного валютного фонду. *Зовнішня торгівля: економіка, фінанси, право*, (2), 77–95. http://zt.knute.edu.ua/index.php?lang=en&Itemid=791

Explore History. (2024, June 09). *The World Bank.* https://www.worldbank.org/en/archive/history#

Fernandes, C. (2024, *November).* The lost call for international financial architecture reform in the G20. *Brettonwoods project*. https://www.brettonwoodsproject.org/2024/10/the-lost-call-for-international-financial-architecture-reform-in-the-g20/

IBRD. (2017, June 30). *Management's Discussion & Analysis and Financial Statements International Bank for Reconstruction and Development*. https://www.ifc.org/content/dam/ifc/doc/2010/fy17-q4-annual-mda-financial-statements.pdf

IBRD. (2020, June 30). *Management's Discussion & Analysis and Financial Statements International Bank for Reconstruction and Development*. http://pubdocs.worldbank.org/en/732821597064968827/IBRD-Financial-Statements-June-2020.pdf/

IBRD. (2023, June 30). *Management's Discussion & Analysis and Financial Statements International Bank for Reconstruction and Development.* https://www.ifc.org/content/dam/ifc/doc/2023/FY23-Annual-Information-Statement.pdf

International Bank for Reconstruction and Development Subscriptions And Voting Power Of Member Countries. (2025, January 2). *World Bank Group*. https://thedocs.worldbank.org/en/doc/a16374a6cee037e274c5e932bf9f88c6-0330032021/original/IBRDCountryVotingTable.pdf

Klymenko, K. V. (2017). Foreign experience of cooperation with International Bank for Reconstruction and Development and International Development Association. *Scientific works. NDFI*, (1), 16–40. http://www.irbis-nbuv.gov.ua/UJRN/Npndfi_ 2017_1_3	Клименко, К. В. (2017). Зарубіжний досвід співробітництва з Міжнародним банком реконструкції та розвитку і Міжнародною асоціацією розвитку. *Наукові праці НДФІ*, (1), 16–40. http://www.irbis-nbuv.gov.ua/UJRN/Npndfi_2017_1_3
Kolosova, V. (2023). Dopomoga grupy' Svitovogo banku Ukrayini u period vijny' ta vidnovlennya krayiny. *National Institute for Strategic Studies*. https://niss.gov.ua/doslidzhennya/mizhnarodni-vidnosyny/dopomoha-hrupy-svitovoho-banku-ukrayini-u-period-viyny-ta	Колосова, В. (2023). Допомога групи Світового банку Україні у період війни та відновлення країни. *Національний інститут стратегічних досліджень*. https://niss.gov.ua/doslidzhennya/mizhnarodni-vidnosyny/dopomoha-hrupy-svitovoho-banku-ukrayini-u-period-viyny-ta

Kolosova, V. P. (2016). Finance of international institutions in Ukraine. *State University of Trade and Economics*, 504. https://knute.edu.ua/file/MjIxNw==/b627e66ba9374fe51e0c97547d132ceb.pdf	Колосова, В. П. (2016). Фінанси міжнародних інституцій в Україні. *Київ. нац. торг.-екон. ун-т*, 504. https://knute.edu.ua/file/MjIxNw==/b627e66ba9374fe51e0c97547d132ceb.pdf
Kozhukhova, T. V. (2016). World Bank Financing of the development projects in Ukraine. *International Humanitarian University Herald. Economics and Management,* (15), 17–20. http://nbuv.gov.ua/UJRN/Nvmgu_eim_2016_15_6	Кожухова, Т. В. (2016). Фінансування Світовим банком проектів розвитку в Україні. *Науковий вісник Міжнародного гуманітарного університету. Економіка і менеджмент,* (15), 17–20. http://nbuv.gov.ua/UJRN/Nvmgu_eim_2016_15_6

Lessambo, F. (2015). International Financial Institutions and Their Challenges. *Palgrave Macmillan US*, 15. https://www.perlego.com/book/3506936/international-financial-institutions-and-their-challenges-a-global-guide-for-future-methods-pdf

McNamara, Robert S. (1973, September 24). *Address to the Board of Governors by Robert S. McNamara (English)*. Presidential speech Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/930801468315304694/Address-to-the-Board-of-Governors-by-Robert-S-McNamara

Relationship Agreement with UN and IMF. (1947). *Treaty Series. Treaties and international agreements registered or filed and recorded with the Secretariat of the United Nations, 16 UNTS*(108), 325–328. https://research.un.org/en/docs/unsystem/imf

Severina, K. (2017). Lending by the World bank for infrastructure development projects in Ukraine. *Scientific works. NDFI,* (1), 114–121. http://npndfi.org.ua/docs/NP_17_01_114_uk.pdf	Севeріна, Х. І. (2017). Кредитування Світовим банком проектів розвитку інфраструктури в Україні. *Наукові праці НДФІ,* (1), 114–121. http://npndfi.org.ua/docs/NP_17_01_114_uk.pdf
Sidenko, S. & Kulbida, M. (2020). International financial organizations in the economic modernization processes of countries. *The International Economic Policy, 1-2*(32-33), 100–136. http://iepjournal.com/en/issue-32-33-2020.html	Сіденко, С., & Кульбіда, М. (2020). Міжнародні фінансові організації у процесах економічної модернізації країн. *Міжнародна економічна політика, 1-2*(32-33), 100–136. http://iepjournal.com/en/issue-32-33-2020.html
Slozko, O. O. (2015). Estimation of Investment Projects of the IBRD and the EBRD in Ukraine. *Global and national problems of the economy,* (7), 66–71. http://global-national.in.ua/issue-7-2015/15-vipusk-7-veresen-2015-r/1185-slozko-o-o-otsinka-efektivnosti-investitsijnikh-proektiv-mbrr-ta-ebrr-v-ukrajini	Сльозко, О. О. (2015). Оцінка ефективності інвестиційних проектів МБРР та ЄБРР в Україні. *Глобальні та національні проблеми економіки*, (7), 66–71. http://global-national.in.ua/issue-7-2015/15-vipusk-7-veresen-2015-r/1185-slozko-o-o-otsinka-efektivnosti-investitsijnikh-proektiv-mbrr-ta-ebrr-v-ukrajini

Specialized Agency relationship agreement IBRD and UN. (1947). Treaty Series. *Treaties and international agreements registered or filed and recorded with the Secretariat of the United Nations*, *16*(109), 341–344. https://research.un.org/en/docs/unsystem/worldbank

Tereshchenko, H. M. (2018). Prospects and priorities of the use of the World Bank's financial and credit instruments, *Finance of Ukraine,* (10), 111–128. http://finukr.org.ua/docs/FU_18_10_111_uk.pdf	Терещенко, Г. М. (2018). Перспективи та пріоритети використання фінансово-кредитного інструментарію Світового банку. *Фінанси України,* (10), 111–128. http://finukr.org.ua/docs/FU_18_10_111_uk.pdf

The World Bank. (2023). *World Bank Annual Report 2023: A New Era in Development.* https://openknowledge.worldbank.org/handle/10986/40219

United Nations and International Bank for Reconstruction, and Development (Acting for and on behalf of the International Finance Corporation) (1957). *Treaty Series. Treaties and international agreements registered or filed and recorded with the Secretariat of the United Nations*, *265(*546), 312–318. https://research.un.org/en/docs/unsystem/worldbank

United Nations and International Development Association. (1957). *Treaty Series. Treaties and international agreements registered or filed and recorded with the Secretariat of the United Nations*, *394*(582), 221–229. https://research.un.org/en/docs/unsystem/worldbank

WBG DC2016-0008. (2016, September 20). *Development Committee. Forward Look a Vision for the World Bank Group in 2030.* https://pubdocs.worldbank.org/en/545241485963738230/DC2016-0008.pdf

WBG, DC2016-0009. (2016, September 20). *Forward Look a Vision for the World Bank Group in 2030 – Main Messages.* https://pubdocs.worldbank.org/en/420891485984810099/DC2016-0009.pdf

WBG, DC2024-0002. (2024, March 29). *From Vision to Impact Implementing the World Bank Group Evolution.* https://www.devcommittee.org/content/dam/sites/devcommittee/doc/documents/2024/Final_DC2024-0002.pdf

WBG. (2023, January 13). *Evolving the World Bank Group's Mission, Operations, and Resources: A Roadmap.* https://www.worldbank.org/en/news/statement/2023/01/13/world-bank-group-statement-on-evolution-roadmap

World Bank Group. (2020). *The World Bank Annual Report 2020: Supporting Countries in Unprecedented Times: Main Report*. http://documents.worldbank.org/curated/en/585151601566378168/Main-Report

World Bank Group. (2020, February 27). *World Bank Group Strategy for Fragility, Conflict, and Violence 2020–2025.* https://documents.worldbank.org/en/publication/documents-reports/documentdetail/844591582815510521/world-bank-group-strategy-for-fragility-conflict-and-violence-2020-2025

World Bank. (2024). *Poverty, Prosperity, and Planet Report 2024: Pathways Out of the Polycrisis.* https://hdl.handle.net/10986/42211

Conflict of interest: The authors claim that they have no financial or non-financial conflicts of interest in relation to this publication; they have no relationships with governmental bodies, commercial or non-commercial organizations that could be interested in submitting this viewpoint. Given that the authors are employed by the institution that publishes the journal, which may give rise to a potential conflict or suspicion of bias, the final decision to publish this article (including the selection of reviewers and editors) was made by those members of the editorial board who are not affiliated with this institution.

The authors received no direct funding for this research.

Chugunov I., Kucher G. IBRD in shaping the architectonics of the global financial system. *Scientia fructuosa*. 2025. № 1. P. 27–44. https://doi.org/10.31617/1.2025(159)02

Sent to the editorial office 26.11.2024.
Accepted for printing 12.01.2025.
Published online 17.02.2025.

DOI: 10.31617/1.2025(159)03
UDC 339.92:[061.1ЄС:1-622(477)=111

SHKUROPADSKA Diana,
PhD (Economics),
Associate Professor of the Department
of Economics and Competition Policy
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0002-6883-711X
diana.shkuropadska2016@knute.edu.ua

LEBEDEVA Larysa,
PhD (Economics),
Associate Professor,
Associate Professor of the Department
of Economics and Competition Policy
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0001-8632-5460
l.lebedeva@knute.edu.ua

GONÇALVES Jorge,
PhD (Geography), Associate Professor,
Institut Superior Tecnico – University
of Lisbon,
Avenida Rovisco Pais, 1, 1049-001, Lisboa, Portugal

ORCID: 0000-0001-6781-5149
jorgemgoncalves@tecnico.ulisboa.pt

INSTITUTIONAL FRAMEWORK FOR THE RESILIENCE OF CRITICAL INFRASTRUCTURE OF EU, NATO COUNTRIES AND UKRAINE

The necessity of protecting critical infrastructure is an extremely important task for the normal functioning of the national states, especially taking into account modern threats related to military actions, natural disasters, cyberattacks, pandemics, etc. The aim of the research is to substantiate and characterize the organizational and legal conditions for ensuring the resilience of critical infrastructure, using the example of the EU, NATO countries and Ukraine. The article's hypothesis is that the resilience of critical infrastructure depends on the level of institutional support, which is capable of adapting to the conditions of modern threats and risks, particularly during wartime, and involves comprehensive interaction between state institutions, the private and international organizations. To achieve the aim of the research, a

ШКУРОПАДСЬКА Діана,
доктор філософії, доцент кафедри економічної
теорії та конкурентної політики
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0002-6883-711X
diana.shkuropadska2016@knute.edu.ua

ЛЕБЕДЕВА Лариса,
к. е. н., доцент, доцент кафедри економічної
теорії та конкурентної політики
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0001-8632-5460
l.lebedeva@knute.edu.ua

ГОНСАЛВЕС Жорже,
к. геогр.н., доцент,
Вищий технічний інститут –
Лісабонський університет
Авеніда Ровішку Пайш, 1, 1049-001, Лісабон,
Португалія

ORCID: 0000-0001-6781-5149
jorgemgoncalves@tecnico.ulisboa.pt

ІНСТИТУЦІЙНЕ ЗАБЕЗПЕЧЕННЯ СТІЙКОСТІ КРИТИЧНОЇ ІНФРАСТРУКТУРИ ЄС, НАТО ТА УКРАЇНИ

Захист критичної інфраструктури є надзвичайно важливим завданням для забезпечення стабільного функціонування держави, особливо в умовах сучасних загроз, пов'язаних з військовими конфліктами, природними катастрофами, кібератаками, пандеміями тощо. Метою дослідження є обґрунтування організаційно-правових умов забезпечення стійкості критичної інфраструктури на прикладі країн ЄС, НАТО та України. У ході дослідження перевірено гіпотезу, що стійкість критичної інфраструктури залежить від рівня інституційного забезпечення, яке здатне адаптуватися до умов сучасних загроз і ризиків, зокрема у воєнний час, і включає комплексну взаємодію між державними інститутами, приватним сектором та міжнародними організаціями.

complex of general scientific and special methods was used, including methods of systematization and generalization, tabular methods, as well as analysis and synthesis.

The main regulatory legal acts ensuring the resilience of critical infrastructure in the EU have been identified and analyzed, highlighting the importance of coordinated efforts among EU member states to enhance the resilience and protection of critical infrastructure, especially in response to cross-border threats. NATO approach to ensuring the resilience of critical infrastructure has been analyzed that focuses primarily on crisis preparedness and ensuring the continuity of governance and essential functions even in the event of military aggression or hybrid threats. The regulatory legal acts on ensuring the resilience of critical infrastructure in Ukraine have also been examined, and the main tasks of the authorities responsible for ensuring the resilience of critical infrastructure identified. The levels and management bodies of Ukraine's national system for protecting critical infrastructure have been defined.

The main determinants of the resilience of critical infrastructure entities include physical resilience, functional resilience, organizational resilience, informational resilience, social resilience, economic resilience, and environmental resilience. These determinants are interconnected and collectively impact the ability of critical infrastructure entities to ensure continuous operation in crisis situations.

Keywords: critical infrastructure, resilience, institutional conditions, risks, crisis situation.

Для досягнення мети використано комплекс загальнонаукових та спеціальних методів: систематизації та узагальнення; табличний; аналізу та синтезу. Розглянуто основні нормативно-правові акти забезпечення стійкості критичної інфраструктури ЄС, що підкреслюють важливість скоординованих зусиль між державами – членами ЄС для підвищення стійкості та захисту критичної інфраструктури, особливо у відповідь на транскордонні загрози. Проаналізовано підхід НАТО до забезпечення стійкості критичної інфраструктури. Акцентовано на готовності до кризових ситуацій і забезпеченні безперервності управління та основних функцій навіть у разі воєнної агресії або гібридних загроз. Проаналізовані нормативно-правові акти щодо забезпечення стійкості критичної інфраструктури України, визначені основні завдання органів забезпечення стійкості критичної інфраструктури. Зазначені рівні та органи управління національною системою захисту критичної інфраструктури України. Основними детермінантами стійкості об'єктів критичної інфраструктури є: фізична, функціональна, організаційна, інформаційна, соціальна, економічна та екологічна стійкість. Ці детермінанти взаємопов'язані та комплексно формують здатність об'єктів критичної інфраструктури забезпечувати безперервне функціонування у кризових ситуаціях.

Ключові слова: критична інфраструктура, стійкість, інституційні умови, ризики, кризова ситуація.

JEL Classification: H12, H54, F53, L78, O43, O52.

Introduction

Critical infrastructure is a set of facilities that are extremely important for the functioning of society and the country's economy. This infrastructure primarily includes defence facilities, as well as those that provide essential services and communication. It may consist of power plants, water supply systems, food production and storage facilities, key transportation hubs, telecommunication networks, medical institutions, and many other priority objects. Ensuring the safety and functioning of these facilities under normal conditions, as well as during emergencies such as martial law, is one of the state's priorities.

The need to protect critical infrastructure is an extremely important task for the normal functioning of the state, especially during modern threats related to military actions, natural disasters, cyberattacks, pandemics etc. In this regard, governments in many countries are strengthening resilience measures (Mukherjee et al., 2023) for facilities considered critical to the livelihood of society.

Ukrainian and foreign researchers are actively studying the problem of critical infrastructure resilience of countries. Scientists emphasize that, within the paradigm of critical infrastructure protection, stakeholders have traditionally approached risk management with an asset-based focus, prioritizing security and physical measures to fully prevent disruptions to critical infrastructure (OECD, 2019, April 17, Ch. 2).

The key priorities for enhancing critical infrastructure resilience include: comprehensive enhancement of the legal framework for its protection; establishment of a state management system for its security; strengthening the safeguarding of critical infrastructure, particularly within the energy and transport sectors; fostering collaboration among entities involved in critical infrastructure protection; and promoting public-private partnerships in emergency prevention and response (Melnychuk, 2021; Yang et al., 2023).

Modern policies for critical infrastructure resilience must consider diverse and complex shock events, more interdependent systems and countries, and the rapid pace of innovation in infrastructure sectors (Khrapkina, 2024). It is also emphasized that protecting critical infrastructure requires partnership interaction between the owners and operators of critical infrastructure on one side and government agencies on the other (NISS, 2013, December 9). The public and private sectors hold a shared responsibility for critical infrastructure resilience, requiring the formation of a robust partnership and a high level of trust to facilitate the effective exchange of sensitive information (Ninković, 2021). Moreover, economists state that institutional conditions for ensuring economic resilience can reduce the vulnerability of the economic system to shocks, promote effective countermeasures, and accelerate economic recovery after such events. The development of institutional conditions depends on effective public policy and mechanisms for counteracting shocks (Lagutin et al., 2020).

Researchers emphasize that today's critical infrastructure is largely digital, with cyber-physical systems playing a central role. These systems integrate computing technologies with physical processes, resulting in digital-physical hybrids that are foundational to our infrastructure. This cyber-physical nature now characterizes sectors such as water, electricity, communications, healthcare, transportation, manufacturing, and defense (Horvitz, 2024).

Key indicators commonly used to measure critical infrastructure resilience include: organizational resilience; performance degradation, disruption, and recovery processes; resilience metrics and indices; safety, security, and risk assessments; societal/community resilience and social equity considerations; dynamic network connectivity; resilience through design and structural robustness; and economic resilience (Osei-Kyei et al., 2022).

It is also noted that national resilience largely depends on the resilience of economic sectors, as the country's economic system is the foundation for its security, well-being, and development. The resilience of economic sectors affects the country's ability to withstand external and internal threats, as well as to recover quickly from crises (Umantsiv & Shkuropadska, 2023).

Ukraine, under martial law, has demonstrated the vulnerability of its energy, transport, and information infrastructure to targeted destruction. EU and NATO countries have significant experience and mechanisms to ensure the resilience of critical infrastructure, while in Ukraine, these systems need strengthening in the face of Russian aggression. Ukraine's integration into European and Euro-Atlantic structures requires harmonizing approaches to critical infrastructure protection. After the war, the restoration of Ukraine's critical infrastructure will require modern approaches that incorporate the experiences of the EU and NATO.

The aim of the research is to substantiate and characterize the organizational and legal conditions for ensuring the resilience of critical infrastructure, using the example of the EU, NATO countries and Ukraine.

The article's hypothesis is that the resilience of critical infrastructure depends on the level of institutional support, which can adapt to the conditions of modern threats and risks, particularly during wartime, and involves comprehensive interaction between state institutions, the private sector, and international organizations. The hypothesis suggests that the foundation for ensuring resilience lies in the institutional component, which can either strengthen or weaken the level of protection of critical infrastructure.

To achieve the aim of the research, a combination of general scientific and specific methods was used: methods of systematization and generalization to identify the organizational and legal conditions for ensuring the resilience of critical infrastructure in EU and NATO countries; a tabular method for analysing the organizational and legal conditions for ensuring the resilience of Ukraine's critical infrastructure; analysis and synthesis for identifying the factors that ensure the resilience of critical infrastructure objects.

The structure of the article is as follows: first, the organizational and legal conditions for ensuring the resilience of critical infrastructure in EU and NATO countries are analysed; next, the organizational and legal conditions for ensuring the resilience of Ukraine's critical infrastructure are examined; finally, the determinants for ensuring the resilience of critical infrastructure objects are highlighted; and conclusions.

1. Organizational and legal conditions for ensuring resilience of the EU critical infrastructure

Considering the probability of new challenges and threats to life safety, particularly those resulting from Russia's aggression against Ukraine, the European Union recognized the need to coordinate the actions of member states, national authorities, EU institutions, and critical infrastructure operators to ensure the resilience of essential services in the EU market. In December 2022, the EU Council adopted the "Recommendations for a Coordinated Approach to the Resilience of Critical Infrastructure". It specifically recommended introducing the necessary tools and coordinating actions at the EU level to improve preparedness and response to security incidents threatening the provision of essential services within the EU internal market.

The EU Council also adopted the "Directive on the Resilience of Critical Entities" (which took effect on January 16, 2023). The Critical Entities Resilience (CER) Directive establishes a framework to support member states in ensuring that critical entities can prevent, withstand, absorb, and recover from disruptive incidents, including those caused by natural disasters, terrorism, internal threats, sabotage, civil unrest, or public health emergencies. The regulatory framework for the EU's critical infrastructure resilience policy is presented in *Table 1*.

Table 1

The regulatory framework for the EU critical infrastructure resilience policy

Name of the document	Number, date of acceptance	Purpose
Directive on the resilience of critical entities (CER Directive)	2022/2557, 14 December 2022	The directive provides for strengthening coordination, risk assessment, ensuring continuity of operation and establishing a monitoring and reporting system to improve safety and resilience of critical facilities
Impact Assessment of the proposed CER Directive	SWD/2020/358 final, 16 December 2020	To analyze the potential consequences and effectiveness of the proposed measures to increase the resilience of critical infrastructure. The document provides a rationale for proposed policies, assessing their impact on safety, economy, social aspects and the environment, helping to make informed decisions about the implementation of new regulations
Council Recommendation on a Union-wide coordinated approach to strengthen the resilience of critical infrastructure	2023/C 20/01, 8 December 2022	To ensure joint action and coordination between EU member states to increase protection and resilience of critical facilities. These recommendations aim to facilitate the exchange of information, best practices and resources to effectively respond to threats and incidents that may affect the security and operation of critical infrastructure in the EU
Council Recommendation on a blueprint to coordinate a response at Union level to disruptions of critical infrastructure with significant cross-border relevance	C/2024/4371, 25 June 2024	To ensure a coordinated and effective response to disruptions that have a cross-border impact. The recommendations are aimed at strengthening cooperation between member states, ensuring rapid information exchange, mobilizing resources and coordinating actions to minimize the negative consequences of such disruptions for the security, economy and well-being of EU citizens
Commission Staff Working Document: Evaluation of ECI Directive	SWD (2019) 308 final, 23 July 2019	To assess the effectiveness of the implementation of the European Critical Infrastructure Directive (ECI Directive). This document analyzes the extent to which the directive's objectives have been achieved, identifies the strengths and weaknesses of its implementation, and provides recommendations for possible improvements to enhance the level of protection of critical infrastructure in the EU
European Critical Infrastructure (ECI) Directive	2008/114/EC, 8 December 2008	To increase the level of protection of critical infrastructure in the European Union. This directive establishes processes and measures for the identification and protection of critical objects that are important for maintaining the life of society, the economy and security, in particular in the event of terrorist attacks or other threats

Source: compiled by the authors based on data from (European Commission, 2024, September 23).

At the beginning of 2023, the synchronization of efforts between the EU and NATO to ensure the resilience of critical infrastructure was announced. The goal of strengthening the EU critical infrastructure resilience policy is to enhance the capacity of member states to improve resilience in the provision of services that are essential for maintaining vital societal functions, economic activities, public health, safety, and the environment in the EU. The CER Directive covers eleven sectors of critical infrastructure (*Figure 1*).

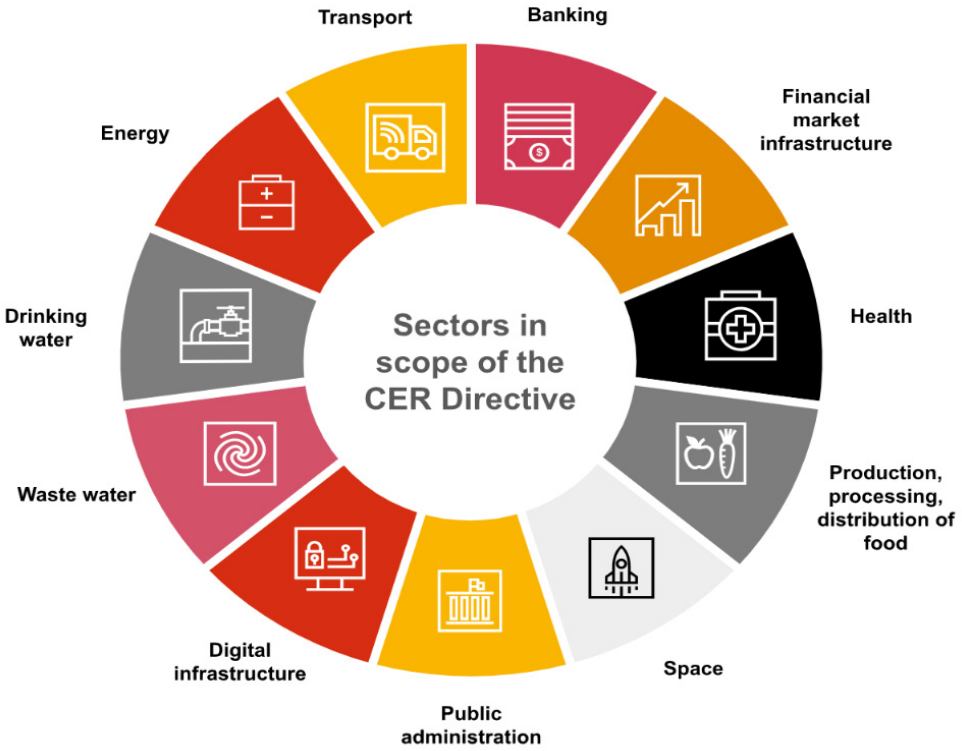

Figure 1. Sectors of critical infrastructure in the EU

Source: compiled by the authors based on data from (PwC, n. d.).

The aim of The Critical Infrastructure Resilience Group (CIRG) is to facilitate cooperation between Member States and with the European Commission, in order exchange experience from implementing best practices on improving the characteristics of critical infrastructure resilience.

Our sectoral analysis of critical infrastructure resilience in transport logistics, energy, healthcare, and food in the EU and Ukraine highlights the following resilience factors:

In transport Logistics: efficiency in customs and border procedures, quality of trade and transport infrastructure, cost-effective international shipping, quality of logistics services, and reliable tracking and timely delivery (Lebedeva & Shkuropadska, 2024a).

In energy: geopolitical stability, energy resource availability, robust infrastructure, risk management, energy-efficient technologies, and transparent regulations (Lebedeva & Shkuropadska, 2024b).

In healthcare: preparedness, resource allocation, data analytics, communication, public trust, and adaptive policies–key factors during the pandemic (Lebedeva & Shkuropadska, 2024c).

In Food: diversifying agricultural production through increased capitalization and investment in agro-enterprises, enhancing resource efficiency, food resilience, market institutions, and higher value-added exports (Shkuropadska et al., 2024).

2. Organizational and legal conditions for ensuring resilience of NATO critical infrastructure

Since the early 1950s, NATO has taken efforts in fostering and enhancing civil preparedness among its member states. The concept of resilience is described in Article 3 of the Alliance's Founding Treaty, which obligates member states to "maintain and develop their individual and collective capacity to resist armed attack". This commitment includes ensuring the continuity of government operations, maintaining essential services, and providing civil support for military efforts within member nations (Roepke & Thankey, 2019).

NATO identifies such sectors of critical infrastructure to ensure national and international security (*Figure 2*).

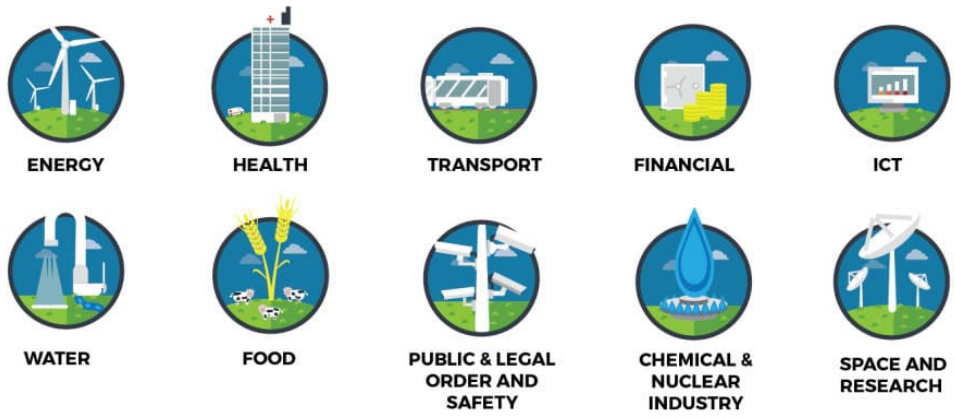

Figure 2. Sectors of Critical Infrastructure in NATO countries

Source: Roepke & Thankey, 2019, February 27.

During the Cold War, NATO civil preparedness was highly organized. However, the 1990s saw significant reductions in plans, structures, and resources at both national and NATO levels. Events after 2014, including Russia's annexation of Crimea and the rise of ISIS/Daesh, highlighted a shifting strategic environment, prompting NATO to enhance its defense. Simultaneously, growing terrorist and hybrid threats, such as cyberattacks on critical infrastructure, highlited the need to strengthen civil preparedness as a cornerstone of resilience (Becker et al., 2022).

At the 2016 Warsaw Summit, NATO leaders committed to seven core civil preparedness requirements (NATO Summit Guide, 2016, July):

- Maintaining governance and essential public services;
- Ensuring resilient energy supplies;
- Managing large population movements;
- Securing food and water supplies;
- Addressing mass casualties;
- Protecting civil communication systems;
- Safeguarding public transportation.

In 2021, NATO emphasized that resilience is essential for credible defense and the protection of society and shared values. Recent years have shown that military efforts alone cannot ensure security, highlighting the need for effective civil defense system to reduce risks during both war and peace.

Military forces increasingly depend on civilian resources for transport, communications, and supplies like water and food. Post-Cold War defense budget cuts have deepened this reliance, with much critical infrastructure privately owned. For example, 90% of military transport for large operations comes from commercial entities, 30% of defense satellite communications are provided by private companies, and local commercial infrastructure supplies 75% of NATO operational support (Shelest, 2021).

Ukraine's cooperation with NATO during the full-scale war has become a crucial element in strengthening Ukraine's defence capabilities and ensuring its ability to counter russia's aggression. The Alliance also emphasizes the importance of supporting Ukraine on its path to future NATO membership, which is a significant step toward ensuring resilience and security in Europe.

3. Organizational and legal conditions for ensuring the resilience of Ukrainian critical infrastructure

Ukrainian legislation on critical infrastructure and its protection comprises the Constitution of Ukraine, the Law "On Critical Infrastructure", the Cabinet of Ministers' decree "On the Approval of the National Plan for the Protection, Security, and Resilience of Critical Infrastructure", international treaties ratified by the Verkhovna Rada of Ukraine, and other relevant legal acts. The protection and legal regime of critical infrastructure objects during emergencies, martial law, or special periods are regulated by the Law "On the Legal Regime of Martial Law", the Law "On the Legal Regime of Emergency Situations", the Law "On the Functioning of Ukraine's Unified Transport System in a Special Period", and the Law "On the Defence of Ukraine".

The Law "On Critical Infrastructure" (dated November 16, 2021, No. 1882-IX) defines resilience as the ability of critical infrastructure to

function normally, adapt to changing conditions, and recover quickly from threats. It outlines tasks such as preventing unauthorized interference, establishing a national protection system, creating regulatory frameworks, and developing state programs to enhance infrastructure security and resilience, as well as ensuring international cooperation in the field.

The national system for the protection of critical infrastructure includes various management levels: national, regional and sectoral, local, and facility-specific (*Table 2*).

Table 2

Levels of management of the national system for protection of critical infrastructure of Ukraine

Management levels	Responsible entities
National level	Management is carried out by the Cabinet of Ministers of Ukraine, the authorized body for critical infrastructure protection in Ukraine, government authorities according to their jurisdiction, other central executive bodies and state agencies, as well as the National Bank of Ukraine
Regional and sectoral levels	Management carried out by central and local executive authorities, designated in accordance with the established legal procedure as responsible for ensuring the formation and implementation of state policy in the area of critical infrastructure protection in a specific sector of critical infrastructure, and responsible for the functioning of individual state protection and response systems
Local level	Management carried out by local executive authorities (military-civil administrations, if established) and local self-government bodies
Facility level	Management carried out by the critical infrastructure operator based on regulatory and legal acts in the area of critical infrastructure protection

Source: compiled by the authors based on data from (Law of Ukraine "On Critical Infrastructure", 2024, September 21).

To organize the functioning of the national critical infrastructure protection system, the Cabinet of Ministers of Ukraine, central executive authorities, local executive authorities (military-civil administrations, if established), and local self-government bodies develop and approve relevant crisis response plans and programs.

The features of implementing state policy in the area of critical infrastructure protection are identified for critical infrastructure sectors. The formation and implementation of state policy in the relevant sectors are carried out by sectoral bodies within critical infrastructure protection. Sectoral bodies in this field maintain sectoral lists of critical infrastructure facilities. The list of critical infrastructure sectors and entities responsible for forming and implementing state policy in the respective sectors of the national critical infrastructure protection system are defined by the Cabinet of Ministers of Ukraine. The Law of Ukraine "On Critical Infrastructure" (2024, September 21) includes the following in the list of vital functions and/or services, the violation of which leads to negative consequences for the

national security of Ukraine: management and provision of the most important public (administrative) services; energy supply (including thermal energy supply); water supply and drainage; food security; health care; pharmaceutical industry; production of vaccines, sustainable functioning of biolaboratories; information services; electronic communications; financial services; transportation support; defence, state security; law and order, administration of justice, detention; civil protection of the population and territories, rescue services; space activities, space technologies and services; chemical industry; research activity.

To determine the level of requirements for ensuring the protection of critical infrastructure facilities according to their importance for providing specific vital functions within the sectors of critical infrastructure, a categorization of critical infrastructure facilities is conducted based on criticality categories:

I Critical Category – particularly important facilities that have national significance, a substantial impact on other critical infrastructure facilities, and whose disruption would lead to a crisis situation of national significance;

II Critical Category – vital facilities, the disruption of which would lead to a crisis situation of regional significance;

III Critical Category – important facilities, the disruption of which would lead to a crisis situation of local significance;

IV Critical Category – necessary facilities, the disruption of which would lead to a crisis situation of local significance.

The categorization of critical infrastructure facilities is carried out by sectoral bodies in the area of critical infrastructure protection according to sectoral specifics and the requirements of sectoral legislation. Sectoral bodies, together with critical infrastructure operators, carry out the categorization of critical infrastructure facilities within their sectors (subsectors) in accordance with the Methodology for Categorizing Critical Infrastructure Facilities.

Entities within the national critical infrastructure protection system develop a cooperation plan with each other, which is coordinated with the authorized body for critical infrastructure protection in Ukraine and approved by the Cabinet of Ministers of Ukraine, and reviewed every three years. The cooperation plan may define the specifics of interaction for the operational modes of the national critical infrastructure protection system.

4. Determinants of ensuring the resilience of critical infrastructure facilities

The full-scale invasion of Russia has caused significant damage to Ukrainian critical infrastructure, leading to substantial disruptions in the provision of essential utility services. Subsequent targeted attacks have

severely impacted drainage, water, heating, and electricity supply systems, and have also resulted in the destruction of residential buildings, schools, and medical facilities. Given such extensive consequences, the repair and reconstruction of critical infrastructure have become urgent priorities.

To address these pressing needs, in December 2022, the European Union and NEFCO launched a EUR 50 million initiative for the restoration of key municipal infrastructure in 12 communities in Kyiv Oblast. These projects fall under Component I of the program. Despite the war, and partly due to it, the initiative has made significant progress as over 80% of planned procurements have been initiated. In 2024, the program was expanded to include five additional projects to modernize critical utility services such as water supply, drainage, and heating in Chernihiv, Sumy, and Mykolaiv Regions. The program is expected to benefit 245 000 residents, reducing electricity consumption by approximately 17 000 MWh per year and cutting greenhouse gas emissions by 15 700 tons of CO_2 annually (EEAS. Delegation of the European Union to Ukraine, 2024, May 22).

It is important to note that critical infrastructure facilities, such as power plants, transport hubs, telecommunications networks, and other enterprises, are among the highest priorities. They have a higher level of protection and are provided with energy and other resources as a priority. For the protection of Ukraine's critical information infrastructure, which is fundamental to the country's stable functioning, it is essential to ensure not only physical protection but also cybersecurity measures for critical infrastructure facilities. Cyberattacks have occurred repeatedly, so all facilities connected to the internet require reliable cybersecurity measures.

Today, the registry includes many facilities of varying degrees of importance, such as ports and industrial enterprises that produce armaments for the front and maintain Ukraine's defence. Essentially, while the country's economy is on a military footing, it also affects the situation in this area. The registry may also include vital bridges upon which the functioning of the state's arteries and the supply of weapons to the front depend.

To protect these facilities, the Ukrainian government has approved a critical infrastructure protection policy for 2024. According to this policy, important infrastructure facilities must be protected from potential threats and attacks by hostile forces. In particular, the placement of air defence systems in the country is carried out taking into account the criticality of the facilities that need protection from enemy attacks and technogenic disasters (Kyiv Post, 2024, February 19).

Thus, the determinants of critical infrastructure resilience are a combination of factors that influence the ability of infrastructure facilities to withstand and recover from various types of impacts (*Table 3*).

Table 3

Determinants of the resilience of critical infrastructure facilities

Factors	Essence
Physical resilience	The strength and reliability of buildings, structures and technical systems, the ability to withstand shocks
Functional resilience	The ability of infrastructure objects to maintain or quickly restore functionality after an interruption or damage
Organizational resilience	Effectiveness of management and coordination of actions in emergency situations, readiness of personnel to act in emergency conditions
Informational resilience	The ability to protect and restore information systems and data important for the functioning of the infrastructure
Social resilience	The ability of society to support the functioning of critical infrastructure objects, the interaction of citizens and their trust in the actions of authorities in crisis situations
Economic resilience	Financial capacity to ensure restoration and modernization of critical infrastructure facilities, availability of resources for rapid response to crises
Environmental resilience	The ability of critical infrastructure facilities to minimize the negative impact on the environment and adapt to climate change and other environmental challenges

Source: compiled by the authors.

The main determinants of the resilience of critical infrastructure entities include: physical resilience, functional resilience, organizational resilience, informational resilience, social resilience, economic resilience, and environmental resilience. These determinants are interconnected and collectively impact the ability of critical infrastructure entities to ensure continuous operation in crisis situations. Let's consider specific examples that demonstrate the interrelationship between various determinants of critical infrastructure resilience:

Physical and Functional Resilience. Recovery from floods in Germany in 2021. Infrastructure such as bridges and roads was physically damaged, leading to disruptions in transportation routes and the supply of goods. It was necessary not only to repair these facilities but also to ensure they quickly regained functionality, which required a comprehensive approach to repair and recovery management (Witting, 2023).

Organizational and Informational Resilience. The cyberattack on the National Health Service (NHS) in the United Kingdom in 2017 (WannaCry). The attack disrupted the functioning of medical institutions, highlighting the need for reliable organizational response and recovery plans, as well as effective information and data protection systems (House of Commons Committee of Public Accounts, 2018, April 18).

Social and Economic Resilience. The "Yellow Vests" protests in France that began in 2018 due to economic and social issues. Distrust in government reforms and social unrest negatively affected the economy and the resilience of infrastructure, emphasizing the importance of citizen trust and the stability of social systems in ensuring economic resilience (Cigainero, 2018, December 3).

Environmental and Physical Resilience. The Italian city of Venice frequently faces flooding issues due to rising sea levels and climate change. The city's infrastructure, including historic buildings and transport systems, is constantly at risk of damage. Strengthening the physical resilience of infrastructure and developing ecological solutions (such as the MOSE system for flood protection) are critical for maintaining Venice's functionality (Bonjour Venise, 2024, February 24).

Functional and Informational Resilience. Under martial law, Ukraine experienced a series of large-scale cyberattacks that disrupted the functioning of government and financial systems. The cyberattacks revealed vulnerabilities in information systems and communication networks and demonstrated that insufficient IT protection can seriously impact organizations' ability to maintain continuous operations.

Organizational and Social Resilience. An example of this interaction is the response to the COVID-19 pandemic in the EU. Organizational resilience, including effective coordination among member states and health authorities, was key to ensuring social resilience, building citizen trust in vaccination, and implementing quarantine (epidemiological) measures (Council of the EU and the European Council, n. d.)

These examples illustrate how different aspects of resilience interact and influence one another, emphasizing the importance of a comprehensive approach by governments to ensure the resilience of critical infrastructure facilities.

Conclusions

The protection of critical infrastructure and the assurance of the resilience of vital facilities are essential for modern society. Without reliable energy supply, safe drinking water, medical services, banking and financial services, or predictable transportation, our way of life would be impossible.

Critical infrastructure provides important functions for the state, and infrastructure sectors are interconnected. An attack on a single facility within the network will affect other facilities and networks. The degree of interdependence between defence and infrastructure is high and complex. The destruction or damage of even one facility that is part of critical infrastructure can have tragic consequences.

Institutional assurance of critical infrastructure resilience is a system of organizational, legal, and administrative mechanisms that ensure the reliable functioning and protection of critical infrastructure from threats and challenges. Its main elements include: legislative and regulatory frameworks; management authorities; critical infrastructure operators; risk management and emergency response systems; personnel training and education; and financial support for critical infrastructure.

The approaches to ensuring critical infrastructure resilience in the EU, NATO, and Ukraine share common features but differ due to their specific functions and objectives. The EU focuses on developing regulatory

frameworks and creating integrated protection systems aimed at safeguarding the civilian population, economy, and environment. NATO concentrates on ensuring the resilience of infrastructure necessary for military operations and collective defence, with an emphasis on cybersecurity, energy security, and transportation corridors.

Ukraine, due to the conditions of war, prioritizes the rapid restoration of damaged infrastructure, protection against physical and cyberattacks, and integration with partner systems. A key difference is that while the EU and NATO operate in peacetime, Ukraine must ensure infrastructure resilience during active hostilities. Nevertheless, all three systems recognize the importance of collaboration between the public and private sectors to achieve this goal.

The main determinants of the resilience of critical infrastructure entities include: physical resilience, functional resilience, organizational resilience, informational resilience, social resilience, economic resilience, and environmental resilience. These determinants are interconnected and collectively impact the ability of critical infrastructure entities to ensure continuous operation in crisis situations and to sustain economy in the crisis situations that confirms the article hypothesis.

Currently, critical infrastructure of Ukraine is undergoing a stress test for resilience. Our further scientific research will be dedicated to assessing the degree of its resilience in wartime.

REFERENCE/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Becker, J., Duda, M., & Lute, D. (2022). From context to concept: history and strategic environment for NATO's 2022 strategic concept. *Defence Studies, 22*(3), 489–496. https://doi.org/10.1080/14702436.2022.2082959

Bonjour Venise. (2024, February 24). *Flooding in Venice: Current causes and preventive measures*. https://bonjourvenise.fr/en/flooding-venice

Cigainero, J. (2018, December 3). Who Are France's Yellow Vest Protesters, And What Do They Want? *NPR.* https://www.npr.org/2018/12/03/672862353/who-are-frances-yellow-vest-protesters-and-what-do-they-want

Council of the EU and the European Council. (n. d.). *The EU's response to the COVID-19 pandemic.* https://www.consilium.europa.eu/en/policies/coronavirus-pandemic/

EEAS. Delegation of the European Union to Ukraine. (2024, May 22). *EU and Nefco initiative makes significant progress in rebuilding Ukraine's critical infrastructure*. https://www.eeas.europa.eu/delegations/ukraine/eu-and-nefco-initiative-makes-significant-progress-rebuilding-ukraine's-critical-infrastructure_en?s=232

European Commission. (2024, September 23). *Critical infrastructure resilience at EU-level.* https://home-affairs.ec.europa.eu/policies/internal-security/counter-terrorism-and-radicalisation/protection/critical-infrastructure-resilienceen.

Horvits, E. (2024). *Fortifying the Resilience of our Critical Infrastructure.* https://www.linkedin.com/pulse/fortifying-resilience-our-critical-infrastructure-eric-horvitz-gq84c

House of Commons Committee of Public Accounts. (2018, April 18). Cyber-attack on the NHS. *Thirty-Second Report of Session 2017–19*. https://publications.parliament.uk/pa/cm201719/cmselect/cmpubacc/787/787.pdf

Khrapkina, V. V. (2024). Mechanisms for Ensuring the Resilience of Critical Infrastructure: European Experience. In V. V. Khrapkina, N. V. Trushkina, (Eds.), *Management of Innovative Development of Socio-Economic Systems*, Kyiv-Mohyla Academy (6.3), 613–626. https://ekmair.ukma.edu.ua/server/api/core/bitstreams/956affad-5103-4f4b-b19f-cbbe18e4c839/content	Храпкіна, В. В. (2024). Механізми забезпечення стійкості критичної інфраструктури: європейський досвід. У Храпкіна В. В., Трушкіна Н. В. (Ред.), *Управління інноваційним розвитком соціально-економічних систем.* Національний університет "Києво-Могилянська академія". Києво-Могилянська академія, (6.3), 613–626. https://ekmair.ukma.edu.ua/server/api/core/bitstreams/956affad-5103-4f4b-b19f-cbbe18e4c839/content
Kyiv Post. (2024, February 19). Critical Infrastructure Objects of Ukraine: Everything You Need to Know. https://www.kyivpost.com/uk/post/28283	Kyiv Post. (2024, 19 лютого). Об'єкти критичної інфраструктури України: все, що варто знати. https://www.kyivpost.com/uk/post/28283

Lagutin, V., Boiko, A., & Shkuropadska, D. (2020). Institutional conditions for ensuring resilience of national economy: on the example of Ukraine. Latvia. *Baltic Journal of Economic Studies, 6*(3), 76–86.

Law of Ukraine "On Critical Infrastructure" № 1882-IX (2024, September 21). https://zakon.rada.gov.ua/laws/show/1882-20#Text	Закон України "Про критичну інфраструктуру" № 1882-IX (2024, 21 вересня). https://zakon.rada.gov.ua/laws/show/1882-20#Text

Lebedeva, L., & Shkuropadska, D. (2024a). Resilience of transport logistics in EU and Ukraine. *Foreign trade: economics, finance, law, 4*(135), 108–127. https://doi.org/10.31617/3.2024(135)07

Lebedeva, L., & Shkuropadska, D. (2024b). Determinants of energy system resilience. *Scientia fructuosa*, *3*(155), 23–41. https://doi.org/10.31617/1.2024(155)02

Lebedeva, L., & Shkuropadska, D. (2024c). Resilience of EU Healthcare Systems. *Foreign Trade: Economics, Finance, Law*, *2*(133), 120–133. https://doi.org/10.31617/3.2024(133)07

Melnychuk, O. (2021). Current Issues of Public Policy on Critical Infrastructure Resilience: Status and Prospects for its Implementation in Ukraine. *Mechanisms of Public Administration*, (26), 90–112. http://taais.oridu.odessa.ua/article/view/239031	Мельничук, О. (2021). Актуальні питання публічної політики стійкості критичної інфраструктури: стан та перспективи її впровадження в Україні. *Mechanisms of public administration,* (26), 90–112. http://taais.oridu.odessa.ua/article/view/239031

Mukherjee, M., Abhinay, K., Rahman, M. M., Yangdhen, S., Sen, S., Adhikari, B. R., ... & Shaw, R. (2023). Extent and evaluation of critical infrastructure, the status of resilience and its future dimensions in South Asia. *Progress in Disaster Science*, (17), 100275.

NATO Summit Guide. (2016, July). *Warsaw, 8-9 July.* https://www.ulib.sk/files/sk/depozitna-kniznica-nato/fondy/monografie/warsaw-summit-guide_2016eng.pdf

Ninković, V. (2021). Critical infrastructure resilience – national approaches in the United States of America, the United Kingdom and Australia. *Collected Papers of the Faculty of Law in Novi Sad, University in Novi Sad*, *LV*(4), 1205–1225, https://doi.org/10.5937/zrpfns55-30333	Ninković, V. (2021) Critical infrastructure resilience – national approaches in the United States of America, the United Kingdom and Australia. *Collected Papers of the Faculty of Law in Novi Sad, University in Novi Sad*, *LV*(4), 1205–1225, https://doi.org/10.5937/zrpfns55-30333
NISS. (2013, December 9). European Experience in Developing a Critical Infrastructure Protection System: Lessons for Ukraine". *Analytical Note. National Institute for Strategic Studies. National institute for strategic studies.* https://www.niss.gov.ua/doslidzhennya/nacionalna-bezpeka/evropeyskiy-dosvid-rozbudovi-sistemi-zakhistu-kritichnoi	НІСД. (2013, 9 грудня). Європейський досвід розбудови системи захисту критичної інфраструктури: уроки для України" *Аналітична записка. National institute for strategic studies*. https://www.niss.gov.ua/doslidzhennya/nacionalna-bezpeka/evropeyskiy-dosvid-rozbudovi-sistemi-zakhistu-kritichnoi

OECD. (2019, April 17). *OECD Reviews of Risk Management Policies. Good governance for critical infrastructure resilience.* https://doi.org/10.1787/02f0e5a0-en

Osei-Kyei, R., Melo Almeida, L., Ampratwum, G., & Tam, V. (2022). Systematic Review of Critical Infrastructure Resilience Indicators. *Construction Innovation Information, Process, Management 23*(4). https://doi.org/10.1108/CI-03-2021-0047

PwC. (n. d.). *Critical Entities Resilience Directive: Why it is relevant to you*. https://www.pwc.com/ee/en/services/advisory-services/crisis-management/critical-entities-resilience-directive.html

Roepke, W.-D., & Thankey, H. (2019, February 27). Resilience is the first line of defense. NATO Review. https://www.nato.int/docu/review/uk/articles/2019/02/27/stjkst-persha-lnya-oboroni/index.html

Roepke, W.-D., & Thankey, H. (2019, 27 лютого). *Стійкість – перша лінія оборони. NATO Review.* https://www.nato.int/docu/review/uk/articles/2019/02/27/stjkst-persha-lnya-oboroni/index.html

Shelest, H. (2021). *NATO and Ukraine's resilience concept.* https://prismua.org/nato_ukraine

Шелест, Г. (2021). *Концепція стійкості НАТО та України*. https://prismua.org/nato_ukraine

Shkuropadska, D., Lebedeva, L., Shtunder, I., Nikolaiets, K., Ozhelevskaya, T., & Sokolovska, I. (2024). Food Resilience in Ukraine During Martial Law. *Financial and Credit Activity Problems of Theory and Practice, 5*(58), 409–420. https://doi.org/10.55643/fcaptp.5.58.2024.4503

Umantsiv, Yu., & Shkuropadska, D. (2023). National resilience of Ukraine under the Martial Law. *Scientia fructuosa*, (5), 4–19. https://doi.org/10.31617/1.2023(151)01

Witting, V. (2023). *Germany's Ahr Valley flood survivors reflect on the rebuild. DW*. https://www.dw.com/en/germanys-ahr-valley-flood-survivors-reflect-on-the-rebuild/a-66178329

Yang, Z., Barroca, B., Laffréchine, K., Weppe, A., Bony-Dandrieux, A., & Daclin, N. (2023). A multi-criteria framework for critical infrastructure systems resilience. *International Journal of Critical Infrastructure Protection,* (42), 100616, https://doi.org/10.1016/j.ijcip.2023.100616

Conflict of interest. The authors certify that don't they have any financial or non-financial interest in the subject matter or materials discussed in this manuscript; the authors have no association with state bodies, any organizations or commercial entities having a financial interest in or financial conflict with the subject matter or research presented in the manuscript. Given that one of the authors is affiliated with the institution that publishes this journal, which may cause potential conflict or suspicion of bias and therefore the final decision to publish this article (including the reviewers and editors) is made by the members of the Editorial Board who are not the employees of this institution.

The preparation of the article was financed within the Erasmus+ Jean Monnet project: 101083497 — EUERP — ERASMUS-JMO-2022-HEI-TCH-RSCH "EU Economic Resilience Policy".

The contribution of the authors is equal

Shkuropadska, D., Lebedeva, L., Gonçalves, J. Institutional framework for the resilience of critical infrastructure of EU, NATO countries and Ukraine. *Scientia fructuosa*. 2025. № 1. P. 45–60. https://doi.org/10.31617/1.2025(159)03

Received by the editorial office 06.01.2025.
Accepted for printing 15.01.2025.
Published online 17.02.2025.

DOI: 10.31617/1.2025(159)04
UDC 339.9:(560+575)=111

QULIYEV Maqsud,
Postgraduate Student of the Department
of Economic Theory
Azerbaijan Cooperation University
93, N. Narimanov St., Baku, Az 1106, Azerbaijan

ORCID: 0009-0009-5973-394X
magsud226@gmail.com

GREEN TRANSITION: THE CASE OF TURKEY AND CENTRAL ASIA COUNTRIES

Green transition is the most pressing issue in the modern world and demands collaborative action at the global level. In this context, Turkey, Azerbaijan, Kazakhstan, and Uzbekistan adopted a green agenda to achieve clean electricity production by 2030. Azerbaijan even hosted the world's largest conference on climate change in November 2024. The relevance of the work is a hotly debated issue both globally and within these countries. The study tests the hypothesis that most people are climate responsible and aware. The result showed that people share responsibility for the climate. In addition, the survey questions (100 participants for each country) concerned the root cause of climate change, green energy engineers/experts, and the substitution of the oil and gas sector for renewable energy sources. Concerning green experts, respondents believe that in the future, there will be enough of them. In Turkey, Azerbaijan and Kazakhstan, respondents consider industry/ business the main cause of climate change, while in Uzbekistan, they chose the "people" option. Can renewable energy sources replace the oil and gas sector? Respondents from Turkey (70%) and Kazakhstan (80%) answered "yes". In Azerbaijan, 39% of respondents said "no", 38% – "yes", while in Uzbekistan 80% of participants answered "don't know". Additionally, the Pearson correlation and linear regression methods were also used to identify the relationship between electricity production

ГУЛІЄВ Магсуд,
аспірант кафедри економічної теорії
Азербайджанського кооперацiйного університету
вул. Н. Наріманова, 93, Баку, Аз 1106,
Азербайджан

ORCID: 0009-0009-5973-394X
magsud226@gmail.com

ЗЕЛЕНИЙ ПЕРЕХІД: КЕЙС ТУРЕЧЧИНИ ТА КРАЇН ЦЕНТРАЛЬНОЇ АЗІЇ

Зелений перехід є найактуальнішим питанням у сучасному світі та потребує спільних дій на глобальному рівні. У цьому контексті Туреччина, Азербайджан, Казахстан і Узбекистан прийняли зелений порядок денний, щоб досягти виробництва чистої електроенергії до 2030 р. Азербайджан навіть став господарем найбільшої у світі конференції з питань зміни клімату в листопаді 2024 р. Актуальність роботи є гостро дискутованим питанням як у світовому масштабі, так і в рамках цих країн. У ході дослідження перевіряється гіпотеза, що більшість людей є кліматично відповідальними та обізнаними. Результат показав, що люди поділяють відповідальність за клімат. Крім того, запитання опитування (по 100 учасників для кожної країни) стосувалися першопричини зміни клімату, інженерів/експертів із зеленої енергетики та заміни нафтогазового сектору на відновлювані джерела енергії. Щодо зелених експертів, то респонденти вважають, що в майбутньому їх буде достатньо. У Туреччині, Азербайджані та Казахстані респонденти вбачають промисловість/бізнес основною причиною зміни клімату, тоді як в Узбекистані вони вибрали варіант "люди". Чи можуть відновлювані джерела енергії замінити нафтогазовий сектор? Респонденти з Туреччини (70%) та Казахстану (80%) відповіли "так". В Азербайджані 39% опитуваних сказали "ні", 38% – "так", тоді як в Узбекистані 80% учасників відповіли "не знаю". Також для визначення зв'язку між виробництвом електроенергії та зростанням чисельності населення використано кореляцію Пірсона та методи

and population growth. Population growth contributes to an increase in electricity production by 9.98 units in Turkey, 6.98 in Azerbaijan, 13.62 in Kazakhstan, and 3.03 units in Uzbekistan.

Keywords: renewable energy, research, transition, investment, climate.

лінійної регресії. Приріст населення сприяє збільшенню виробництва електроенергії на 9.98 од. у Туреччині, 6.98 в Азербайджані, 13.62 в Казахстані та 3.03 од. в Узбекистані.

Ключові слова: відновлювана енергія, дослідження, перехід, інвестиції, клімат.

JEL Classification: Q21, Q22, Q27, Q28.

Introduction

Transition to clean, environmentally friendly energy usage is one the most complex tasks of today's humanity. Preventing global climate change and temperature rise depends on hand-in-hand or collaborative action and future vision. The modern world is already likely to be ready to wean fossil fuels off and accelerate the shifting process to renewables. The countries, Turkey, Azerbaijan, Kazakhstan, and Uzbekistan that comprise the topic of this research, generate most of their electricity from fossil fuels, approximately 80–90%. Therefore, their green agenda and future-forward policies must be examined.

As green energy can play a pivotal role in preventing our sole planet from destruction, researchers around the globe focused on improving energy transition issues from a scientific point of view. Bilgin and Kara (2024) collected people's comments, made only energy-related news on the YouTube social platform, and revealed Turkey's public attitudes towards all energy sources. The result showed that people have a great interest in nuclear, hydro, solar, wind, geothermal, and biomass – respectively.

Umarov (2024) examined the weak and strong sides of renewables in Uzbekistan in the framework of solar energy and noted that the lack of financing and public awareness is on the list of weakest sides. To prove this notion, we carried out a survey among the Uzbek population.

The production of green hydrogen in Kazakhstan was explored by Tleubergenova et al. (2023), and they came to the result that two million tonnes of green hydrogen would demand 30 gigawatts of power. Additionally, the minerals (gold, copper, molybdenum, etc.) demanded for the manufacturing of solar and wind devices were determined.

Humbatova et al. (2019) explored the relationship between electricity consumption and people's income in Azerbaijan. According to the research, a 1% increase in electricity consumption of the population diminishes their income by 20.5%. Hampel-Milagrosa et al. (2020) research predicted that population growth is expected in Azerbaijan in the near future.

DW Planet A's (2023, September 15) exploration of the carbon emissions of renewables proved that solar and wind energy production also emits 40 g and 16 g carbon emissions per kilowatt hour, respectively.

The aim of the research is to assess people's approach towards green energy transition and to identify people-electricity connections. The study tests the hypothesis that most people are climate responsible and aware. The survey method was utilized to conduct research, and the results indicated a positive approach. The purpose of the study:

- examining the green policy of the countries, green investors, green projects, and targets;
- surveying people to reveal their opinions on the ongoing green transition;
- to identify the relationship between population growth and electricity production.

The main methods of research are statistical, comparative, survey, correlation, and regression analyses.

All studies have centered on renewable energy production and public attitude (through the Internet). Studying people's approach to renewables in Turkey, Azerbaijan, Kazakhstan, and Uzbekistan can be called the research gap. That is why we conducted a survey to determine people's thoughts on wind and solar energies. The survey consists of 4 questions and has 100 respondents from each country. The questions are the following:

- Which of the following caused climate change the most?
- Is each of us responsible for combating climate change?
- Are there enough experts in the field of green energy in your country?
- Can renewable energy replace the oil-gas sector?

The structure of the research consists of three sections. The first and second sections are dedicated to green energy policy and projects and green energy surveys, respectively, and the last section discusses population growth and electricity production relationships.

1. Renewable energy transition in Turkey, Azerbaijan, Kazakhstan and Uzbekistan

Turkey, Azerbaijan, Kazakhstan, and Uzbekistan utilize fossil fuels (oil, natural gas, coal) to generate electricity. Except for Turkey, the rest of the countries have massive hydrocarbon reserves. That is why large-scale extraction and usage of fossil fuels are understandable in those countries. Now, the modern world has difficulty preventing global warming and keeping 1.5 °C within reach. All countries in the world, including Turkey, Azerbaijan, Kazakhstan, and Uzbekistan, take significant steps and provide unwavering support in the renewable energy field in order to reach clean and green energy targets and reduce greenhouse gas (GHG) levels. As for targets, we need to look at *Table 1* to comprehensively understand the countries' transition process.

Table 1

The countries' targets and incentives for green transition

Targets and incentives	Turkey	Kazakhstan	Uzbekistan	Azerbaijan
GHG target 2030	41% reduction (base year 2012)	15–25% reduction (base year 1990)	35% reduction (base year 2010)	35% reduction (base year 1990)
RE production target in energy mix	50% share by 2030 80% by 2053	15% by 2030	40% by 2030	35.5% by 2030
Tax and incentives	Machinery and equipment purchases and importation (related to renewables) are exempted from VAT and import duties. Corporate tax reduction depends on the region and investment scale. The guaranteed purchase price for a specific period in the feed-in tariff	The guaranteed purchase price for a 15 year period in the feed-in tariff. Areas for the installation of renewables are exempted from property and land tax. Machinery and equipment importation (related to renewables) is exempted from import duties. Corporate income tax reduction depends on the region and investment scale. Green auction	Introduces tax incentives for renewable energy producers. Reducing corporate income tax property tax by 50%. Machinery and equipment importation (related to renewables) is exempted from import duties. Areas for the installation of renewables are exempted from land tax (or at reduced rate). The guaranteed purchase price for a specific period in the feed-in tariff	Machinery and equipment importation (related to renewables) is exempted from import duties. Areas for the installation of renewables are exempted from land tax. Import of electric vehicles is exempted from VAT. Corporate tax exemption

Source: made by the author from AzStat (n. d.); TÜİK (n. d.); QazStat (n. d.); Statistic Agency of Uzbekistan (n. d.); Yalçın (2024, February 22); Uzbekistan – Introduces tax incentives for renewable energy producers (n. d.).

Table 1 shows what steps have been undertaken by the countries to accelerate smooth transition. By 2030, Turkey aims to achieve a 41% GHG reduction compared to 2012, 50% renewables share in entire electricity production (by 2053, 80%).

Machinery and equipment purchases and importation (related to renewables) are exempted from value-added tax (VAT) and import duties not only in Turkey but also in Azerbaijan, Kazakhstan, and Uzbekistan. Corporate tax reduction or exemption has been implemented in these countries, and land areas allocated to install renewable energy devices have an exception from property or land tax. The guaranteed purchase price for electricity in the feed-in tariff system has been adopted and measured.

With respect to the GHG target, Azerbaijan plans a 35% reduction (base year 1990), Kazakhstan 15–25%, and Uzbekistan 35% (base year 2010) until 2030 (KAZ Policy Brief (2022). Regarding green energy production in the energy landscape, Azerbaijan aims to achieve a 35.5% share, Kazakhstan 15%, and Uzbekistan 40% by 2030.

At this point, we should scrutinize renewable energy companies that have made investments in the countries and implemented clean energy projects (*Figure 1*).

Turkey	Azerbaijan	Kazakhstan	Uzbekistan
• TotalEnergies • JinkoSolar Holding Co. LTD • Statkraft AS • Gangfeng Lithium Group • IC İÇTAŞ Energy Investment Holding • Sanko Energy Group • Aksa Energy • Akfen Renewables • Kalyon Holding	• Masdar • Nobel Energy Management • ACWA Power • TotalEnergies • China Gezhouba Group Overseas Investment • Notus • Fortescue Future Industries • bp • Czech Engineering • SOCAR Green	• Masdar • Total Eren • China Power International Holding • Universal Energy • Samruk-Energy • Kazakh National Invest Holding • SVEVIND Energy Group	• Masdar • ACWA Power • Voltalia • Gezhouba Overseas Investment Group • China Datang Overseas Investment

Figure 1. Renewable energy companies

Source: compiled by the author.

Figure 1 clearly shows both local and international companies that invested in the renewable energy sector of Turkey, Azerbaijan, Kazakhstan, and Uzbekistan. Masdar is the most active player and has partnered with Azerbaijan, Kazakhstan, and Uzbekistan, while ACWA Power invested in Azerbaijan and Uzbekistan. Fossil fuel company TotalEnergies has collaborated with Azerbaijan and Turkey.

Besides that, if we highlight the renewable energy partners of the countries, the list of them is this:

- JinkoSolar Holding Co. LTD, Statkraft AS, Gangfeng Lithium Group, IC İÇTAŞ Energy Investment Holding, Sanko Energy Group, Aksa Energy, Akfen Renewables, Kalyon Holding have invested in Turkey;
- Nobel Energy Management, China Gezhouba Group Overseas Investment, Notus, Fortescue Future Industries, bp, Czech Engineering, (SOCAR Green local company) in Azerbaijan;
- Total Eren, China Power International Holding, Universal Energy, Samruk-Energy, Kazakh National Invest Holding, SVEVIND Energy Group in Kazakhstan;
- Voltalia, Gezhouba Overseas Investment Group, China Datang Overseas Investment in Uzbekistan.

ACWA Power's second-largest market is Uzbekistan, with a portfolio of 11.4 gigawatts (9.9 out of which is green energy). In Azerbaijan, Masdar owns the biggest renewable energy portfolio, with precisely ten portfolios (Salian, 2024, November 1).

If we know what companies have made investments in the green energy field in the countries, the next step must be to illustrate the projects on the map of the countries in order to perceive the ongoing shifting journey more accurately (*Figures 2–5*).

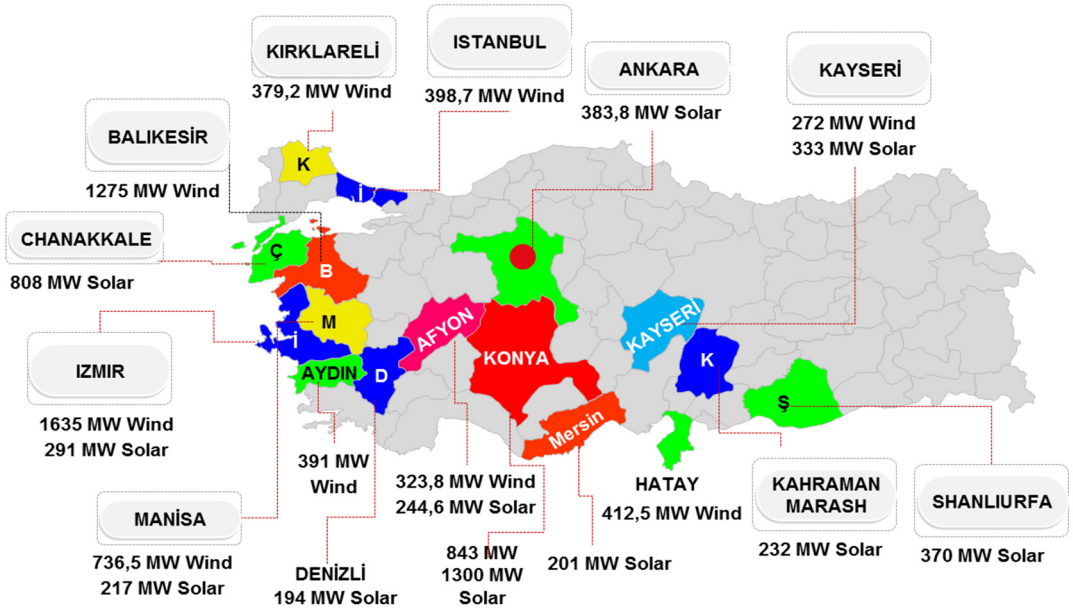

Figure 2. Turkey's main wind and solar map

Source: made by the author based on TurkStat (n. d.), and Kaya (2021).

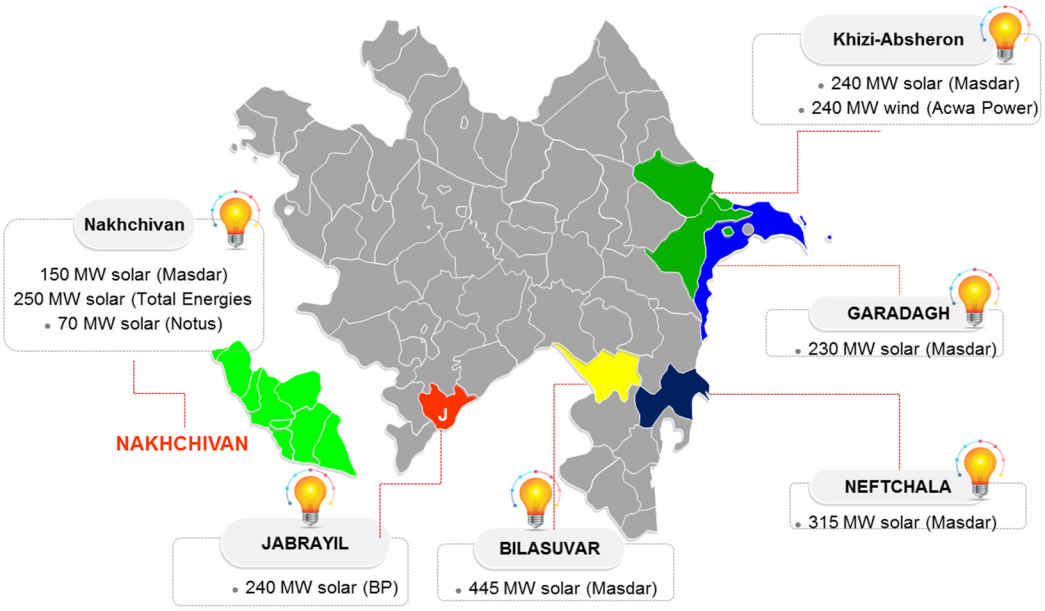

Figure 3. Azerbaijan's wind and solar map

Source: made by the author based on Azerbaijan Renewable Energy Agency (n. d.).

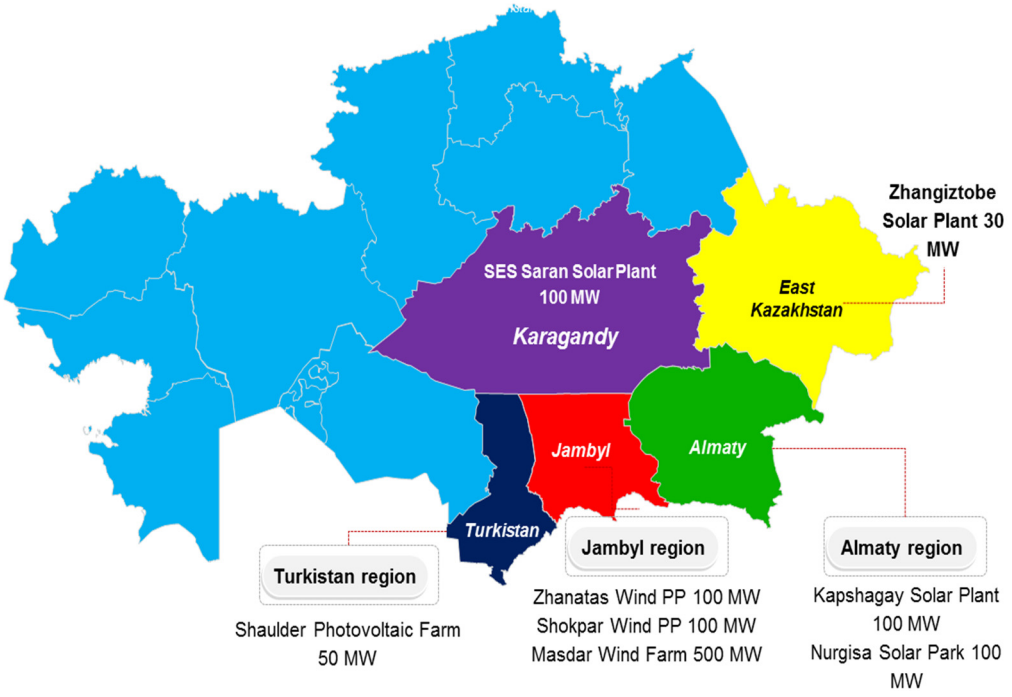

Figure 4. Kazakhstan's wind and solar map

Source: made by the author based on Onsat (2023, September 28).

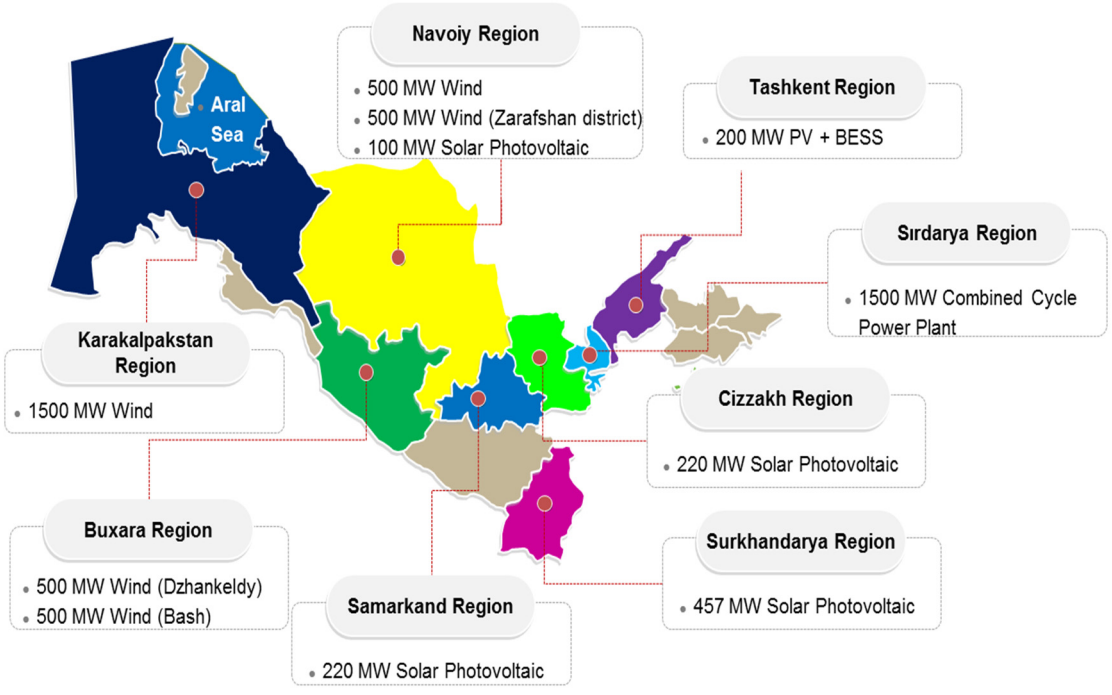

Figure 5. Uzbekistan's wind and solar map

Source: made by the author based on Guliyev (2024).

As we look at the maps, initially, we see that Konya, Izmir, Balikesir, Manisa, and Chanakkale are leading renewable energy zones in Turkey. In Azerbaijan, Khizi-Absheron, Nakhchivan Bilasuvar regions, in Kazakhstan, Jambyl and Almaty, and in Uzbekistan, Karakalpakstan, Navoiy, and Bukhara regions have taken leadership in the field of green energy, especially wind and solar.

We have to note the fact that Azerbaijan, Kazakhstan, and Uzbekistan agreed to export clean electricity to Europe in the near future (Sakenova, 2024, November 13). The Green Energy Corridor starts in Azerbaijan and ends in Hungary, with a capacity of 4 gigawatts. Besides that, Kazakhstan is going to export 2 million tons of green hydrogen to the European Union (EU) by 2030. With this amount, the EU will meet 20% of its hydrogen demand (bne Intellinews, 2024, September 21).

2. Green energy surveys

The second line of our study has focused on a questionnaire in the renewable field. The number of participants in our survey is 100 for each country. The first question is related to climate awareness and the root cause of this irreversible change (*Figure 6*).

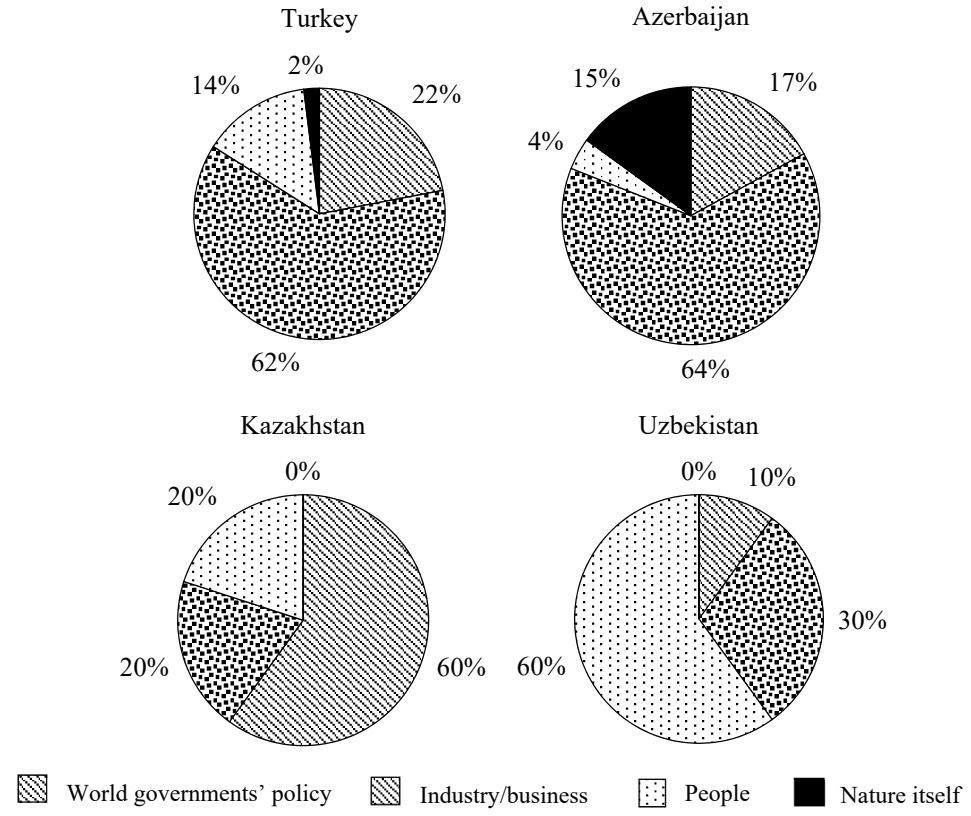

Figure 6. Climate change question

Source: made by the author.

Figure 6 shows that respondents from Turkey, Azerbaijan, and Kazakhstan believe that the industry/business sector is the culprit of climate change 62%, 64%, and 60%, respectively. Our surveyors from Uzbekistan (60%) noted that people are most responsible for climate disasters. The next questions below investigate the climate responsibilities and skilled people in the clean energy field of the countries (*Figures 7; 8*).

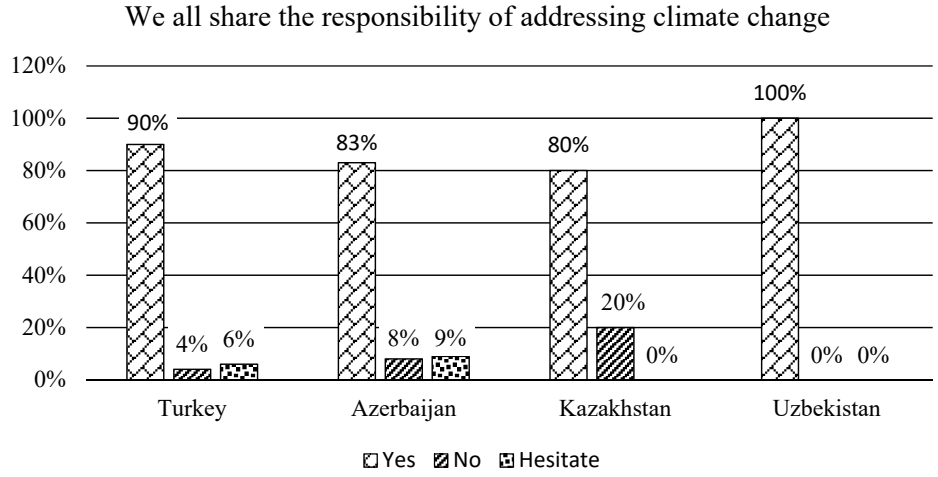

Figure 7. Climate responsibility question

Source: made by the author.

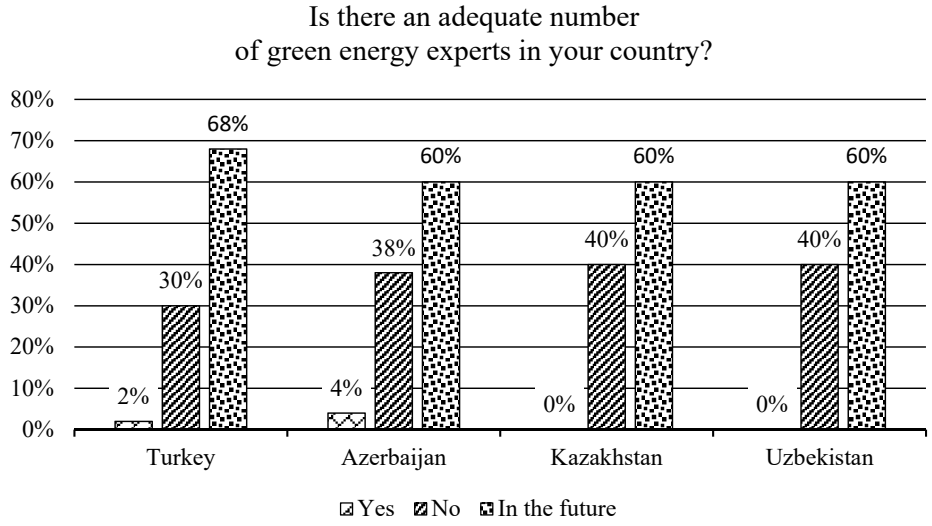

Figure 8. Question regarding green experts

Source: made by the author.

The question is, "Each of us has the responsibility to tackle climate change", and respondents from all countries strongly supported this idea, precisely 90% from Turkey, 83% from Azerbaijan, 80% from Kazakhstan, and 100% from Uzbekistan. Only a small part out of 100 did not consider the responsibility seriously, 4% in Turkey, 8% in Azerbaijan, and 20% in

Kazakhstan. There is a hesitation among respondents only from Turkey and Azerbaijan, 6% and 8%, respectively.

Transitioning to new energy sources demands relevant, skilled, profound knowledge of experts and employees. With respect to this, we asked people how they consider the current situation in the renewables field (*Figure 8*).

According to the results displayed above in *Figure 8*, all surveyors deem that, in the present situation, there is a lack of skilled labor in the green energy field. All of them noted that in the future, green energy experts would be available in their countries (68% Turkey, 58% Azerbaijan, 60% Kazakhstan and Uzbekistan). Only 2% in Turkey and 4% in Azerbaijan believe that there are enough experts.

The last survey question was concerning the replacement of the oil and gas sector by renewables (*Figure 9).*

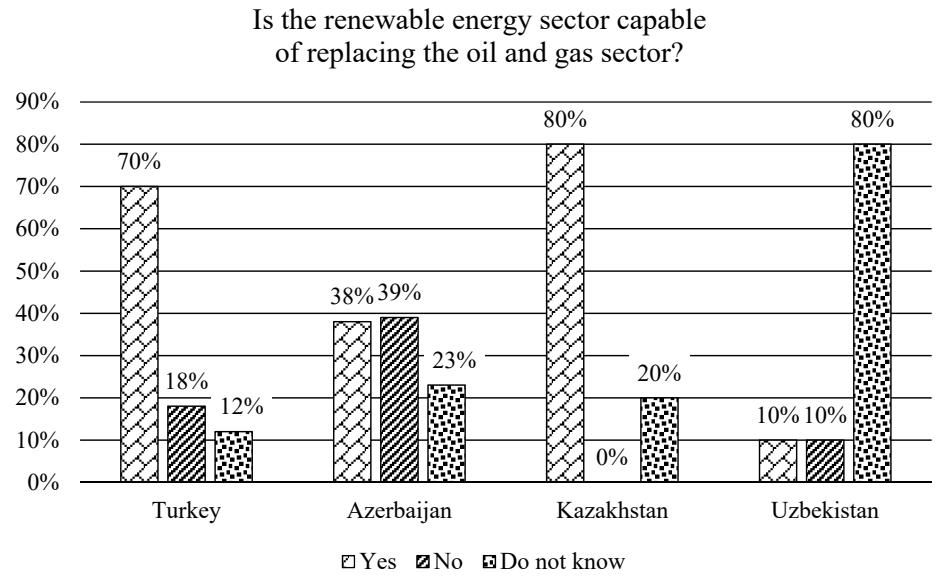

Figure 9. Question regarding green energy and oil and gas

Source: made by the author.

Figure 9 displays the opinions of the people on the substitution, and only the respondents in Turkey and Kazakhstan are in line with the positive approach, 70% and 80%, respectively. In Azerbaijan, surveyors tend to think that renewables cannot substitute the oil and gas sector, precisely 39%. 38% believe that it is possible, and 23% said "don’t know." People in Uzbekistan remained neutral, and 80% chose the "don’t know" option.

3. The investigation of relationship between population growth and electricity production

The last section of the research aims to identify the available connection between population growth and demand for electricity

production. To this end, we conducted the Pearson correlation and simple linear regression. The correlation formula is following (Coskun et al., 2019):

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 (y_i - \bar{y})^2}}, \quad (1)$$

where: r – correlation coefficient;

x_i – values of the x variable;

$\bar{x}$ – mean of the values of x variable;

y_i – values of the y variable;

$\bar{y}$ – mean of the values of y variable.

As secondary data, we collected statistical material for all countries in the period of 2010–2022. The correlations that have been conducted for each country are as follows (*Table 2*).

Table 2

The Pearson Correlation for the studied countries

Indicators		Total electricity, kWh billion	Population, million
Azerbaijan			
Electricity production	Pearson Correlation	1	0.922*
	Sig. (2-tailed)		0
	N	13	13
Population	Pearson Correlation	0.922*	1
	Sig. (2-tailed)	0	
	N	13	13
Turkey			
Electricity production	Pearson Correlation	1	0.986*
	Sig. (2-tailed)		0
	N	13	13
Population	Pearson Correlation	0.986*	1
	Sig. (2-tailed)	0	
	N	13	13
Kazakhstan			
Population	Pearson Correlation	0.996*	1
	Sig. (2-tailed)	0	
	N	13	13
Electricity production	Pearson Correlation	1	0.996*
	Sig. (2-tailed)		0
	N	13	13
Uzbekistan			
Uzbek population	Pearson Correlation	0.949*	1
	Sig. (2-tailed)	0	
	N	13	13
Uzbek electricity production	Pearson Correlation	1	0.949*
	Sig. (2-tailed)		0
	N	13	13

* Correlation is significant at the 0.01 level (2-tailed).

Sourse: made by the author.

Our correlations above determined that there are solid and positive relationships between population and electricity production. As a result of this identification, we applied simple linear regression (Coskun et al., 2019):

$$Y_i = \alpha + \beta_i + \varepsilon_i , \quad (2)$$

where: Y – y coordinate;
i – observations
α – y intercept;
β – slope.

Simple linear regression was conducted with the help of SPSS software and is as follows (*Table 3*):

Table 3

Regression analysis for the studied countries

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Azerbaijan					
(Constant)	–42822.155	8549.675		–5.009	0
Population, million	6.987	0.887	0.922	7.876	0
Turkey					
(Constant)	–515.789	40.242		–12.817	0
Population, million	9.987	0.507	0.986	19.690	0
Kazakhstan					
(Constant)	–138.756	6.937		–20.002	0
Population, million	13.625	0.389	0.996	35.034	0
Uzbekistan					
(Constant)	–36.665	9.737		–3.766	0.003
Population, million	3.038	0.304	0.949	9.979	0

Note: Dependent Variable – electricity production.

Sourse: made by the author.

If the p-value is less than 0.05, then the regression is important, or in other words, is of impact on variables. All values in these regressions are less than the significant value and demonstrate strong relationships. As a result of regression analysis, we can illustrate the outcome as follows:

$$Y = –42822.155 + 6.987 \cdot X + 8549.675 \text{ (AZ)} \quad (3)$$

$$Y = –515.789 + 9.987 \cdot X + 40.242 \text{ (TR)} \quad (4)$$

$$Y = –138.756 + 13.625 \cdot X + 6.937 \text{ (KZ)} \quad (5)$$

$$Y = –36.665 + 3.038 \cdot X + 9.737 \text{ (UZ)} \quad (6)$$

A one-unit increase in population increases electricity production by 6.98 units in Azerbaijan, 9.98 units in Turkey, 13.62 units in Kazakhstan, and 3.03 units in Uzbekistan. According to the International Monetary Fund's calculations, the number of people in these countries is inclined to grow in the years to come.

Conclusions

This research centered on analyzing the green energy transition from the perspectives of the citizens of Turkey, Azerbaijan, Kazakhstan, and Uzbekistan. In parallel to this purpose, the green agenda of the countries, clean energy projects, green-minded policies, and incentives have been brought to the center stage.

People in Turkey, Azerbaijan, and Kazakhstan believe that the industry/business sector is responsible for the irreversible climate change, while the Uzbeks consider just "people" in charge of this damage. People in these countries share climate responsibility and consider tackling climate-related issues both as their and all human beings' equal responsibility. Hence, the outcome was positive and our hypothesis was confirmed.

With respect to green energy-related education backgrounds and skilled people, respondents believe that there is a lack of these kinds of experts in their countries. A majority of surveyors voted for the option that shows in the future there will be.

The last survey question was investigating the hypothesis that represented the replacement of the oil and gas industry by renewable energy. A significant proportion of respondents from Turkey (70%) and Kazakhstan (80%) agree that green energy sources will be the substitution for the oil and gas industry, while in Azerbaijan, with a tiny difference (39%), surveyors do not agree, 38% agree with this opinion. Unlike the previous countries, in Uzbekistan, people chose to remain neutral in this question (10% agree, 10% disagree), and 80% chose the "don't know" option.

As to correlation and regression analyses, our research investigated the possible relationship between population growth and electricity production and results revealed that a unit jump in the number of people increases electricity production by 6.98 units in Azerbaijan, 9.98 units in Turkey, 13.62 units in Kazakhstan, and 3.03 units in Uzbekistan.

For prospective research, researchers may continue to analyze policy implementation, the actual situation on the ground, and people's future climate awareness in these countries, or this study might encourage others to conduct new surveys.

REFERENCE/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Azerbaijan Renewable Energy Agency. (n. d.). https://area.gov.az/en/page/yasil-texnologiyalar/boem-potensiali

AzStat. (n. d.). *The State Statistic Committee of Azerbaijan.* https://www.stat.gov.az/source/balance_fuel/?lang=en

Bilgin, U., & Kara, S. S. (2024). Identification of Perceived Challenges in the Green Energy Transition by Turkish Society through Sentiment Analysis. *Sustainability*, *16*(8), 3367. https://doi.org/10.3390/su16083367

Bne Intellinews. (2024, September 21). *Infrastructure bottleneck could thwart Kazakhstan's ambition to export green hydrogen to Europe.* https://www.intellinews.com/infrastructure-bottleneck-could-thwart-kazakhstan-s-ambition-to-export-green-hydrogen-to-europe-344530/

Yalçın, D. (2024, Februray 22). *Renewable energy in Turkey.* https://cms.law/en/int/expert-guides/cms-expert-guide-to-renewable-energy/turkey

Coskun, R., Altunisik, R., & Yildirim, E. (2019). Research Methods in Social Sciences SPSS Applied (10th ed.). Sakarya Publication.

Coşkun, R., Altunişık, R., & Yıldırım, E. (2019). Sosyal Bilimlerde Araştırma Yöntemleri SPSS Uygulamalı (10. Baskı). Sakarya Yayıncılık.

DW Planet A. (2023, September 15). *Wind power's unsolved problem* [Video]. https://www.youtube.com/watch?v=HzQShAlObn8

Guliyev, M. (2024). Green Growth in Uzbekistan: Prospective Green Priorities for Carbon-neutral development. *Journal of Scientific and Innovative Technologies*, *30*(2), 12–22. https://doi.org/10.30546/2616-4418.30.2024.012

Quliyev, M. (2024). Özbəkistanda yaşıl artım: Karbon-neytral inkişafın perspektiv yaşıl prioritetləri. *Elm və İnnovativ Texnologiyalar jurnalı*, *30*(2), 12–22. https://doi.org/10.30546/2616-4418.30.2024.012

Hampel-Milagrosa, A., Haydarov, A., Anderson, K., Sibal, J., & Ginting, E. (2020). *Azerbaijan: Moving toward more diversified, resilient, and inclusive development.* Asian Development Bank.

Humbatova, S. I., Ahmadov, F. S., Seyfullayev, İ. Z., & Hajiyev, N. G. (2019). The Relationship Between Electricity Consumption And Economic Growth: Evidence From Azerbaijan. *International Journal of Energy Economics and Policy*, *10*(1), 436–455. https://doi.org/10.32479/ijeep.8642

Kaya, N. E. (2021). *The share of "green" in Turkey's energy map is increasing.* Anadolu Ajansı. https://www.aa.com.tr/tr/ekonomi/turkiyenin-enerji-haritasinda-yesilin-payi-artiyor/2280401#

Kaya, N. E. (2021). *Türkiye'nin enerji haritasında "yeşil"in payı artıyor.* Anadolu Ajansı. https://www.aa.com.tr/tr/ekonomi/turkiyenin-enerji-haritasinda-yesilin-payi-artiyor/2280401#

KAZ Policy Brief. (2022). *Fossil Fuel Subsidies in Kazakhstan and Options for Fiscal Measures to Stimulate Low-Carbon Development. International Institute for Sustainable Development, Global Subsidies Initiatives, UN, Economic Research Institute.* https://www.un-page.org/static/c4a48018785d8ce72c19a0fe2225faf9/kaz-policy-brief-eng-2.pdf

Onsat, J. (2023, September 28). Rigzone. https://www.rigzone.com/news/eni_inaugurates_50_mw_solar_plant_in_kazakhstan-28-sep-2023-174159-article/

QazStat. (n. d.). *Bureau of National Statistics of Kazakhstan.* https://stat.gov.kz/en/industries/business-statistics/stat-energy/

Sakenova, S. (2024, November 13). *Kazakhstan, Azerbaijan, and Uzbekistan sign agreement on energy system integration.* The Astana Times. https://astanatimes.com/2024/11/kazakhstan-azerbaijan-and-uzbekistan-sign-agreement-on-energy-system-integration/

Salian, N. (2024, November 1). *ACWA Power secures $62m for renewable energy project in Uzbekistan.* Gulf Business. https://gulfbusiness.com/acwa-power-secures-62m-for-project-in-uzbekistan/

Statistics Agency of Uzbekistan. (n. d.). https://stat.uz/en/official-statistics/energy-efficiency-and-fuel-balance

Tleubergenova, A., Abuov, Y., Danenova, S., Khoyashov, N., Togay, A., & Lee, W. (2023). Resource assessment for green hydrogen production in Kazakhstan. *International Journal of Hydrogen Energy*, *48*(43), 16232–16245. https://doi.org/10.1016/j.ijhydene.2023.01.113

TÜİK. (n. d.). *Turkish Statistical Institute.* https://data.tuik.gov.tr/Kategori/GetKategori?p=cevre-ve-enerji-103&dil=2

Umarov, E. (2024). Sustainable energy development in Uzbekistan: opportunities and challenges. *International Journal of Southern Economic Light*, *12*(3), 1–8. https://doi.org/10.36713/epra2712

Uzbekistan – Introduces tax incentives for renewable energy producers. (n. d.). UNCTAD Investment Policy Hub. https://investmentpolicy.unctad.org/investment-policy-monitor/measures/4102/uzbekistan-introduces-tax-incentives-for-renewable-energy-producers

Conflict of interest. The author certify that he has no financial or non-financial interest in the subject matter or materials discussed in this manuscript; the author has no association with state bodies, any organizations or commercial entities having a financial interest in or financial conflict with the subject matter or research presented in the manuscript. Given that the author is affiliated with the institution that publishes this journal, which may cause potential conflict or suspicion of bias and therefore the final decision to publish this article (including the reviewers and editors) is made by the members of the Editorial Board who are not the employees of this institution.

The author received no direct funding for this research.

Quliyev M. Green transition: the case of Turkey and Central Asia countries. *Scientia fructuosa*. 2025. № 1. P. 61–74. https://doi.org/10.31617/1.2025(159)04

Received by the editorial office 26.11.2024.
Accepted for printing 10.12.2024.
Published online 17.02.2025.

DOI: 10.31617/1.2025(159)05
UDC 339.543:061.1ЄС=111

ZOLOTAROVA Oksana,
PhD in Technical Sciences,
Associate Professor, Associate Professor of the
Department of Commodity Science and Customs Affairs
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0003-2534-3125
o.zolotarova@knute.edu.ua

KARAVAYEV Taras,
Doctor of Sciences (Technical),
Professor, Professor of the
Department of Commodity Science and Customs Affairs
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0003-4429-2474
t.karavayev@knute.edu.ua

DUGINETS Ganna,
Doctor of Sciences (Economics), Professor,
Head of the Department
of World Economy
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0003-3708-3666
g.duginets@knute.edu.ua

AEO CONCEPT IN EU CUSTOMS REFORM

This research is focused on the evolution of the concept of Authorized Economic Operator (AEO) within the framework of the EU customs system reform in 2023. It was focused on the concept of Trusted and Verified Traders proposed by the reform, which is based on the principles of the AEO program and aimed to further simplify customs procedures, improve transparency and enhance trade security. The hypothesis is that implementing of this concept in Ukraine could additionally simplify customs procedures for Ukrainian foreign economic operators who meet established criteria, as well as improve the efficiency and transparency of customs system management, facilitate Ukraine's integration into the European economic area, and strengthen economic ties with the EU. Based on an analysis of European legislation and academic literature, it has been found that, while Ukraine already possesses certain

ЗОЛОТАРЬОВА Оксана,
к. т. н., доцент, доцент кафедри
товарознавства та митної справи
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0003-2534-3125
o.zolotarova@knute.edu.ua

КАРАВАЄВ Тарас,
д. т. н., професор,
професор кафедри товарознавства та митної справи
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0003-4429-2474
t.karavayev@knute.edu.ua

ДУГІНЕЦЬ Ганна,
д. е. н., професор,
завідувач кафедри світової економіки
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0003-3708-3666
g.duginets@knute.edu.ua

АЕО В РЕФОРМІ МИТНОЇ СИСТЕМИ ЄС

Проведено аналіз еволюції концепції Авторизованого економічного оператора (АЕО) у рамках реформи митної системи Європейського Союзу 2023 р. Увага авторів зосереджена на запропонованій реформою концепції Довірених і перевірених трейдерів, що базується на принципах програми АЕО та спрямована на подальше спрощення митних процедур, покращення прозорості й підвищення безпеки торгівлі. Гіпотеза полягає в тому, що впровадження цієї концепції в Україні може додатково спростити митні процедури для українських суб'єктів зовнішньоекономічної діяльності, що відповідають встановленим критеріям, а також підвищити ефективність і прозорість управління митною системою, сприяти інтеграції України в європейський економічний простір і посилити економічні зв'язки з ЄС. На основі аналізу європейського законодавства та наукової літератури зазначено, що, хоча

prerequisites of implementing the AEO programme, it faces challenges, including insufficient integration of information systems and the need to strengthen the institutional capacity of customs authorities. The results of the research indicate that implementing the Trusted and Verified Traders' Concept could expand opportunities for automation and enhance transparency in customs procedures, which is an important step towards integrating Ukraine into international economic processes.

Keywords: customs reform, AEO, trade security, customs procedures, EU, Ukraine.

Україна вже має певні передумови імплементації програми АЕО, перед нею стоять виклики, зокрема недостатня інтеграція інформаційних систем і потреба у зміцненні інституційної спроможності митних органів. Результати дослідження свідчать, що впровадження концепції Довірених і перевірених трейдерів (ДПТ) може розширити можливості для автоматизації й підвищення прозорості митних процедур, що є важливим кроком на шляху до інтеграції України в міжнародні економічні процеси.

Ключові слова: митна реформа, АЕО, безпека торгівлі, митні процедури, ЄС, Україна.

JEL Classification: F13, F15, K33, L81.

Introduction

In the context of globalization and the accelerated development of international trade, institutions that facilitate the simplification of customs procedures have become a necessary condition for increasing competetiveness and security. One such instrument is the institution of Authorized Economic Operator (AEO), which has been introduced in many countries of the world as a response to the need to strengthen the security of supply chains and reduce the administrative burden on business. In world practice, the AEO institution is one of the most important instruments for simplifying customs procedures for foreign economic operators that meet certain standards of reliability and security.

In 2023, the European Commission presented "the most ambitious reform of the Customs Union since its creation in 1968"[1] (European Commission, 2023a), which expands the AEO concept by introducing a new Concept of Trusted and Verified Traders. The latter provides for the introduction of simplified procedures for traders that meet strict criteria of financial stability, compliance with security measures and proper documentation.

The AEO global concept, its development and impact on international trade, as well as the advantages and problems of implementation in different countries of the world have become the subject of numerous studies by both foreign (Chen & Ma, 2015; Świerczyńska, 2018; Romans, 2022; Gwardzińska, 2023) and domestic scientists, in particular Kanygina et al. (2022). The problem research of implementation and features of the AEO development in Ukraine, as well as their compliance with international standards, was carried out by Verbytskyi et al. (2021), Mykytenko et al. (2023), Vargulyak (2023). Lux (2023) and Muñiz (2023) devoted their works to the study of reforms of the EU customs system. Plohuta (2024a, 2024b) examines the features of the implementation of the EU customs reform in Ukraine and its prospects and challenges for Ukrainian customs. The prospects and challenges of

[1] All quotes from foreign sources are translated by the authors of the article.

implementing the new Concept of Trusted and Verified Traders in the EU were the subject of research by Fruscione (2023), Lux (2024).

Second part of the article is devoted to a substantive analysis of recent publications and research, which necessitates an in-depth study of key areas, challenges, and prospects for implementing AEO simplifications for foreign economic entities in international supply chains. Particular attention is paid to the understudied problems of implementing the Trusted and Verified Traders (TVT) Concept, which includes an analysis of the conditions, risks, and prospects for its adaptation to the realities of the Ukrainian customs system.

The aim of the research is to study the evolution of the AEO concept in the context of the EU customs reform, identify the main prospects and challenges for Ukraine, as well as study the prospects for integrating the TVT concept into the practice of Ukrainian foreign economic activity and assess its possible impact on simplifying customs procedures, increasing trade security, and facilitating Ukraine's integration into international economic processes.

The problem of the research is to determine the assessment of Ukraine's readiness to harmonize its customs system with new EU standards and the possibility of implementing the TVT concept to simplify and strengthen trade relations with the European Union. The relevance of this issue is growing in light of Ukraine's integration course into the European Union and its role in regional trade.

The main hypothesis is that the introduction in Ukraine of the Trusted and Verified Traders Concept, which is an improved version of the concept of Authorized Economic Operator, can further simplify customs procedures for Ukrainian entities of foreign economic activity that meet the established criteria, as well as increase the efficiency and transparency of customs administration, promote Ukraine's integration into the European economic space and strengthen economic ties with the EU.

The research methods were an analysis of European customs legislation, a review of scientific publications on the AEO program and its evolution, as well as a qualitative analysis of the prospects and challenges associated with the implementation of the TVT concept in Ukraine. To assess Ukraine's readiness to implement reforms, comparative analysis methods, a review of legislative initiatives, and interviews with experts in the field of customs were used.

The main part of the article consists of three sections. The first presents a reform overview of the EU customs system in evolution terms of the AEO program, its role in trade security, and its impact on international supply chains. The second section is devoted to a review of recent scientific research and publications on the main elements of the EU customs system reform, the functioning of AEO in Ukraine and the world, and the new TVT concept. The third section considers an assessment of the prospects for the implementation of the TVT concept in Ukraine, identifies potential barriers, and recommends ways to overcome them.

1. Reform of the EU customs system: what will change for AEOs

The 2023 reform of the European Union customs system (European Commission, 2023a) is one of the most ambitious and comprehensive measures aimed at modernizing customs procedures, improving risk management and facilitating international trade. The reform is based on three key principles: increased efficiency, geopolitical relevance and the ability to adapt to new challenges. These principles reflect current global trade trends, the changing economic environment and the need to strengthen risk control, in particular in the context of the growing role of e-commerce.

1.1. EU Customs Data Centre

One of the central elements of the reform of the EU customs system is the creation of the EU Customs Data Hub, which will become an important tool for integrating national customs systems into a single digital platform. This platform will allow foreign economic operators to submit data on goods for customs clearance only once for all EU member states through a unified interface, which will significantly reduce the administrative burden and minimize duplication of processes. Data centralization will not only simplify customs procedures, but also strengthen the analytical capabilities of customs authorities, which will contribute to more effective customs risk management and the fight against smuggling and fraud in international trade.

1.2. Creation of a single EU customs authority

Another important aspect of the reform is the creation of a single EU Customs Authority, which will be responsible for centralised risk management within the EU customs union. This authority will play a key role in coordinating the activities of national customs administrations and ensuring a common approach to risk management, which is particularly important in the context of today's global challenges. Centralised risk management will allow resources to be focused on high-risk entities and operations, while bona fide economic operators will be able to benefit from significant simplifications under the new AEO concept. This concept expands the AEO programme and allows entities that meet high standards of compliance with customs rules and procedures to benefit from simplified procedures, such as reduced customs checks, accelerated declarations, the use of a single simplified declaration for multiple transactions and automated customs clearance procedures.

1.3. New risk management mechanisms

The reform will introduce a new risk management model in the European Union, involving Member States, the European Commission, the EU Customs Authority and other relevant authorities, including market

surveillance authorities. An important element of this new governance model is the partnership with business, which will become the basis for the implementation of effective risk management.

The reform will establish a new EU government structure responsible for implementing risk management aimed at protecting the EU's common border for goods. First, a Central Risk Analysis Capability will be created on the basis of the EU Customs Authority, which will use new data from the EU Customs Data Hub. It will also develop a mechanism to ensure a more harmonised implementtation of risk management and control at the EU's common border and establish a framework for cooperation between the different authorities managing the single market and the customs union. This process will be completed by creating a mechanism for developing a shared vision for risk prioritization, which will help focus efforts on the most critical aspects of risk management in the European Union.

1.4. Unified interface for submitting customs declarations

The reform pays special attention to the development of digital tools and the introduction of a single interface for submitting customs declarations (Single window), which will ensure harmonized compliance with customs legislation requirements throughout the EU. This system will significantly reduce logistics costs and speed up the time for moving goods across customs borders, ensuring faster and more efficient service for foreign economic operators.

In addition, the reform is aimed at simplifying customs procedures for e-commerce, which is gaining increasing importance in the global economy. E-commerce platforms, such as large online stores and marketplaces, will receive the status of conditional importers and will be responsible for customs clearance of goods sold through their services and moved across the EU customs borders. This implies that such platforms will be obliged to submit customs declarations on behalf of their sellers and buyers, which will contribute to increasing the transparency of customs operations. Such a change will simplify the process for end consumers, reducing bureaucratic obstacles for them, and at the same time will increase the effectiveness of control over compliance with customs rules by government authorities.

1.5. Reform implementation stages

The reform envisages a phased implementation of the described new tools and systems. According to the plan, the roll-out of the reform will continue over the next 10–15 years, which will allow for the gradual introduction of new elements without disrupting the existing process of the EU customs authorities. The European Customs Data Centre will be deployed in several stages, with e-commerce platforms starting in 2028 to use the new customs clearance regime. By 2032, businesses will be able to use the European Customs Data Centre on a voluntary basis, and from 2038 this will become a mandatory requirement for all participants in international trade.

The reform of the EU customs system is an important step towards creating a single customs area that will allow the European Union to respond more effectively to modern challenges in trade, increase the security and transparency of customs procedures, and promote the development of international cooperation in the field of customs.

2. Review of recent scientific research and publications

The reform of the EU customs system, which introduces the concept of Trusted and Verified Traders as an extension of the AEO status, has become the subject of scientific research focused on studying the directions of modernization of customs systems and the increased use of digital tools to increase the security of international trade and the efficiency of customs procedures.

2.1. Innovations in the EU Customs Reform in 2023

In Ukraine, research on the reform of the EU customs system remains limited, especially in the context of analyzing its impact on countries seeking integration into the European Economic Area. The authors of the article are among the few Ukrainian scholars studying this issue. In their research, Karavayev et al. (2024) laid the theoretical foundations for considering key aspects of the EU customs reform, highlighting the European Commission's strategy to eliminate inefficiencies through digitalization and an emphasis on e-commerce, while emphasizing the need to synchronize Ukraine's customs information systems with the future EU Customs Data Center. The authors have laid the foundation for further research in the future aimed at deepening the analysis in the context of the adaptation and possibilities of applying the AEO and TVT concepts in Ukraine, so this article is a logical continuation of such research.

Plohuta (2024b) also actively studied the specifics of the reform of the EU customs union, focusing on the challenges and opportunities for Ukraine arising from the introduction of the updated AEO and TVT concepts and emphasizing the importance of modernizing the information systems of Ukrainian customs authorities and implementing innovative IT solutions that are in line with the EU's digital initiatives.

Lux (2023) critically assesses the impact of the creation of the EU Customs Data Centre on AEO programmes, highlighting the shift from the traditional AEO model to the new TVT concept, which gives market operators more autonomy in customs clearance, in particular through the possibility of self-release of goods, while at the same time shifting more responsibility to importers and exporters. In his follow-up work, Lux (2024) analyses the implications of the proposed reform, in particular the issue of the transfer of responsibility in the implementation of customs procedures, criticizing that such approaches do not take into account the complexity of supply chains, where customs brokers and logistics operators play an important role.

Muñiz (2023) proposes a promising approach to the reform of the EU Customs Union through the introduction of artificial intelligence and data analytics, highlighting the importance of the EU Customs Data Centre for centralizing information and accelerating checks, which simplifies the customs clearance of low-risk goods.

In general, scientific research focuses on updating the AEO concept, digitalization of the customs system and risk management, as well as the need to harmonize customs procedures and technological solutions to ensure more efficient international trade. For Ukraine, the implementation of the AEO concept is both a challenge and an opportunity, requiring legislative changes and infrastructure modernization, but ultimately will contribute to integration into the EU economic space and ensure more secure and efficient trade relations.

2.2. AEO as a tool for compliance, security and trade facilitation

An analysis of current research on AEO confirms the key role of this initiative in ensuring that foreign economic operators (FEOs) comply with customs requirements and enhance the security of international trade. Chen and Ma (2015) and Romans (2022) focus on the AEO importance in risk management in global supply chains. Chen and Ma emphasize that cooperation between governments and businesses is the basis for reducing risks and strengthening supply security. Romans, examining the experience of South Africa, shows that the AEO program not only reduces administrative burdens, but also increases the level of security in international trade, which contributes to the economic development of the country.

Other studies also confirm the important AEO role in stimulating economic activity and ensuring security. For her part, Świerczyńska (2018) notes the critical importance of striking a balance between simplifying customs procedures and maintaining effective controls that contribute to the security of trade flows. Gwardzińska (2023) considers AEO as a tool for verifying compliance with customs regulations, drawing attention to the lack of uniform rules on sanctions for violations within the EU, which leads to uneven conditions for program participants.

Unlike numerous foreign works, studies of international experience in implementing AEO in Ukraine remain quite limited, as does the study of individual aspects of the reform of the EU customs system. In this context, the authors of the study act as leading Ukrainian scholars, focusing on a thorough study of this topic, emphasizing the prospects and challenges for adapting the new concept in the conditions of Ukraine. Karavaev et al. (2022) conducted a thorough analysis of the experience of implementing AEO in the USA, the EU and China, emphasizing the positive impact of AEO on accelerating international logistics, which can be valuable in the context of geopolitical instability in Ukraine. Kanygin et al. (2022) examined the need to improve the screening process for AEO candidates in Ukraine, comparing

it with the European model, and recommended adapting control mechanisms. Duginets and Vdovichenko (2024) examined the complexities associated with different national requirements that complicate the mutual recognition of AEO statuses, emphasizing the importance of international harmonization of procedures to increase the effectiveness of the program.

Overall, the research confirms that the AEO program is a critically important tool for ensuring the security and efficiency of international trade. However, its implementation faces a number of challenges, in particular in the area of harmonization of procedures and establishment of close cooperation between customs authorities and business. For Ukraine, which continues its integration course in the context of geopolitical changes, it is important to adapt the AEO program to international standards. This requires not only political will, but also strengthening cooperation between state authorities and foreign economic operators, as well as the introduction of the latest technologies to increase the efficiency of customs procedures.

2.3. Implementation of the AEO Institute in Ukraine: challenges, benefits and ways to improve

The issue of functioning and obtaining AEO status in Ukraine is of considerable interest in academic shere, as this initiative is part of a broader customs reform in the context of European integration. The conducted studies demonstrate both prospects and challenges in the implementation of this institution in Ukraine.

Scientists unanimously note that the AEO introduction has significant potential for simplifying customs procedures, reducing time and money costs, and increasing the competitiveness of Ukrainian companies in international markets. Verbytskyi et al. (2021) emphasize that the adaptation of Ukrainian customs legislation to EU norms reduces administrative pressure on enterprises, facilitating their activities in the international arena. Adamiv (2022) adds that obtaining AEO status allows companies to take advantage of a number of advantages in customs control, which increases their reputation in international markets.

An important aspect is also the methodological approach to assessing enterprises applying for AEO status. Vakulchyk et al. (2023) developed a methodology that includes the use of customs diagnostic indicators, which ensures objectivity in assigning AEO status and increases the transparency of the process. This is an important element for the institute development in Ukraine, as it allows avoiding subjectivity and ensuring transparency of procedures. Researchers also note the significant role of international standards in the development of the AEO institute in Ukraine. Mykytenko et al. (2023) emphasize the importance of compliance with World Customs Organization standards, such as security standards, which allow Ukraine to more actively integrate into global supply chains and strengthen international trade.

Looking ahead, the AEO introduction is accompanied by a number of problems for both large and especially small and medium-sized businesses. As of October 30, 2024, the Unified State Register of Authorized Economic Operators includes 63 enterprises, most of which are large, while for small and medium-sized businesses, fulfilling the requirements for obtaining the status remains a difficult task. Verbytskyi et al. (2021) note that the customs clearance process remains complex and it requires the introduction of new technologies. Varhulyak (2023) emphasizes the existing gaps in national legislation that slow down the process of enterprise authorization and reduce the effectiveness of realizing the potential of AEO. This problem is also confirmed by Plohuta (2024a), drawing attention to the terminological difficulties and shortcomings in the adaptation of Ukrainian legislation to EU norms. Some researchers even doubt the achievement of the expected results from the AEO introduction. Ryndenko et al. (2023) emphasize that although the new customs procedure is designed to facilitate foreign economic activity; its real impact on business is not yet fully understood and requires additional research.

Deepening the analysis, the article by Bezrydna et al. (2024) is devoted to the legal regulation of AEO status in the context of fulfilling Ukraine's obligations under the Association Agreement with the European Union. The paper examines international standards, in particular the "Framework Standards for Security and Facilitation of International Trade" (SAFE), developed by the World Customs Organization, which became the basis for the formation of Ukrainian legislation. Particular attention is paid to the issues of implementing these standards into national customs law, which contributes to the development of the AEO institution.

Ivanchenko (2024) examines the AEO implementation in Ukraine during martial law, emphasizing the importance of maintaining European integration processes despite external challenges. The author notes that, despite the aggression from Russia, the AEO implementation is an important stage in simplifying customs procedures and increasing the competitiveness of Ukrainian companies in international markets. However, he also emphasizes the existence of significant difficulties in the process of obtaining the status, especially due to the long terms of AEO obtaining, which can be delayed up to a year.

Klyatsky et al. (2024) analyze the problems of implementing the AEO institution in Ukraine, comparing the Ukrainian experience with more developed European practices. The main obstacles include the complexity of the procedures for obtaining AEO status for small and medium-sized businesses, which often do not have sufficient resources to ensure compliance with the criteria. In addition, the low level of awareness of the benefits of AEO status among entrepreneurs negatively affects the pace of implementtation of this system.

All of the above publications emphasize the importance of developing the AEO institution in Ukraine as an element of European integration, but

also draw attention to the challenges associated with the adaptation of Ukrainian customs legislation, the complexity of procedures, and the need for harmonization with international standards.

2.4. "Trusted and Verified Traders" Concept: what will change for business

Merz (2024) identifies key changes in EU customs legislation, including the transition from AEO to the new AEO status. The main changes relate to the technological readiness of operators, including integration with the EU Customs Hub platform for real-time data transmission. This will allow customs authorities to receive up-to-date information on the movement of goods, increasing the efficiency of controls and reducing the number of checks. In order to obtain AEO status, AEO operators will need to invest in new technologies, which, although opening up new opportunities, also create additional obligations and risks, especially for small businesses.

Fruscione (2023) notes that the introduction of new technologies within the AEO framework will have a positive impact on companies that are ready to innovate, but may create barriers for SMEs that do not have sufficient resources to make such changes. The author suggests considering the possibility of additional support for small market entities to ensure a level playing field for all operators.

The introduction of the TVT status, despite certain technological and financial requirements, can significantly increase the efficiency of customs control, help reduce the administrative burden and optimize processes for business. Particular attention should be paid to the challenges for small and medium-sized businesses, which may experience significant financial burdens from the need for technological modernization. In addition, the introduction of the Trusted and Verified Traders concept in Ukraine opens up new opportunities for integration into European logistics chains and improved interaction with EU customs authorities. This creates the potential for more harmonious cooperation with European partners, simplification of customs procedures and strengthening Ukraine's positions in international markets.

3. Advantages of introducing the concept of Trusted and Verified Traders in Ukraine

Aligning Ukraine's customs policy with the EU customs reforms will provide significant benefits, especially within the new AEO concept. This concept is based on the principles of the AEO program and aims to further simplify customs procedures improve transparency and increase trade security.

3.1. Improved trade security and simplified procedures

One of the key benefits of implementing the TVT concept is the increased level of security in international trade, achieved through real-time

data exchange and enhanced monitoring of supply chains. By aligning its actions with this concept, Ukraine can improve customs security through the use of a centralized European Customs Data Center, which promotes transparency and reduces risks in international trade (European Commission, 2023a). Alignment with this framework will allow Ukrainian companies to obtain TVT status, which will provide access to simplified customs procedures: reduced physical checks, accelerated cargo clearance and the ability to transmit cargo data in real time. Such simplified processes will help Ukrainian companies increase efficiency, reduce transaction costs and strengthen their competitiveness in the EU market (WCO, 2021). Reducing customs intervention in the form of periodic inspections and the ability to self-monitor compliance with customs requirements will also create additional benefits for businesses in Ukraine (European Commission, 2023b).

3.2. Strengthening trade relations through mutual recognition agreements

One of the main outcomes of aligning the Ukrainian customs system with EU standards is the potential for concluding Mutual Recognition Agreements (MRAs) between Ukraine and the EU. These agreements contribute to improving trade flows, as mutual recognition of customs controls and authorizations simplifies customs procedures for both parties (WCO, 2021). This will not only enable Ukraine to simplify access to the EU market, but also lay the foundation for deeper economic integration. With the introduction of the TVT concept, Ukraine can position itself as a reliable trading partner in the EU. This will open up opportunities for concluding MRAs, which will facilitate smoother customs procedures and eliminate delays at the borders (European Commission, 2023c). This is particularly important for Ukrainian exporters, who face administrative barriers and significant delays in moving goods across the border.

3.3. Increasing economic competitiveness and investment attractiveness

The introduction of the TVT concept will also contribute to increasing Ukraine's economic competitiveness by reducing the administrative burden and accelerating customs clearance processes. Optimized customs procedures reduce border crossing times and reduce administrative costs, which is especially important for Ukrainian exporters in the European market. This will allow Ukrainian enterprises to focus on improving their products rather than meeting complex customs requirements, which will contribute to increasing their productivity and efficiency.

Harmonizing Ukraine's customs procedures with EU requirements will also increase its investment attractiveness. For international investors, stability, transparency and predicttability of regulatory procedures are important factors. The TVT introduction and compliance with European

customs standards will contribute to creating a favorable business climate in Ukraine, which in turn will stimulate foreign investment and economic growth (World Bank, 2023).

Therefore, harmonizing Ukraine's customs policy with the reforms of the EU customs system within the framework of the TVT concept can be an important step towards economic and full integration with the EU, contributing to both improving the security of international trade and increasing the country's competitiveness and investment attractiveness.

Conclusions

The research is devoted to the analysis of the evolution of the Authorized Economic Operator (AEO) concept in the context of the European Union customs system reform in 2023 and the study of the prospects for adapting the updated concept of Trusted and Verified Traders in Ukraine.

The results of the research confirmed the hypothesis that the implementation of new approaches within the framework of the EU customs reform will contribute to increasing the efficiency of customs procedures, in particular through simplification for certified economic operators, and can become a key element for increasing the security of supply chains in the context of globalization. The proposed concept of Trusted and Verified Traders is a logical continuation of the AEO development, which is focused on strengthening the interaction between customs authorities and the private sector, which creates new opportunities for automating processes and implementing digital solutions.

In the research it has been found that, although Ukraine has already made significant steps towards adapting its customs system to EU standards, in particular through the increase in the number of AEOs, a number of challenges remain, including insufficient integration of information systems, the need to improve the institutional capacity of customs authorities and interaction with the business community. Despite these challenges, the study proves that Ukraine has significant prospects for further integration of the latest standards, and the concept of Trusted and Verified Traders can significantly contribute to this process.

The research obtained additional unplanned results related to the identification of new aspects of interaction between customs authorities and economic operators, in particular the need to harmonize the regulatory framework and increase the level of trust between all participants in customs procedures. In addition, it was found that the AEO development in Ukraine can be accelerated through international technical assistance and training of personnel in accordance with best European practices.

The scientific novelty of the research lies in the comprehensive analysis of the impact of the reform of the EU customs system on the development of the AEO concept and its potential for implementation in Ukraine. The research highlights new trends in the development of customs procedures, which are important for the future integration of Ukraine into the European Economic Area, as well as for increasing its competitiveness in world markets.

The practical value of the results obtained is determined by the possibility of their use in developing new approaches to adapting Ukraine's customs policy in accordance with EU reforms. This research can become the basis for improving the regulatory framework in the field of customs policy, which will contribute to strengthening the economic security of the state and creating favorable conditions for business.

The prospects for further research in this area are a detailed analysis of the impact of the implementation of the Trusted and Verified Traders' Concept on the development of small and medium-sized businesses in Ukraine, as well as a study of best practices in the use of digital technologies in the customs sector to ensure transparency and efficiency of control procedures. An important area of further research is also studying the impact of customs reforms on cross-border trade and cooperation between customs authorities of different countries.

REFERENCE/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Adamiv, M. (2022). The Institution of an Authorised Economic Operator in Ukraine: Possibilities of Boosting the Competitiveness of Enterprises under the European Integration. *Analizy i Studia CASP*, *13*(1), 55–63. https://www.ceeol.com/search/article-detail?id=1073212

Bezridnya, V., Shpirno, O., & Korostashova, I. (2024). The status of the Authorized Economic Operator in Ukrainian customs legislation. *UNIVERSUM***,** (10), 34–41. https://archive.liga.science/index.php/universum/article/view/1166

Безрідня, В., Шпірно, О., & Коросташова, І. (2024). Статус автоматизованого економічного оператора в митному законодавстві України. *UNIVERSUM*, (10), 34–41. https://archive.liga.science/index.php/universum/article/view/1166

Chen, L., & Ma, Y. (2015). A study of the role of customs in global supply chain management and trade security based on the Authorized Economic Operator system. *Journal of Risk Analysis and Crisis Response*, *5*(2). https://www.jracr.com/index.php/jracr/article/view/137

Duginets, G., & Vdovychenko, M. (2024). Authorised economic operator: advantages and challenges of implementation in the world. *Economy and Society*, (64). https://doi.org/10.32782/2524-0072/2024-64-73

Дугинець, Г., & Вдовиченко, М. (2024). Авторизований економічний оператор: переваги та проблеми імплементації в світі. *Економіка та суспільство,* (64). https://doi.org/10.32782/2524-0072/2024-64-73

European Commission. (2023*a*). Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee. *Customs reform: Taking the Customs Union to the next level.* COM/2023/257final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0257&qid=1684913179617

European Commission. (2023*b*). *Questions and answers: EU Customs reform*. https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_2644

European Commission. (2023*c*). *EU Customs Reform: Enhancing trade and security through data-driven customs management*. https://taxation-customs.ec.europa.eu/customs-4/eu-customs-reform_en

Fruscione, A. (2023). Facilitations for Trust & Check Operators. *Global Trade and Customs Journal,18*(11), 454–456. https://kluwerlawonline.com/JournalArticle/Global+Trade+and+Customs+Journal/18.11/GTCJ2023053

Gwardzińska, E. (2023). The AEO system as a diagnostic and verification tool for compliance with customs legislation. *In Tax Compliance and Risk Management,* 202–218. Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9781003456032-13/aeo-system-diagnostic-verification-tool-compliance-customs-legislation-ewa-gwardzi%C5%84ska

Ivanchenko, E. P. (2024). Prospects for the introduction of the institution of an authorized economic operator in ukraine during the legal regime of martial law. *Baltija Publishing*. http://www.baltijapublishing.lv/omp/index.php/bp/catalog/download/473/12674/26474-1?inline=1	Іванченко, Е. П. (2024). Перспективи запровадження інституту авторизованого економічного оператора в Україні в умовах воєнного стану. *Балтія Паблішинг.* http://www.baltijapublishing.lv/omp/index.php/bp/catalog/download/473/12674/26474-1?inline=1
Kanyhin, S., Tyschenko, V., & Azizova, K. (2022). International experience of validation of authorized economic operator candidates. *Economy and Society*, (39). https://doi.org/10.32782/2524-0072/2022-39-68	Канигін, С., Тищенко, В., & Азізова, К. (2022). Міжнародний досвід організації перевірок кандидатів на отримання статуса авторизованого економічного оператора. *Економіка та суспільство,* (39). https://doi.org/10.32782/2524-0072/ 2022-39-68
Karavayev, T., & Kaluha, H. (2024). EU customs reform: implementation in Ukraine. F*oreign trade: economics, finance, law*, *1*(132), 4–22. https://doi.org/10.31617/3.2024(132)01	Караваєв, Т., & Калуга, Н. (2024). Митна реформа ЄС: імплементація в Україні. *Зовнішня торгівля: економіка, фінанси, право*, *1*(132), 4–22. https://doi.org/10.31617/3.2024(132)01
Karavayev, T., Duginets, G., & Nikanorova, O. (2022). Authorized economic operator: world experience. *Foreign trade: economics, finance, law*, *2*(121), 26–37. https://doi.org/10.31617/zt.knute.2022(121)03	
Klyatskyi, D., Bilonozhko, M., & Korostashova, I. (2024). The essence of the customs-legal institution of the Authorized Economic Operator and problematic issues of its implementation in Ukraine. *UNIVERSUM*, (9), 108–115. https://archive.liga.science/index.php/universum/article/view/1089	Кляцький, Д., Білоножко, М., & Коросташова, І. (2024). Сутність митно-правового інституту Авторизованого економічного оператора та проблемні питання його реалізації в Україні. *UNIVERSUM*, (9), 108–115. https://archive.liga.science/index.php/universum/ article/view/1089
Lux, M. (2023). The Ambitious Customs Reform Package Proposed by the EU Commission. *Global Trade and Customs Journal, 18*(7), 399–425. https://doi.org/10.54648/gtcj2023049	
Lux, M. (2024). Special Procedures the Responsible Person(s): What Would Change under the EU Commission's Reform Proposal? *Global Trade and Customs Journal*, (7), 528–545, https://doi.org/10.54648/gtcj2024064	
Merz, M. (2024). *Trust & Check Trader: EU customs reform.* 03/09/2024. https://michaelamerz.org/2024/09/03/trust-check-trader-eu-customs-reform/	
Muñiz, P. (2023). Designing a Dream EU Customs Union. *Global Trade and Customs Journal*, *18*(7), 426–430. https://doi.org/10.54648/gtcj2023056	
Mykytenko, T., Melnyk, O., & Sahaidak, I. (2023). Development of the Authorized economic operator institute in Ukraine in the context of implementing international standards. *Economy and Society*, (58). https://doi.org/10.32782/2524-0072/2023-58-21	Микитенко, Т., Мельник, О., & Сагайдак, І. (2023). Розвиток інституту Авторизованого економічного оператора в Україні в контексті імплементації міжнародних стандартів. *Економіка та суспільство*, (58). https://doi.org/10.32782/2524-0072/2023-58-21
Plohuta, Ye. (2024a). Customs and legal concept of an authorised economic operator in Ukraine: terminological discourse. *Law scientific electronic journal,* (3), 84–90. http://www.lsej.org.ua/3_2024/84.pdf	Плохута, Є. (2024*a*). Митно-правова концепція Авторизованого економічного оператора в Україні: *Термінологічний дискурс. Юридичний науковий електронний журнал*, (3), 84–90. http://www.lsej.org.ua/3_2024/84.pdf
Plokhuta, Ye. (2024b). EU Customs Union Reform: prospects and challenges for Ukrainian customs. *Scientific law journal*, (2024). http://www.legalnovels.in.ua/journal/22_2024/25.pdf	Плохута, Є. (2024*b*). Реформа митного союзу ЄС: перспективи та виклики для митної справи України. *Науковий юридичний журнал*, (2024). http://www.legalnovels.in.ua/journal/22_2024/25.pdf
Romans, B. (2022). *Securing Supply Chains Under the Authorised Economic Operator Programme*. TAXtalk, *97*(2022), 38–41. https://journals.co.za/doi/abs/10.10520/ejc-taxtalk_v2022_n97_a13	

Ryndenko, M., Ryndenko, S., & Pashko, P. (2023). Failure or breakthrough: How the new AEO customs procedure will affect Ukrainian business. *Proceedings of the MNL Conference (December 15, 2023, Ivano-Frankivsk*), 68–71. https://archive.liga.science/index.php/conference-proceedings/article/view/637	Ринденко, М., Ринденко, С., & Пашко, П. (2023). Провал чи прорив: як нова митна процедура АЕО вплине на український бізнес. *Матеріали конференцій МНЛ* (15 грудня 2023 р., м. Івано-Франківськ), 68–71. https://archive.liga.science/index.php/conference-proceedings/article/view/637

Świerczyńska, J. (2018). The institution of the authorised economic operator–facilitating economic activity and minimizing the risk of compromising the security of the trade flow in goods in the international trade. *Krakowskie Studia Międzynarodowe*, *15*(4), 263–275. https://www.ceeol.com/search/article-detail?id=783632

Vargulyak, O. H. (2023). Introduction and current state of functioning of the Authorized Economic Operator in Ukraine. *Scientific Bulletin of the International Humanitarian University. Series: Jurisprudence***,** (64). https://doi.org/10.32841/2307-1745.2023.64.6	Варгуляк, О. Г. (2023). Запровадження та сучасний стан функціонування інституту авторизованого економічного оператора в Україні. *Науковий вісник Міжнародного гуманітарного університету*. *Юриспруденція*, (64). https://doi.org/10.32841/2307-1745.2023.64.6
Verbytskyi, O. M., Dombrovska, O. P., Tikhosova, H. A., & Boyarska, O. V. (2021). The state of implementation of the Authorized Economic Operator in Ukraine. *Herald of Kherson National Technical University, 1*(76), 20–26. https://doi.org/10.35546/kntu2078-4481.2021.1.2	Вербицький, О. М., Домбровська, О. П., Тіхосова, Г. А., & Боярська, О. В. (2021). Стан запровадження в Україні інституту Авторизованого економічного оператора. *Вісник Херсонського національного технічного університеț*, *1*(76), 20–26. https://doi.org/10.35546/kntu2078-4481.2021.1.2

WCO. (2021). *SAFE framework of standards to secure and facilitate global trade*. https://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/frameworks-of-standards/safe_package.aspx

World Bank. (2023). *Logistics performance index (LPI) 2023: Measuring trade logistics across the globe*. https://lpi.worldbank.org/

Conflict of interest. The authors certify that they have no financial or non-financial interest in the subject matter or materials discussed in this manuscript; the authors have no association with state bodies, any organizations or commercial entities having a financial interest in or financial conflict with the subject matter or research presented in the manuscript. Given that one of the authors are affiliated with the institution that publishes this journal, which may cause potential conflict or suspicion of bias and therefore the final decision to publish this article (including the reviewers and editors) is made by the members of the Editorial Board who are not the employees of this institution.

The study was conducted within the framework of the Erasmus+ project Jean Monnet action "EU Authorized Economic Operator Program: Implementation in Ukraine" (101085558 – EUAEOUA). The authors received no direct funding for this research.

Zolotarova O., Karavayev T., Duginets G. AEO concept in EU customs reform. *Scientia fructuosa*. 2025. № 1. P. 75–89. https://doi.org/10.31617/1.2025(159)05

Received by the editorial office 05.11.2024.
Accepted for printing 13.11.2024.
Published online 17.02.2025.

DOI: 10.31617/1.2025(159)06
UDC 339.5:338.43]:355.271=111

MYLNYCHUK Tetiana,
PhD (Economics), Associate Professor,
Associate Professor of the Department
of Trade Entrepreneurship and Logistics
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0003-0624-5829
t.mylnychuk@knute.edu.ua

INTERNATIONAL GRAIN SUPPLY CHAINS UNDER MARTIAL ARTS

Nowadays Ukraine in all spheres has been transformed due to the difficult conditions of martial law, in which the country has been for a long time. In particular, such changes concern logistics, namely the destruction of the usual international cargo supply chains. Logistics companies were forced to quickly respond to hybrid threats and develop new alternative cargo supply chains, in particular grain, change delivery routes using alternative modes of transport and find new directions for managing such chains. Given the above research, the issue of the functioning of international supply chains is relevant and timely and will help to identify gaps in this issue.

The research is based on the hypothesis that hostilities in Ukraine have affected the geography of exports and imports, including products of the agro-industrial complex. The methods of elementary theoretical analysis and synthesis, deduction, economic and statistical methods, in particular grouping and graphics, were used, thanks to which the results of the research are visually presented.

The challenges for grain cargo supply chains under martial law are outlined and a list of tools for overcoming these challenges is provided. An analysis of adaptation to the challenges of martial law was conducted; in particular, the functioning of the "grain and Ukrainian corridors" under current conditions was investigated. The geography of grain exports was studied, a list of main partners before martial law and in war conditions was determined. The impact of changes in the geography of grain exports on world food security was determined.

МИЛЬНИЧУК Тетяна,
к. е. н., доцент, доцент кафедри
торговельного підприємництва та логістики
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0003-0624-5829
t.mylnychuk@knute.edu.ua

МІЖНАРОДНІ ЛАНЦЮГИ ПОСТАЧАННЯ ЗЕРНОВИХ ВАНТАЖІВ В УМОВАХ ВОЄННОГО СТАНУ

Сьогодення України трансформоване через важкі умови воєнного стану, в якому країна перебуває вже тривалий час. Зокрема ці зміни пов'язані з руйнуванням звичних міжнародних ланцюгів постачання вантажів. Логістичні компанії були змушені швидко реагувати на гібридні загрози та розробляти нові альтернативні ланцюги постачання зернових вантажів, змінювати шляхи доставки, використовуючи альтернативні види транспорту, а також знаходити нові напрями управління такими ланцюгами. Відтак аналіз функціонування міжнародних ланцюгів постачання є надзвичайно актуальним і своєчасним, оскільки завдяки цьому можна виявити прогалини в цій сфері. Невчасне вирішення проблеми може загрожувати продовольчій безпеці багатьох країн.

В основу дослідження покладено гіпотезу, що бойові дії на території України вплинули на географію експорту та імпорту, зокрема продукції агропромислового комплексу. Використано методи елементарно-теоретичного аналізу та синтезу, дедукції, а також економіко-статистичні, групування та графічне представлення результатів дослідження.

Окреслено виклики для ланцюгів постачання вантажів зернових в умовах воєнного стану та визначено перелік інструментів подолання цих викликів. Проведено аналіз адаптації до умов воєнного стану, зокрема досліджено функціонування "зернового та українського коридорів" у нинішніх умовах. Досліджено географію експорту зернових, надано перелік основних партнерів до воєнного стану та в умовах війни. Визначено вплив зміни географії експорту зернових на продовольчу безпеку світу.

As a result of the research, the author concluded that given that the main supply chain through the Black Sea was not fully used in general, Ukraine has today retained its leading position in grain exports and has even been able to expand the geography of supplies.

Keywords: supply chains, grain cargo, martial law, export.

У результаті проведеного дослідження зроблено висновок, що, попри обмежене використання основного ланцюга постачання через Чорне море, Україна зберегла свої лідируючі позиції в експорті зернових і навіть змогла розширити географія постачань.

Ключові слова: ланцюги постачання, зернові вантажі, воєнний стан, експорт.

JEL Classification: F14, F40, Q17, R49.

Introduction

The devastating consequences of the russian federation's aggression against Ukraine are felt in all spheres of social and economic life. One of the important aspects of this general situation is the destruction of international cargo supply chains, which has become a threat to the food security not only of Ukraine, but also of many countries for which Ukraine is one of the largest grain exporters. Logistics companies were forced to quickly respond to hybrid threats, develop new alternative cargo supply chains, in particular grain, change delivery routes using alternative modes of transport, and also look for new directions for managing such chains. Therefore, research into the functioning of international cargo supply chains is extremely relevant.

A number of scientists have studied the problem of the formation and functioning of supply chains under martial law. In particular, the logistics of oilseed crops in Ukraine and the main directions of its improvement were studied by Shiryaeva and Sokolov (2024), concluding that quick commercial and logistical solutions are needed, as well as an operational response to the constantly changing situation. Gusenko and Bomchak (2023) analyzed the current state and dynamics of grain exports in Ukraine in the context of the complexity of international logistics.

Scientists Sushchenko and Ilchenko (2023) identified the main problems associated with the formation of supply chains during the war in Ukraine and provided recommendations for minimizing risks in the logistics industry. The authors proved that the adaptation of supply chains in martial law occurs through a rethinking of business processes, for which it is necessary to constantly study the processes of ordering and supplying goods.

Migai (2024) investigated the impact of war on macroeconomic indicators of the functioning of the economy and assessed the mutual influence of inflationary processes and logistics chains, providing a justification for the optimal directions of their organization in conditions of high risk. Sopotsko (2022) analyzed the current state of food supply chains and the impact of the war in Ukraine on logistics activities, providing some recommendations for managing such chains.

Nechyporuk et al. (2022) investigated the throughput capacity of grain exports by rail. In their work, the authors identified the problems of managing agricultural supply chains and proposed ways to solve these problems in conditions of war.

Kryveshchenko et al. (2024) in their scientific article identified the directions of optimizing logistics chains in the context of increasing global crises and proved that optimizing supply chains in conditions of global crises is a complex process that requires the use of modern technologies.

Volokhova I. and Volokhov V. (2023) systematized the main challenges and directions of work of the logistics front in his publication. The authors identified the fuel crisis, the problem of military logistics, grain transporttation, and border crossing points, bureaucratic apparatus, and the lack of a development strategy as the main challenges of today. Scientists proposed directions for solving these problems.

Luchnikova, Kovalenko and Sholom (2023) conducted a study of the logistics processes of managing the supply chains of goods exports in Ukraine under martial law and proposed the main directions of such management. The authors proved that under the current crisis conditions of management, the greatest losses were suffered by the export of goods, especially grain, which is critical not only for the economy of Ukraine, but also for the well-being of the whole world.

The research results of the full-scale russian invasion impact on the world trade in oilseed crops are considered in the work (Soojung et al., 2023). It was determined that the russian-ukrainian war significantly affects the geography of grain exports, which has negative consequences for the economies of a number of countries around the world.

The aim of the research is to identify the main challenges for cargo supply chains under martial law and the impact of these challenges on international grain cargo supply chains under these conditions.

Overcoming the challenges of martial law for the effective management of international supply chains is impossible without a detailed analysis of the current state of grain exports, which emphasizes the relevance of this research. It is based on the hypothesis that the hostilities in Ukraine have affected the geography of exports and imports, including products of the agro-industrial complex. Untimely resolution of this problem may pose a threat to the food security of many countries.

The information basis of the research was the work of national and foreign scientists, data from the State Statistics Service of Ukraine, the Information and Analytical Agency "APK-Inform", the Ministry of Agrarian Policy and Food of Ukraine, the International Trade Center, as well as the results of research by the Center for Foreign Policy Studies.

During the analysis, the methods of elementary theoretical analysis and synthesis, deduction, economic and statistical methods, in particular grouping and graphics, were used, which made it possible to visually present the results of the research.

The main part of the article consists of three sections: the first considers the challenges for the grain export market in martial law conditions and provides a list of tools for overcoming these challenges. The second is devoted to the analysis of adaptation to these challenges, in particular the functioning of the "grain and Ukrainian corridors" in modern conditions.

The third section examines the geography of grain exports, identifies the main partners before the start of hostilities, and also assesses the impact of changes in the geography of grain exports on world food security.

1. Challenges for grain supply chains under martial law

The hostilities in Ukraine, which began in 2014 in the Donetsk and Luhansk regions and later escalated into a full-scale invasion on February 24, 2022, forced logistics companies to quickly adapt to serious challenges in the process of transporting and storing goods. This created the need for a rapid response to difficult conditions that affected not only the logistics sector, but also the economy as a whole (Telegin & Koval, 2023). In wartime, it is impossible to plan long-term storage of goods (grain), since grain stocks can be lost during an attack, and the deployment of a new storage facility takes about three months. Logistic activities are significantly complicated by checkpoints, numerous checks, and opaque movement rules during curfews.

The consequences of war for logistics companies include specific challenges (*Figure 1*), which directly affect the change in the functioning of logistics flows.

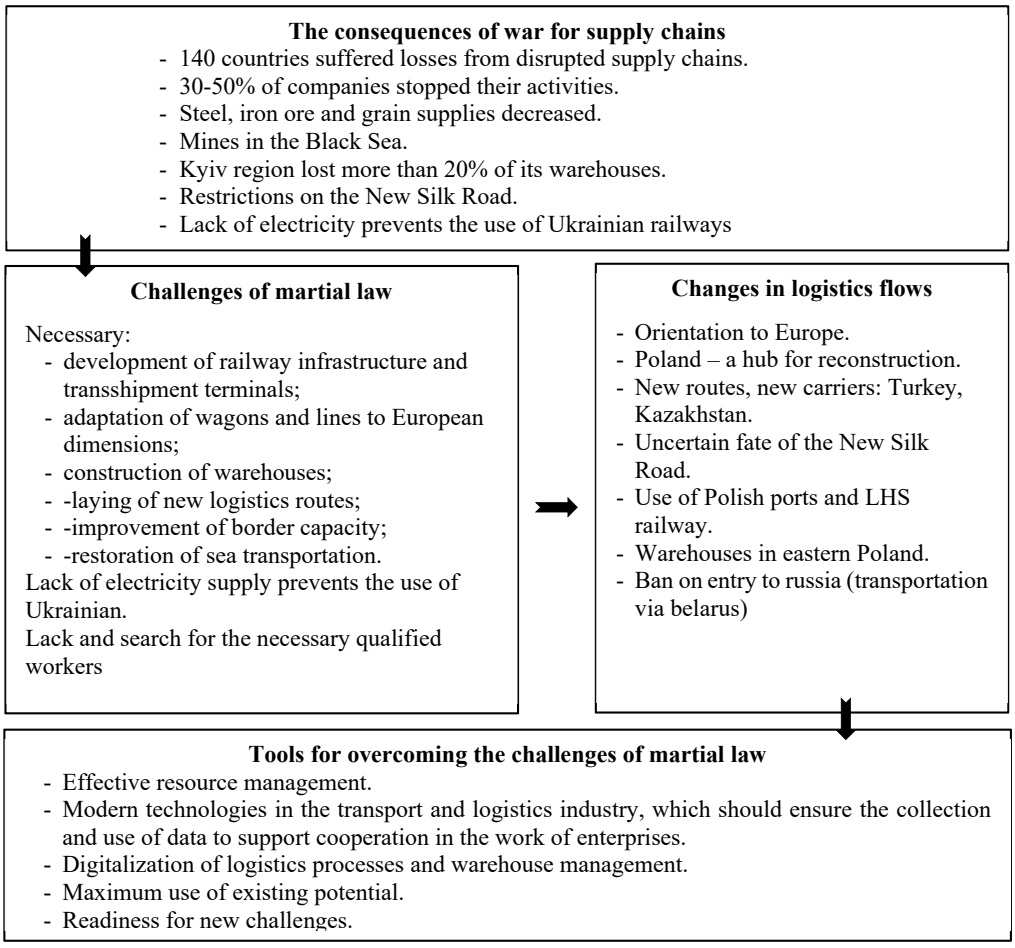

Figure 1. The biggest challenges for grain supply chains under martial law

Source: compiled by the author according to (CargoON, 2024).

To overcome the current complex challenges in logistics processes, it is necessary to coordinate all parts of their management, supported by the use of innovative IT systems that facilitate control and allow for further optimization.

2. Functioning of the "grain and Ukrainian corridors" in the context of war

Export routes, including grain cargo, developed over decades and provided the Ukrainian economy with significant foreign exchange earnings. Products of the agro-industrial complex were exported to various countries and the world. The russian-ukrainian war significantly disrupted export routes. In 2022, the ports of Berdyansk, Mariupol, Mykolaiv, Skadovsk and Kherson were under the full control of the invaders, which paralyzed the work of the ports of Great Odessa and Dunayske. Disruptions in the export of grain cargo caused a significant shortage of basic food products in the countries of Africa and Asia. The difficult task of transporting grain cargo stored in warehouses exacerbated the global food crisis. There was an urgent need to create alternative logistics routes.

International institutions and heads of state joined the global problem, which russia had joined by then (Sira & Filippova, 2024, April 24). The problem was partially resolved by signing the so-called "grain agreement" or the Black Sea Grain Initiative, the main goal of which was to unblock three ports (Odessa, Chornomorsky, and Yuzhny) for the export of grain and other products of the agro-industrial complex. The agreement (the so-called Black Sea Grain Initiative) was signed on July 22, 2022 in Istanbul by the Minister of Infrastructure of Ukraine O. Kubrakov and the Minister of Defense of Russia S. Shoigu, with the UN and Turkey acting as guarantors. The first ship with Ukrainian grain was sent from the port in Odesa on August 1 (Luchnikova, Tarnovska & Vorobyov, 2023).

Grain corridors have become an important tool for restoring food supplies. Despite martial law, constant shelling, significant destruction of transport infrastructure, and the blocking of the "grain corridor" by russia, Ukraine has remained the largest supplier of agricultural products. Thus, during the period of operation of the "grain corridor" from Ukraine, about 32.9 million tons of grain cargo and oil were exported, 1004 ships left Ukrainian ports with grain in difficult conditions to 45 countries of the world.

Therefore, grain corridors in wartime have become not only a matter of economic stability for Ukraine, but also an important element for ensuring food security throughout the world. The main grain cargoes that were supplied through this corridor are shown in *Figure 2*.

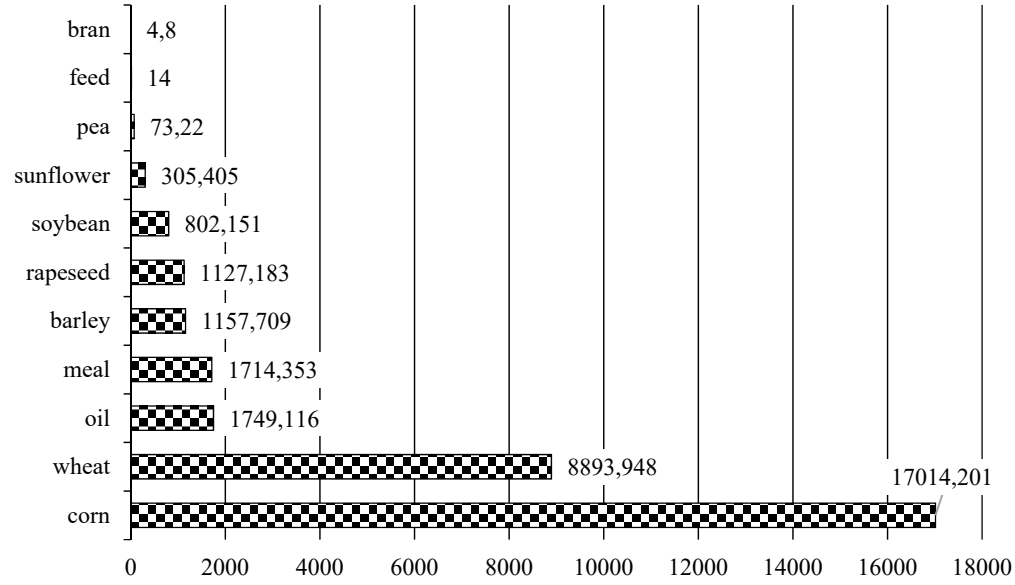

Figure 2. Export commodity structure of agricultural products by the "grain corridor" for the period of its operation in 2022–2023, thousand tons

Source: compiled by the author based on data from (APK-Inform, n. d.).

During the operation of the "grain corridor" (*Figure 2*), the export nomenclature was dominated by corn (51.8%), wheat (27.1%), and oil (5.3%). The main importing countries within the framework of the Black Sea Grain Initiative in 2022–2023 were China – 24.2%, Spain – 18.2%, Turkey – 9.9%, Italy – 6.3%, the Netherlands – 6%, Egypt – 4.7%, Bangladesh – 3.2%, and other countries – 27.5% (Bobrovytskyi et al., 2024).

The operation of the "grain corridor" ceased on July 16, 2023, with the termination of the agreement by russia, so the work of the Black Sea Grain Initiative was blocked again.

To unblock ships that were stuck in Ukrainian ports on their way to Africa and Asia and resume the export of Ukrainian goods in August 2023, Ukraine proposed opening a so-called humanitarian corridor without Russia's participation. The temporary route, called the "Ukrainian Corridor", began operating on August 8, 2023, with the evacuation of blocked ships. As of November 20, 2024, 3,118 ships had passed through the "Ukrainian Corridor", and 83.5 million tons of cargo had been delivered from Ukrainian ports to 46 countries around the world, of which 55.6 million tons were grain.

Unlike the "grain corridor", the "Ukrainian Sea Corridor" provides not only agricultural products, so Ukraine has the opportunity to independently control exports (Ministry of Community and Territorial Development of Ukraine, 2024, August 16). Despite the difficult conditions of martial law and constant shelling of critical infrastructure, according to the results of 2023, Ukraine retained its leading positions in the world export of certain agricultural and food products (*Table 1*).

Table 1

The place of Ukraine in the world ranking of exporters in 2023

Commodity item	Position
Sunflower oil	1
Rapeseed	3
Sorghum	4
Walnuts	4
Corn	4
Sunflower	5
Barley	5
Rapeseed oil	6
Soybean	6
Wheat	6
Soybean oil	7
Poultry meat	7
Butter	9
Soybean meal	10
Sugar	21

Source: compiled by the author based on data from the Ministry of Agrarian Policy and Food of Ukraine (n. d.).

It was possible to maintain such high positions in the world ranking of exporters thanks to the successful functioning of the "grain" and later the "Ukrainian" corridors, which became important for ensuring the functioning of international grain supply chains in the difficult conditions of martial law.

3. Countries – partners of Ukraine in grain exports

After the full-scale invasion, the geographical structure of agricultural exports changed (*Figure 3*).

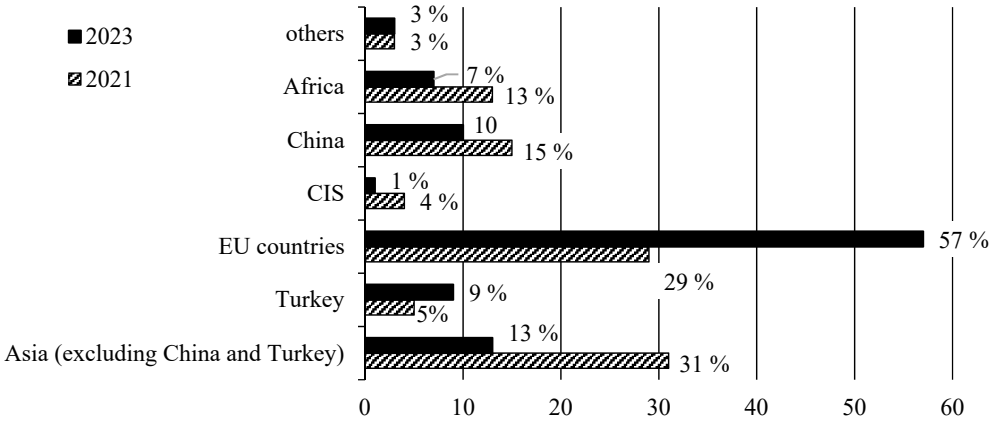

Figure 3. Geographical structure of agricultural exports from Ukraine in 2021 and 2023, %

Source: compiled by the author based on data from the International Trade Center (International Trade Center, n. d.).

As we can see from *Figure 3*, in 2023, the largest market for Ukrainian agricultural products, including grains, became the European Union, the share of which increased significantly compared to 2021. Such changes led primarily to the war-related destruction of the usual supply chains for these products. The market for Ukrainian food products to the EU includes countries such as Romania, Spain, the Netherlands, Italy, Germany, and Hungary. China remained the second place in 2023, although with a slightly smaller share in the total volume. The top three countries in recent years have invariably included Asian countries (excluding China and Turkey), although the share of exports to these countries in 2023 decreased by 18% compared to 2021 (Bobrovytskyi et al., 2024).

A more detailed geography of grain exports in 2023 compared to pre-war 2021 is presented in *Table 2.*

Table 2

Export dynamics of grains (grain processing products) from Ukraine to major markets in 2021, 2023, billion USD

Products	Period	Total amount	Main markets/volume		
Sunflower oil	2021	6.4	India/1.9	EU/1.9	China/0.9
	2023	5.0	EU/1	Turkey/0.8	China/0.5
Corn	2021	5.9	China/1.9	EU/1.8	Egypt/0.5
	2023	5	EU/2.9	China/1.1	Egypt/0.5
Wheat	2021	5.1	Egypt 0.9	Indonesia /0.7	Turkey/0.4
	2023	2.9	EU/1.5	Turkey/0.4	Egypt/0.2
Rapeseed	2021	1.7	EU/1.1	Pakistan/0.2	Great Britain /0.2
	2023	1.2	EU/1.1	Turkey/0.02	Great Britain /0.02
Barley	2021	1.3	China/0.7	Turkey/0.2	Saudi Arabia /0.1
	2023	0.4	EU/0.2	Turkey/0.08	China/0.07
Sunflower cake (meal)	2021	1.2	China/0.6	EU/0.3	belarus /0.1
	2023	0.9	EU/0.4	China/0.3	Turkey/0.04
Total	2021	27.7	EU/7.7	China/4.3	India/2
	2023	22	EU/12.5	China/2.2	Turkey/2

Source: compiled by the author based on data from (International Trade Center, n. d.).

Thus, in 2023, Ukraine exported only 21% less agro-industrial products than in 2021, which was a record year. In 2023, the largest share of exports was accounted for by grain crops (38%), fats and oils, prepared edible fats, waxes (26%), and seeds and fruits of oil plants (13%) (International Trade Center, n. d.).

Russia's full-scale invasion of Ukraine has finally changed the geographical structure of exports by individual commodity items, in particular Ukrainian grain. The disruption of certain shipping routes has led to the fact that Ukrainian wheat exports are now more directed to the EU and less to Asian and African countries (*Figure 4*).

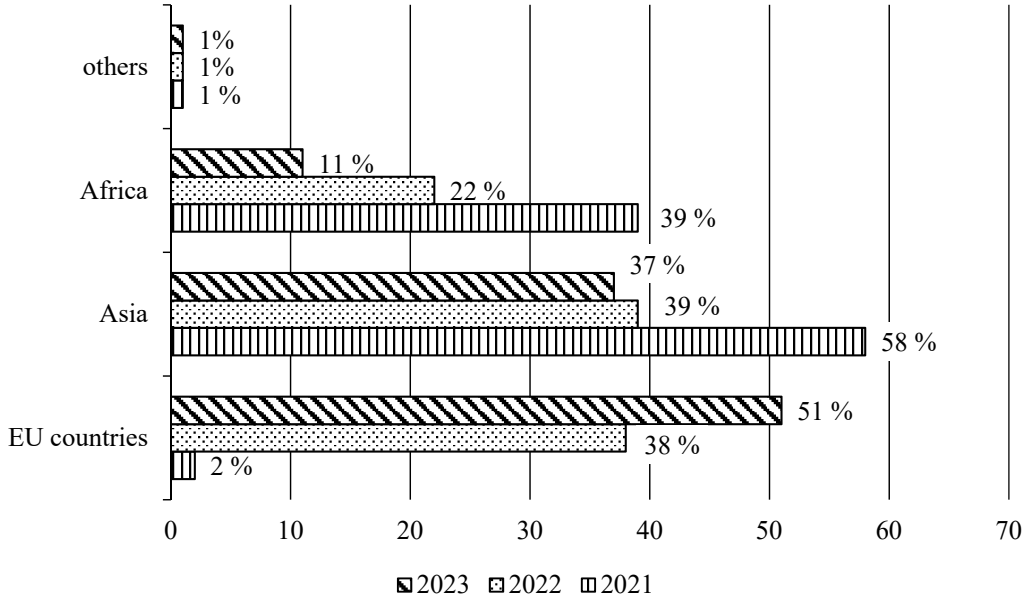

Figure 4. Geography of Ukrainian wheat exports by world regions in 2021–2023, %

Source: compiled by the author based on data from (International Trade Center, n. d.).

According to *Figure 4*, the share of exports to the EU has increased significantly since 2021, which is explained primarily by the impossibility of transporting cargo by the usual, well-established supply chains in wartime. At the same time, African countries experienced a significant decrease in wheat exports, although before the full-scale invasion of the russian federation into the territory of Ukraine, many countries in Asia and Africa counted on the import of Ukrainian wheat (Bobrovytskyi et al., 2024).

Assessing the importance of Ukrainian grain exports to a large number of developing countries, in particular in Asia and Africa, it should also be taken into account that, by ensuring the supply of raw materials and food products for production to these countries, Ukraine reduces their dependence on russia and stabilizes world prices. For Ukraine, maintaining its export potential at a high level makes it possible to receive additional budget revenues, supporting the national economy in wartime.

Conclusions

After russia's full-scale invasion of Ukraine, national logistics companies faced challenges that negatively affected the functioning of international cargo supply chains, including grain. Therefore, the primary task was to establish international food supply chains. russia's blockade of Ukrainian ports, constant shelling, and massive destruction of port infrastructure made it impossible to export grain and other cargo, which became one of the biggest challenges of the war. This situation threatened global food security, as Ukraine is one of its guarantors. Accordingly, the urgent problem of forming new alternative supply chains arose. Therefore, the research confirmed the hypothesis that the hostilities in Ukraine affected the geography of exports and imports, in particular products of the agro-industrial complex. Thus, the export share to the EU after the full-scale invasion of Ukraine by the russian federation significantly increased, which is explained primarily by the impossibility of transporting cargo using familiar, well-established supply chains in wartime. At the same time, African countries experienced a significant decrease in wheat exports, although until February 24, 2022, many Asian and African countries were counting on importing Ukrainian wheat.

The rapid response of the authorities within international allies, the successful actions of the Armed Forces of Ukraine, the Security Service of Ukraine and the State Security Service in the Black Sea made it possible to successfully exist first the "grain corridor", and then the "Ukrainian corridor" and other equally important projects. Thus, despite the fact that the main supply chain through the Black Sea was not fully used, Ukraine retained its leading position in grain exports and was even able to expand the geography of supplies. In the future, the main means of overcoming the challenges of martial law and effective management of grain logistics should also include productive resource management; the use of modern technologies in the transport and logistics industry; increased digitalization of logistics processes and warehouse management; readiness for new challenges, etc. Prospects for further scientific research include the development of a mechanism for managing international grain supply chains under martial law.

REFERENCE/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

APK-Inform. (n. d.). *Information and analytical agency*. https://www.apk-inform.com/uk/about	АПК-Інформ. (б. д.). *Інформаційно-аналітичне агентство.* https://www.apk-inform.com/uk/about
Bobrovytskyi, A., Bordilovska, O., Kolosova, V., Shyrokyi, G., & Palamarchuk, M. (2024). Russian aggression against Ukraine as a threat to global food security: *analytical supplement.* https://doi.org/10.53679/NISS-analytrep.2024.10	Бобровицький, А., Борділовська, О., Колосова, В., Широкий, Г., & Паламарчук, М. (2024). Агресія рф проти України як загроза глобальній продовольчій безпеці: *аналіт. доп*. https://doi.org/10.53679/NISS-analytrep.2024.10
CargoON. (2023, March 8). How to increase supply chain efficiency? https://cargoon.eu/ua/spilnota/blog/inshe/yak-pidvyshchyty-efektyvnist-lantsiuha-postachannia/	CargoON. (2023, 8 березня). Як підвищити ефективність ланцюга постачання? https://cargoon.eu/ua/spilnota/blog/inshe/yak-pidvyshchyty-efektyvnist-lantsiuha-postachannia/

Gusenko, O. S., & Bomchak, Yu. V. (2023). Analysis of the current state and dynamics of grain exports in Ukraine in the context of complicated international logistics. *Proceedings of the XI International Scientific and Practical Conference. Helsinki, Finland*, 60–67.	Гусенко, О. С., & Бомчак, Ю. В. (2023). Аналіз сучасного стану та динаміки експорту зернових культур України в умовах ускладнення міжнародної логістики. *Proceedings of the XI International Scientific and Practical Conference. Helsinki, Finland*, 60-67.
International Trade Center. (n. d.). https://www.intracen.org/	
Kryveshchenko, V. V., Khmurkovsky, G. V., & Lyadenko, T. V. (2024). Optimization of logistics supply chains in conditions of global crises. *Economy and Society*, (63). https://doi.org/10.32782/2524-0072/2024-63-110	Кривещенко, В. В., Хмурковський, Г. В., & Ляденко, Т. В. (2024). Оптимізація логістичних ланцюгів постачання в умовах глобальних криз. *Економіка та суспільство*. (63). https://doi.org/10.32782/2524-0072/2024-63-110
Luchnikova T. P., Kovalenko, V. V., & Sholom, A. O. (2023) Supply chain management of goods exports under martial law. *Business Inform*, (11), 218–225. https://doi.org/10.32983/2222-4459-2023-11-218-225	Лучникова, Т. П., Коваленко, В. В., & Шолом, А. О. (2023). Управління ланцюгами постачання експорту товарів в умовах воєнного стану. *Бізнес Інформ*, (11), 218–225. https://doi.org/10.32983/2222-4459-2023-11-218-225
Luchnikova, T. P., Tarnovska, I. V., & Vorobyov, Ye. V. (2023). Adaptation of Ukrainian transport enterprises to martial law conditions. *Business Inform*, (1), 116–122. https://doi.org/10.32983/2222-4459-2023-1-116-122	Лучникова, Т. П., Тарновська, І. В., & Воробйов, Є. В. (2023). Адаптація транспортних підприємств України до умов воєнного стану. Бізнес Інформ, (1), 116–122. https://doi.org/10.32983/2222-4459-2023-1-116-122
Migai, N. (2024). Assessment of the mutual influence of macroeconomic factors and supply chains in wartime conditions. *Economic Space*, (190), 92–97. https://doi.org/10.32782/2224-6282/190-17	Мігай, Н. (2024). Оцінка взаємовпливу макроекономічних чинників та ланцюгів постачань в умовах війни. *Економічний простір*, (190), 92–97. https://doi.org/10.32782/2224-6282/190-17
Ministry of Agrarian Policy and Food of Ukraine. (n. d.). https://minagro.gov.ua/	Міністерство аграрної політики та продовольства України. (б. д.). https://minagro.gov.ua/
Ministry of Community and Territorial Development of Ukraine. (2024, August 16). *One year of operation of the Ukrainian Corridor: over 64 million tons of products exported.* https://mtu.gov.ua/news/35854.html	Міністерство розвитку громад та територій України. (2024, 16 серпня). Р*ік роботи Українського коридору: експортовано понад 64 млн тонн продукції.* https://mtu.gov.ua/news/35854.html
Nechyporuk, A., Priymuk, O., & Kotova, M. (2022). Grain Export: European Hub in Supply Chains. *Foreign Trade: Economics, Finance*, *Law*, *123*(4), 29–43. https://doi.org/10.31617/3.2022(123)03	Нечипорук, А., Приймук, О., & Котова, М. (2022). Експорт зернових: європейський хаб в ланцюгах постачання. *Зовнішня торгівля: економіка, фінанси, право*. *123*(4), 29–43. https://doi.org/10.31617/3.2022(123)03
Shyriaieva, L. V., & Sokolov, A. S. (2024). The problems and improving' directions of oil crops' logistics in Ukraine at the present stage. *Development of management and entrepreneurship methods on transport*, Odesa: ONMU, *2*(86), 23–33. https://doi.org/10.31375/2226-1915-2024-2-23-33	Ширяєва, Л. В., & Соколов, А. С. (2024). Проблеми та напрямки вдосконалення логістики олійних культур України на сучасному етапі. *Розвиток методів управління та господарювання на транспорті*: *Зб. наук. праць.* Одеса: ОНМУ, *2*(86), 23–33. https://doi.org/10.31375/ 2226-1915-2024-2-23-33
Sira, O., & Filippova, O. (2024, April 24).Grain Corridor – the Road of Life https://dif.org.ua/article/zernoviy-koridor-doroga-zhittya	Сіра, О., & Філіппова, О. (2024, 24 квітня). Зерновий коридор – дорога життя https://dif.org.ua/article/zernoviy-koridor-doroga-zhittya
Soojung, Ahn, Dongin, Kim, & Sandro, Steinbach. (2023). The impact of the Russian invasion of Ukraine on grain and oilseed trade. *Agrobusiness,* (39.1), 291–299. https://onlinelibrary.wiley.com/doi/10.1002/agr.21794	

Sopotsko, O. Yu. (2022) Speciality of food products supply chain management under martial law in Ukraine. Economics: time realities, *4*(62), 5–14. https://doi.org/10.15276/ETR.04.2022.1	Сопоцько, О. Ю. (2022). Особливості управління ланцюгами постачань продуктів харчування в умовах воєнного стану в Україні. *Економіка: реалії часу*, *4*(62), 5–14. https://doi.org/10.15276/ETR.04.2022.1
Sushchenko, L., & Ilchenko, N. (2023). Adaptation of supply chains to the challenges of martial law. *Goods and Markets*, (1), 4–16. https://doi.org/10.31617/2.2023(45)01	Сущенко, Л., & Ільченко, Н. (2023). Адаптація ланцюгів постачання до викликів воєнного стану. *Товари і ринки*, (1), 4–16. https://doi.org/10.31617/2.2023(45)01
Telegin, O. O., & Koval, K. P. (2023). Key challenges for logistics in wartime. Problems of training professional logistics personnel in a global competitive environment: XXI MNPK October 27, 2023. Collection of reports.	Тєлєгін, О. О., & Коваль, К. П. (2023). Ключові виклики для логістики в умовах війни. Проблеми підготовки професійних кадрів з логістики в умовах глобального конкурентного середовища: *XXI МНПК 27 жовтня 2023 р. Збірник доповідей.*
Volokhova, I. V., & Volokhov, V. A. (2023). Main challenges and directions of work of the logistics front. *Bulletin of the economy of transport and industry*, (81–82), 34–41. https://doi.org/10.18664/btie.81-82.287102	Волохова, І. В., & Волохов, В. А. (2023). Основні виклики та напрями роботи логістичного фронту. *Вісник економіки транспорту і промисловості*, (81–82), 34–41. https://doi.org/10.18664/btie.81-82.287102

Conflict of interest: The author declares that he/she has no financial or non-financial conflicts of interest in relation to this publication; has no relationships with governmental bodies, commercial or non-commercial organizations that could be interested in presenting this viewpoint. Given that the author works for an institution that is the publisher of the journal, which may give rise to a potential conflict or suspicion of bias, the final decision to publish this article (including the selection of reviewers and editors) was made by those members of the editorial board who are not affiliated with this institution.

The author did not receive direct funding for this research.

Mylnychuk, T. International grain supply chains under martial arts. *Scientia fructuosa*. 2025. № 1. P. 90–101. https://doi.org/10.31617/1.2025(159)06

Received by the editorial office 26.11.2024.
Accepted for printing 17.12.2024.
Published online 17.02.2025.

DOI: 10.31617/1.2025(159)07
UDC 339.5:005.932=111

ILCHENKO Natalia,
Doctor of Sciences (Economics), Professor,
Head of the Department of Trade Entrepreneurship and Logistics
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

n.ilchenko@knute.edu.ua
ORCID: 0000-0003-4052-571X

SUSHCHENKO Roman,
Full Higher Education,
Postgraduate Student of the Department of Trade Entrepreneurship and Logistics
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

r.sushchenko@knute.edu.ua
ORCID: 0000-0001-6642-4744

ADAPTIVE SUPPLY CHAIN MODELS

The change in the usual management models (Supply Chain Adaptability) in wartime has become a critical necessity to ensure the smooth functioning of the food supply. The adaptability of supply chains allows for a rapid response to changes in demand, market conditions, technological innovations, and in crisis situations. The aim of the research is to develop theoretical and methodological approaches to the formation of a business environment that promotes the creation of adaptive supply chain management models. It is hypothesized that the concepts of "SPOD-world", "VUCA-world", "BANI-world" and ANTIFRAGILE-world influence the formation and adaptation of supply chains, taking into account the complexity, instability and variability of the modern world. The main adaptive models of supply chain management are presented and characterized. It is proved that our proposed concept of ANTIFRAGILE-world, the development of which began in the context of the pandemic and continues under martial law in Ukraine, offers a new approach to supply chain management, where the main focus is on the ability of supply chains that form food retailers to become stronger and more efficient due to stress and change. It is proved that in 2024, Ukrainian retail continues to

ІЛЬЧЕНКО Наталія,
д. е. н., професор, завідувач кафедри торговельного підприємництва та логістики
Державного торговельно-економічного університету
вул. Кіото, 19, м. Київ, 02156, Україна

n.ilchenko@knute.edu.ua
ORCID: 0000-0003-4052-571X

СУЩЕНКО Роман,
магістр, аспірант кафедри торговельного підприємництва та логістики
Державного торговельно-економічного університету
вул. Кіото, 19, м. Київ, 02156, Україна

r.sushchenko@knute.edu.ua
ORCID: 0000-0001-6642-4744

АДАПТИВНІ МОДЕЛІ ЛАНЦЮГІВ ПОСТАЧАННЯ

Зміна звичних моделей управління (Supply Chain Adaptability) в умовах війни стала критичною необхідністю для забезпечення безперебійного функціонування постачання продовольчих товарів. Адаптивність ланцюгів постачання дозволяє оперативно реагувати на зміни у попиті, в умовах ринку, технологічних інноваціях, а також у кризових ситуаціях. Метою дослідження є розробка теоретико-методичних підходів до формування бізнес-середовища, що сприяє створенню адаптивних моделей управління ланцюгами постачання. Висунуто гіпотезу, що концепції "SPOD-світу", "VUCA-світу", "BANI-світу" та ANTIFRAGILE-світу впливають на формування та адаптацію ланцюгів поставок, враховуючи складність, нестабільність і мінливість сучасного світу. Наведено основні адаптивні моделі управління ланцюгами постачання, надано їх характеристику. Доведено, що запропонована нами концепція ANTIFRAGILE-світ, розвиток якої почався в умовах пандемії та продовжується за воєнного стану в Україні, пропонує новий підхід до управління ланцюгами постачання, де основний акцент зроблено на здатність ланцюгів постачання, що формують продовольчі роздрібні торговельні мережі ставати сильнішими та більш ефективними завдяки стресам і змінам. Доведено, що у 2024 р. український ритейл продовжує адаптуватися

adapt to the challenges of martial law, economic instability and the development of new technologies. The results of the research are aimed at identifying effective models that ensure the sustainability and efficiency of supply chains of national food retail chains under martial law. The article presents adaptive approaches and models of supply chain management used by retail food chains in Ukraine under martial law, such as: EVA (Emergency and Value-Added) Model, Distributed Supply Chain Model, Humanitarian Support Chain, Agile Supply Chain, Real-Time Visibility Model, Local Sourcing Model. Testing the hypothesis reveals the problems of adaptation and promotes the introduction of innovative management approaches.

Keywords: supply chain, adaptability, martial law, adaptive models, retail food retailers, VUCA-world, BANI-world, anti-fragility, SPOD-world, ANTIFRAGILE-world.

до викликів воєнного стану, економічної нестабільності та розвитку нових технологій. Результати дослідження спрямовані на визначення ефективних моделей, що забезпечують стійкість і ефективність ланцюгів постачання вітчизняних продовольчих торговельних мереж в умовах воєнного стану. Наведено адаптивні підходи та моделі управління ланцюгами постачання, які використовують роздрібні продовольчі мережі в Україні в умовах воєнного стану, такі як: EVA (Emergency and Value-Added) Model, Distributed Supply Chain Model, Humanitarian Support Chain, Agile Supply Chain, Real-Time Visibility Model, Local Sourcing Model. Перевірка висунутої гіпотези розкриває проблеми адаптації та сприяє впровадженню інноваційних підходів до управління.

Ключові слова: ланцюг постачання, адаптивність, воєнний стан, адаптивні моделі, роздрібні продовольчі торговельні мережі, *VUCA*-світ, *BANI*-світ, антикрихкість, *SPOD*-світ, *ANTIFRAGILE*-світ.

JEL Classification: F17, L21.

Introduction

In the context of the declaration of martial law in Ukraine, retailers are compelled to modify their customary supply chain management models (Supply Chain Adaptability) and adapt them to the prevailing circumstances in the country. The development of a supply chain adaptability system is imperative to ensure the smooth and efficient functioning of the food supply. Supply chain adaptability enables a response to changes in the environment, including fluctuations in demand, market conditions, technological innovations, crises or other factors with the potential to affect the supply chain. This process is not a one-time endeavor; rather, it is an ongoing effort necessitating the periodic review and refinement of strategies based on accumulated experience. The adaptability of food supply chains can be defined as the process of modifying and changing the supply system, in order to effectively adjust to market conditions, technological innovations, consumer trends, legislative regulations and other factors of the internal and external environment. This process may include revising company strategies, changing suppliers, and optimizing logistics processes. A prerequisite for adaptability is effective cooperation with suppliers, customers and other partners. The sharing of information and close collaboration with relevant stakeholders can facilitate the alignment of strategies and the coordination of changes in supply chains.

The issue of supply chain management is being addressed by researches and practitioners from both national and foreign institutions. For instance, Grigorak (2017) demonstrated that effective management of flows

within economic systems of enterprises, supply chains, regions and the national economy necessitates the development of new knowledge, technologies and specialists with the relevant professional competencies. Krykavskyi and Chornopyska (2012) determined that the expectation of "materialization" of the potential of external factors of a general business nature, which include the basic megatrends of our time, among which are globalization, individualization, informatization, environmentalization, etc., constitutes a significant contribution to the motivation for the formation of logistics supply chains. In a separate study, Ilchenko and Kochubey (2017) identified the main reference models of supply chain management, namely SCOR, GSCF and CPFR. They then went on to identify the directions and mechanisms for adapting these models to trade enterprises. In addition, they developed a scheme of the model of interaction of trade enterprises (TEs) with suppliers and consumers in the supply chain and a three-level CPFR model of supply chain design for wholesale and retail trade enterprises. In a separate study, Harsun and Patkovs'kyj (2020) examined the nature of cold supply chains and identified the main prerequisites for the development of cold logistics of food products in Ukraine.

According to Christopher (2011), the supply chain can be defined as a network of interconnected organizations involved in various processes and activities aimed at delivering a full range of products and services to the end user. Waters (2018) noted that the supply chain consists of a set of activities and organizations through which materials pass during their movement from the initial supplier to the end user. However, a comprehensive study of the problem of forming an adaptive supply chain that forms food retail chains is required.

The aim of this research is to establish a theoretical and methodological framework for examining the evolution of the business environment, with a view to inform the development of an adaptive supply chain management model. In addition, it will be analyzed which models can be applied to food retailers in Ukraine during the declaration of martial law.

The research puts forward the hypothesis that the concepts of "SPOD-world", "VUCA-world", "BANI-world" and ANTIFRAGILE-world influence the formation and adaptation of supply chains, given the complexity, instability and variability of the modern world. The empirical testing of this hypothesis will facilitate the identification of adaptation challenges and the development of models for supply chain management in the food retail sector.

The main part of the article consists of three sections: the first is devoted to the description of the genesis of supply chain adaptation in the global world, the second part of the article is a theoretical approach to determining the state of adaptive models of supply chain management, the third is devoted to the formation of an adaptive model of the supply chain of food retailers under martial law in Ukraine.

1. Genesis of supply chain adaptation in the global world

In order to ensure sustainable long-term development in the present environment, businesses possess a unique opportunity to reengineer and redesign their supply chains in a manner that reflects the future architecture of global material flows. In this context, logistics management must establish novel priorities in conjunction with established objectives, functions, and systems for the analysis and evaluation of logistics operations. The ongoing global pandemic has underscored the vulnerability of contemporary supply chains. Consequently, businesses have been compelled to restructure their logistics operations, thereby enhancing supply chain resilience. While businesses have developed strategies to cope with the challenges posed by natural disasters and global geopolitical events, they have not been adequately prepared for large-scale changes, particularly in terms of ensuring the resilience and adequate adaptation of supply chains. Such changes are necessary to respond quickly and effectively to challenges and threats. The operational dynamics of supply chains are intricately intertwined with the prevailing business environment, underscoring the necessity for a comprehensive examination of their evolutionary development.

The "*SPOD-world*" (1945–1979) is a concept that describes a world in which systems and processes are under constant stress, pressure, overload, and are subject to disruption. Within the domain of supply chains, this concept mirrors the challenges and issues encountered by enterprises when their supply chains function in an environment characterized by elevated stress and complexity. *"SPOD-world"* is an acronym: *Sourcing* is the process of finding and selecting suppliers of raw materials or components needed to produce goods. It includes assessing the quality, cost and reliability of suppliers. *Production* is the process of transforming raw materials and components into finished products. It is important to consider the efficiency of production processes, quality management, and meeting deadlines. Order – This stage includes processing customer orders, managing inventory, and coordinating between production and warehouse operations. It includes planning and processing demand fulfillment orders. *Delivery* is the process of distributing finished products to the end user. *The conditions for implementation are*: supply chain optimization: helps in coordination between different supply chain participants, improving processes and reducing costs; efficiency improvement: focuses on process integration, which helps in reducing lead times and improving customer service; risk reduction: allows better management of risks associated with sourcing, production, orders and delivery through a more transparent and controlled approach. Accordingly, the *SPOD-world* mirrors the realities of contemporary supply chain management, characterized by incessant stress, pressure, overload, and disruption to routine operations. The implementation of

strategies to monitor and manage risks, adapt to changes, and utilize modern technologies to enhance the resilience and efficiency of supply chains is imperative for effective management in such an environment.

The term "*VUCA-world*" (1980–2000) was coined to describe an era of instability, uncertainty, complexity, and ambiguity. In the context of supply chains, this concept facilitates comprehension and management of the challenges and risks that emerge in a rapidly evolving environment. A thorough examination is warranted to ascertain the manner in which each facet of *VUCA* influences supply chain management and the strategies that can be employed to effectively navigate such a milieu. *Volatility,* defining and managing fluctuations: in the context of supply chains, volatility can manifest through frequent and unpredictable fluctuations in demand, pricing, or the availability of resources. To effectively manage such volatility, it is imperative to implement flexible and adaptive processes that can swiftly respond to these fluctuations. The utilization of flexible procurement strategies, the establishment of buffer stocks, and the implementation of systems to expeditiously respond to fluctuations in supply and demand serve as instrumental tools in the management of volatility. *Uncertainty* is defined as the absence of accurate information or predictability in the future. Effectively managing uncertainty entails the formulation of scenarios, forecasting, and strategic planning to mitigate risks and prepare for various potential outcomes. Management tools, in this case, are monitoring and analytical systems that facilitate the reception and processing of pertinent information, thereby enabling informed decision-making. *Complexity:* Managing complex systems: Supply chains frequently comprise numerous interdependent elements and actors, rendering them challenging to manage. Management tools: The implementation of supply chain management (SCM) technologies, tracking, and data analytics to optimize processes and increase transparency. *Ambiguity,* managing uncertain situations: Ambiguity is defined as the presence of incomplete or conflicting information, which consequently hinders effective decision-making processes. It is imperative to cultivate the capacity to swiftly adapt and respond flexibly to novel and unanticipated circumstances. Management tools include the implementation of mechanisms for the collection and analysis of data, which facilitate improved situational interpretation and the development of adaptable strategies to address changes. The integration of technology to enhance supply chain visibility and management is instrumental in mitigating the repercussions of volatility and complexity. Fostering collaboration with suppliers and partners is crucial to ensure enhanced flexibility and expeditious responses to changes. The preparation for unforeseen circumstances, including the formulation of crisis response plans, is paramount to ensure business continuity. Continuous improvement and learning are essential for developing the capacity to comprehend and manage

novel challenges. Consequently, supply chain management in a *VUCA* environment necessitates an integrated approach encompassing flexibility, transparency, adaptability to change, and the utilization of contemporary technologies. It is imperative to comprehend and execute strategies that acknowledge the inherent volatility, uncertainty, and complexity in order to establish sustainable and adaptive supply chains that are capable of operating effectively in a dynamic environment.

Chaliuk (2022) argues that in order to eliminate the negative consequences caused by uncontrollable external and internal factors, business entities in Ukraine should effectively combine SPOD and VUCA methods depending on the industry, the impact of information and technological changes.

But the "*BANI-world*" (2001–2019) is a concept that reflects the current challenges in supply chain management, in which systems and processes are becoming less resilient and predictable, making them difficult to manage effectively. The term "BANI" stands for "*brittle,*" indicating that systems and processes may appear reliable, but under certain conditions, they can easily fail, often due to excessive centralization or lack of flexibility. Fragile systems can be vulnerable, as evidenced by supply disruptions resulting from issues with a supplier or an inventory management system. *Anxiety* is defined by uncertainty and instability, leading to bottlenecks in the supply chain. These conditions can impede the efficiency of decision-making and management processes, resulting in delays and errors. The term "*nonlinear*" signifies that alterations may be disproportionate to their underlying causes. Minor alterations in a single segment of the supply chain can potentially generate substantial ramifications in other domains. *Incomprehensible* is defined by uncertainty and difficulty in predicting events and trends, which hinders effective decision-making. Unpredictability can complicate planning by making it difficult to assess potential consequences or changes in the environment. In light of these challenges, it is imperative to adopt a proactive approach to ensure resilience and adaptability in supply chains. This entails the development of strategies for unforeseen situations, the formulation of crisis plans, and the implementation of rapid response and recovery mechanisms. Moreover, investing in technology and innovation, leveraging modern technologies, and employing innovative solutions to enhance resilience and adaptability are crucial. Strengthening partnerships to ensure stability and flexibility within supply chains is also essential. Furthermore, continuous monitoring and adaptation to change are necessary to identify opportunities for improvement and to swiftly adapt to new conditions. In the context of the *BANI world*, the challenges posed to supply chain management are novel, characterized by aspects of fragility, nonlinearity, and unpredictability that impact the efficiency and sustainability of systems. To effectively navigate these circumstances, businesses must implement adaptive strategies, allocate

resources toward technological advancements, enhance communication networks, and ensure seamless supply chain operations.

We hereby propose a novel conceptualization of the *ANTIFRAGILE-world (*2020 *inclusive)* in the context of supply chain management adaptation stages. This conceptualization is predicated on the seminal work of Nassim (2013), entitled *Antifragile: Things That Gain from Disorder*. The aforementioned book expounds upon the notion of systems that exhibit a propensity to not only withstand stress and change, but to thrive and function more efficiently in such environments. In the context of supply chain adaptability, the *ANTIFRAGILE-world* exists in an environment where systems and processes are able not only to survive crises, but also to use them as opportunities for improvement and development.

The following discussion will explore the main principles of the *ANTIFRAGILE-world* and their impact on supply chains:

- Non-hereditary adaptation, or anti-fragile systems, is a concept that posits the ability of these systems to not only withstand stresses and crises, but also to utilize them for their own development and enhancement. Within the context of supply chains, businesses that adeptly manage change and risk emerge as stronger and more competitive entities;
- The implementation of redundancy in resilient systems frequently entails the incorporation of certain levels of redundancy or reserves, which facilitate the ability to manage the occurrence of unanticipated events. The incorporation of redundancies serves to mitigate the risk of disruption and ensure the continuity of supply;
- *Antifragile* systems are defined by their structural resilience and adaptability. In the face of change and stress, these systems possess the capacity to adapt and improve, thereby enhancing their ability to cope with challenges and maintain competitiveness.

The *ANTIFRAGILE-worldview* is instrumental in the formation of the LP, and it involves the following: The development of strategies for unforeseen situations, the creation of crisis action plans, and the formulation of rapid response and recovery strategies; the investment in technology and innovation, the utilization of modern technologies, and the implementation of innovative solutions to enhance resilience and adaptability; the strengthening and development of reliable and long-term partnerships to ensure stability and flexibility in supply chains; and the constant monitoring and adaptation, through constant monitoring.

The *ANTIFRAGILE-world* concept, which was developed in the context of the pandemic and martial law, offers a novel approach to supply chain management, emphasizing the capacity of systems to become more robust and efficient through stress and change. The integration of the principles of antifragility into supply chain management enables enterprises to not only withstand challenges but also leverage them for their own

development and enhancement. This approach ensures their competitiveness and sustainability in tumultuous economic conditions.

Thus, the scientific novelty is that these concepts *of* "*SPOD-world*", "*VUCA-world*", "*VUCA-world*" and "*ANTIFRAGILE-world*" have never been considered through the prism of forming a supply chain management model.

2. Adaptive supply chain management models

Adaptive supply chain management models are concepts and approaches to supply chain management that are able to respond quickly to changes in the internal and external environment while maintaining efficiency, sustainability, and compliance with market needs. These models are characterized by their ability to adapt to the volatility inherent in conditions such as economic instability, force majeure (e.g., wars, natural disasters), shifts in demand, technological advancements, and regulatory changes.

These models prioritize flexibility, rapid decision-making processes, the integration of modern technologies (e.g., digitalization, artificial intelligence), and active collaboration among all participants within the supply chain. These models are characterized by several key features, namely flexibility, which refers to the capacity for expeditious reconfiguration of operational processes and supply chains; predictability, the utilization of data for the forecasting of risks and fluctuations in demand; digitalization, the implementation of state-of-the-art technologies (e.g., Big Data, the Internet of Things, blockchain) for the purposes of monitoring, control, and automation; and resilience, the capacity to minimize losses and ensure the continuity of supply even in critical circumstances. The relevance of such models is particularly pronounced during periods of global crises, including pandemics, military conflicts, or economic downturns.

The objective of developing a supply chain adaptability model is to ensure resilience and reliability in an unstable environment. Such adaptation enables businesses to maintain efficiency, reduce costs and risks, and ensure uninterrupted supply of goods to end users even in volatile environments. Supply chain adaptability models (*Table 1*) encompass strategic solutions that enhance flexibility, mitigate vulnerability, and expedite responses to unanticipated changes, thereby safeguarding the stability and competitiveness of enterprises.

According to the findings of our research, supply chain adaptation models are capable of encompassing a variety of aspects, including, but not limited to, the following: flexibility and the capacity to respond expeditiously to fluctuations in demand or supply; integration of state-of-the-art technologies to optimize processes; diversification of supply sources to mitigate dependence on a solitary supplier or region; inventory optimization to minimize the risk of shortages or excess stock; forecasting and risk management to proactively identify potential threats to the supply chain; and continuous improvement, consideration of novel technologies, strategic initiatives, and the capacity for agile adaptation to changes, with due consideration for the aforementioned concepts.

Table 1

Adaptive supply chain management models

Models	Focus	Main features
Agile supply chain model	An agile supply chain can quickly adapt to changes based on customer demands, market conditions, or supply disruptions. It is advisable to use for industries with high variability in demand or those that require frequent product customization (e.g., fashion, electronics)	Flexibility: the ability to quickly reconfigure processes and resources. Responsiveness: quick response to customer orders or changes in the market. Partnership in cooperation: close relationships with suppliers, distributors and customers. Fast decision-making: reducing decision-making cycle time to increase responsiveness
Lean supply chain model	It involves optimizing all stages of the supply chain to reduce losses and increase efficiency. The main focus is on minimizing time, costs and resources, which increases customer value and improves overall system performance. Lean Supply Chain is appropriate for a wide range of industries, as Lean principles are aimed at reducing costs and increasing efficiency, which can bring significant benefits in any sector. However, the greatest effect of Lean Supply Chain is achieved in the following industries: Trade and distribution: In retail chains and distribution companies, Lean approaches help reduce excess inventory, optimize supply, and reduce order processing time. This is especially important in retail, where delays in deliveries should be avoided and logistics efficiency maximized. Food and beverages: In the food industry, it is important to respond quickly to changes in demand and reduce the risk of product spoilage due to long-term storage. Lean Supply Chain helps to reduce delivery times and increase the efficiency of the production and distribution process. Automotive industry: Lean principles are widely used in the automotive industry to achieve high efficiency of production processes. A striking example is the just-in-time (JIT) system, which is used to minimize inventory and maximize adaptation to changing demand. Lean Supply Chain is useful for any industry where cost reduction, process speed, inventory optimization, and product quality are important factors. However, the system achieves the greatest effect in sectors where there is a high level of competition, rapid changes in demand and the need to minimize costs at all stages of the supply chain	Reducing waste: minimizing the loss of time, materials and labor. Continuous improvement: using methods such as Kaizen to continuously optimize processes. Just-in-time (JIT): Inventory is kept at the lowest possible level to reduce costs and space utilization. Standardization of processes to improve efficiency and quality. Quality assurance at every stage (Built-in Quality) Inventory Reduction, which reduces storage costs and reduces the risk of accumulating outdated goods or raw materials. Flow Optimization: minimizes delays and inefficient processes, which helps to respond more quickly to changes in demand and reduces order processing costs. Pull Systems: orders are placed only when there is real demand. Lead Time Reduction: It is important to reduce the time spent moving goods between supply chain participants; it is also important to reduce the time spent moving goods between different stages of the supply chain. This is achieved through efficient operations and logistics, process automation, optimization of transport and communications
A model for a sustainable supply chain	This model has the ability to withstand and recover from disruptions caused by natural disasters, geopolitical events, or unexpected changes in demand. It is typical for industries that face frequent supply chain disruptions (including food retailers)	Diversification: multiple sources for critical components or materials. Risk management, proactive strategies to identify, assess and mitigate risks. Buffering inventory, maintaining safety stock or flexible production capacity to adapt to shocks. Emergency planning

Continuation of Table 1

Models	Focus	Main features
Digital supply chain model or artificial intelligence for supply chain optimization	This model uses digital technologies (Internet of Things, artificial intelligence, big data, blockchain) to increase transparency, automation, and real-time data analysis of supply chain management. It is best suited for the technology industry or companies that require a high level of transparency and real-time data (e.g., electronics, retail, pharmaceuticals)	Automation, the use of robotics, artificial intelligence, and machine learning for forecasting, inventory management, and logistics optimization. Real-time data, continuous monitoring and analysis of supply chain activities for decision-making. Blockchain, transparency and tracking of goods from suppliers to consumers. Predictive analytics for demand forecasting and resource optimization
Global supply chain model	This model focuses on creating a supply chain that can operate globally, with international suppliers, manufacturers, and distribution networks. It is typical for multinational companies or enterprises operating in international markets and in different regulatory environments	Global supply, purchasing products from different regions of the world. Cross-border logistics: efficient international delivery, customs clearance and regulatory compliance. Local adaptation, the adjustment of products, goods and services to local demand and regulatory requirements. Global management of risks related to global trade, tariffs and political uncertainty
Circular supply chain model	This model is based on the principles of the circular economy, where products and materials are reused, recycled and repurposed rather than disposed of after use. It is best suited for businesses focused on sustainability, environmental impact, and waste reduction (e.g., consumer electronics, fashion, automotive)	Resource optimization: maximizing the product life cycle and minimizing waste. Recycling and reuse, recycling. Sustainable development, focus on environmental impact, carbon footprint reduction and ethical sourcing. Reverse logistics, managing the return of goods for processing or reproduction
Hybrid supply chain model	This model combines elements of different supply chain strategies (flexibility, lean, resilience) to adapt to different challenges and market demands. It is best suited for businesses that need to operate in a dynamic environment, such as fast-growing companies or companies with diverse product lines	Flexibility, the ability to switch between different strategies depending on changing needs. Cost-effectiveness, a balance between cost reduction and rapid response. Risk diversification, reducing risks by adopting elements of both flexible and resilient approaches. Scalable operations, allows companies to scale operations as needed depending on market conditions
Model of a collaborative supply chain	In this model, supply chain partners (suppliers, manufacturers, distributors, and customers) work closely together, sharing information, resources, and responsibilities. It is best suited for industries where close cooperation with suppliers or distributors is essential (e.g. automotive, consumer electronics, pharmaceuticals)	Shared resources, partners collaborate on joint projects, resources and networks distribution. Transparency, exchange of information between all stakeholders to improve decision-making. Joint planning, coordination of production, forecasting and logistics to optimize the entire supply chain. Trust: establishing long-term partnerships based on mutual benefit

End of Table 1

Models	Focus	Main features
Sustainability-oriented supply chain	It is a supply chain management model that focuses not only on economic aspects, such as cost reduction and efficiency, but also on long-term environmental and social sustainability. The goal is to create a balance between economic, environmental and social requirements to achieve sustainable development and minimize negative impacts on the environment and society. It is best suited for retailers seeking to develop a green reputation and ensure sustainable development	The supply chain is focused on reducing environmental impact, using environmentally friendly raw materials and reducing emissions. This includes the use of renewable resources, energy-saving technologies, waste reduction and integration with socially responsible suppliers. The requirements for ethical standards in the production and transportation of goods are taken into account

Source: compiled by the authors on the basis of (IBM, n. d.). and own research.

3. The adaptive model formation of the supply chain by food retailers under martial law

In 2024, the Ukrainian retail sector is undergoing a period of adjustment to the challenges posed by martial law, economic instability, and the development of new technologies. In response to these challenges, Ukrainian food retail chains have been compelled to recalibrate their supply chain strategies, shifting their focus toward domestic markets and local suppliers with the aim of mitigating potential shortages. In their efforts to mitigate risk and ensure a reliable supply of goods, food chains are exploring alternative sourcing options, including the identification of new suppliers in Ukraine and other countries not previously considered due to security concerns. Concurrently, efforts are being made to bolster local farmers and food producers, ensuring uninterrupted supply even in challenging circumstances. The economic operations of retailers are intricate, entailing cost management, process optimization, and comprehensive adaptation to consumer demands. As illustrated in *Table 2*, leading food retail chains in Ukraine have experienced fluctuations in revenue from sales of products (goods and services) from 2019 to 2023. The profitability of retail chains is influenced by various factors, including the prices for the purchase of goods, logistics, inventory management, pricing, and consumer behavior management.

Revenue from sales of products (goods and services) of ATB Market LLC in the first six months of 2024 increased by 14.3% to UAH 97.5 billion, with a profit of UAH 1.6 billion and 1226 supermarkets. Revenue from sales of products (goods and services) of Fozzy Group (Silpo-Food LLC, Fora LLC, Trash LLC, Expansion LLC) increased by 3.3% to UAH 64.6 billion in the first half of 2024. In 2023, Fozzy Group's revenue from sales of products (goods and services) amounted to UAH 123.7 billion. In January–June 2024, Silpo-Food LLC reduced its loss by 16.6% to UAH 863.5 million, Fora LLC's profit amounted to UAH 7.6 million, Trash LLC's profit decreased by 87.1% to UAH 14.2 million, and Expansion LLC's loss increased by 60.1% to UAH 192.6 million. Fozzy Group has 600 stores across the country (Slovoidilo, 2024, September 11; Retailers, 2024, August 19).

Table 2

Revenue from sales of products (goods and services) of the leading food retail chains in Ukraine in 2019–2023, UAH billion

Name of the network	Years				
	2019	2020	2021	2022	2023
ATB	104.9	123.9	148.7	148.3	181.1
Silpo	62.4	64.4	72.8	70	84.7
Fora	14.3	16.4	18.9	19.6	29.6
Metro Cash & Carry Ukraine	17.8	21.5	25.9	20.2	25.6
NOVUS	11	12.7	17.3	16	23.6
VARUS	11	12.2	13.7	14.6	17.5
AUCHAN	14.2	14	14.5	10.7	11
Velmart	11.1	11.3	12.7	13.5	17.2

Source: compiled by the authors according to (Slovoidilo, 2024, September 11).

Revenue from sales of products (goods and services) of NOVUS Ukraine LLC increased by 25.9% to UAH 13.4 billion in the first six months of 2024. The company overcame a loss of UAH 128.5 million to make a profit of UAH 409 million. Revenue from sales of products (goods and services) in 2023 amounted to UAH 24.5 billion. Revenue from sales of products (goods and services) of the VARUS retail chain increased by 20.6% to UAH 17.5 billion in 2023. At the same time, the company's profit amounted to UAH 140.7 million. The chain has 109 supermarkets in the largest cities of Ukraine: Dnipro, Kyiv, Kryvyi Rih, Zaporizhzhia and Odesa. More than 260 000 customers shop at VARUS every day (Forbes Ukraine, 2024, March 8; Slovoidilo, 2024, September 11; Retailers, 2024, August 19).

In order to ensure the stability of the supply chain under martial law, retailers have been known to create strategic food stocks. These stocks include the storage of critical goods, such as cereals, canned food, meat, and dairy products, which may become scarce under martial law. In the event of a power outage or blackout, food chains prioritize products that are in demand during wartime, such as long-life food, canned goods, water, and cooking products. The range of food products is modified depending on the needs of consumers, such as the provision of ready-to-eat food.

In the context of martial law in Ukraine, food retailers are compelled to recalibrate their supply chains by implementing specialized models to ensure uninterrupted operations and address the demands of the populace. The *Table 3* will present a compendium of the most salient adaptive approaches and management models employed by food retailers in Ukraine.

Therefore, the establishment of an adaptive supply chain model for food retailers under martial law is imperative to ensure food security, maintain social stability, and ensure the efficient functioning of the economy. The efficacy of this model hinges upon the integration of contemporary technologies, collaboration with relevant stakeholders, and the capacity to promptly adapt to evolving crisis scenarios. However, implementing such a model carries inherent risks, including:

Table 3

Adaptive approaches and models of supply chain management used by retail food chains in Ukraine under martial law

Adaptive models	Description	Example of implementation
EVA (Emergency and Value-Added)	It is a model that is used to manage crisis situations while aiming to create added value for organizations or communities. The model combines emergency response with initiatives that promote sustainability, efficiency and long-term benefits. Focus on rapid adaptation to changes in product availability and logistics routes. Priority is given to essential goods.	During martial law, ATB's retail network actively cooperated with suppliers to ensure a minimum set of food products even in combat zones. Reorganization of warehouses for greater mobility and the ability to quickly replenish goods.
Distributed supply chain model	It is a model of supply chain management in which production, warehousing, and logistics processes are located in different geographical regions or segments to achieve greater efficiency, flexibility, and sustainability. This model aims to optimize processes, reduce costs and respond quickly to changes in demand or market conditions. The ability to quickly change routes depending on the situation.	The Silpo retail chain has shifted its focus to creating warehouses closer to safe regions and ensuring delivery to the nearest stores. Engaging local suppliers to reduce transportation time
Humanitarian supply chain model	This is a specialized approach to organizing the supply chain aimed at providing the population with vital goods and services in the context of armed conflict. The model is based on effective logistics management, coordination between different stakeholders, and emergency adaptation. Joining forces with international humanitarian organizations and government agencies to supply products to critical areas. Use of special logistics corridors to ensure safe transportation.	Metro Cash & Carry Ukraine and Fozzy Group actively contributed to humanitarian aid programs by creating additional stocks for the crisis regions. The total amount of charitable assistance provided by ATB during the war to Ukrainian defenders, medical institutions, affected civilians, etc. has already reached almost UAH 2 billion.
Agile supply chain Flexible delivery model	It is an adaptive approach to supply chain management aimed at ensuring rapid response, adapting to changing conditions and meeting the needs of the population in the context of instability caused by war. This model focuses on minimizing risks, maximizing the use of available resources and ensuring continuity of supply, even in situations with high levels of uncertainty.	ATB and NOVUS have introduced flexible delivery models, optimizing routes to avoid dangerous areas. Use of alternative modes of transportation (e.g. rail).
Real-time visibility model	It is an approach to supply chain management that ensures transparency and real-time monitoring of all stages of the delivery of goods. Thanks to the use of modern technologies, this model allows you to quickly respond to changes, eliminate disruptions and maintain continuity of supply in the context of military operations. Real-time monitoring of supplies using digital technologies. Use of GPS, IoT, and mobile platforms to track the movement of goods.	Silpo and ATB have integrated monitoring systems to track the movement of goods and redirect them in case of threats. Implementation of mobile applications for communication with drivers and suppliers.
Local suppliers model	Transition to purchasing goods from local farmers and producers to shorten supply chains. Minimize dependence on imports.	Varus and other local chains actively supported Ukrainian producers by offering products made in safe regions of the country. Expanding the assortment with local brands.

Source: compiled by the author based on (ProConnect Integrated Logistics, n. d.; Li, 2020; Steffes, 2024, September 5).

Logistics risks:

destruction of the logistics infrastructure: Risk: high. *Possible actions*: use of alternative routes, creation of local warehouses;

Danger to transportation: the threat of shelling, checkpoints, or roadblocks makes it difficult to move around. *Risk*: high.*Possible actions*: cargo insurance, cooperation with the military to secure routes.

Economic risks:

Financial constraints: rising costs for fuel, transportation, and security may make the adaptive model economically unprofitable. *Risk*: medium. *Possible actions*: cost optimization through coordination with other networks and partners;

Currency fluctuations: dependence on imported goods increases costs due to currency volatility. *Risk*: medium. *Possible actions*: increasing the share of local suppliers.

Social risks:

Staff outflow: military operations lead to the loss of personnel through mobilization or migration. *Risk*: medium. *Possible actions*: automation of processes, involvement of local communities;

Increased social tension: shortages of goods may cause discontent among the population. *Risk*: high. *Possible actions*: transparent communication with consumers, setting fair prices.

Technological risks:

Limited access to technology: lack of stable internet or electricity makes it difficult to use monitoring systems. *Risk*: medium. *Possible actions*: backup power supplies, decentralized metering systems;

Cyber threats: Hacker attacks can disrupt supply chain management systems. *Risk*: high. *Possible actions*: investing in cybersecurity and backup systems.

Political risks:

Regulatory instability: frequent changes in legislation or regulations can create obstacles for business. *Risk*: medium. *Possible actions*: Adaptation to changes through rapid legal response;

Dependence on humanitarian aid: unpredictable volumes of international aid may affect the availability of goods. *Risk*: medium. *Possible actions*: development of own stocks and local production.

Environmental risks:

Damage to goods: war conditions can cause delays in transportation, which leads to damage to products. *Risk*: high. *Possible actions*: use of cold chains and shorter routes;

Environmental pollution: military operations may affect product quality due to pollution. *Risk*: low. *Possible actions*: control of product quality and sources of supply.

Reputational risks:

Loss of consumer confidence: late delivery or lack of goods may reduce trust in retail chains. *Risk*: medium. *Possible actions*: regular communication with consumers, expanding the range of products.

In the context of martial law in Ukraine, it is imperative for retail analysts to implement tools and methodologies that will enhance supply chain adaptability. We offer risk monitoring systems, such as RiskWatch, a platform for assessing and monitoring risks in supply chains. To facilitate

data analysis and forecasts, we recommend Tableau or Microsoft Power BI, which offer capabilities for the visualization of inventory, demand, and supply data, thereby enabling the identification of trends in real time. Supply chain management platforms, such as Oracle Supply Chain Management Cloud, offer capabilities for data integration, order management, and forecasting. For the inventory management system, SAP Integrated Business Planning can be utilized to optimize inventory management and demand forecasting. Collaboration platforms, such as Slack or Microsoft Teams, facilitate real-time communication between teams and partners. For the monitoring of road transport carriers, Project44 or FourKites can be utilized to track cargo and provide visibility at all stages of supply.

Conclusions

A rigorous examination of the hypothesis positing the significance of the concepts of SPOD-world, VUCA-world, BANI-world, and ANTIFRAGILE-world in the formation and adaptation of supply chains has substantiated their pivotal function in elucidating the predicaments of the contemporary era. These concepts enable us to encapsulate various dimensions of complexity, instability, and variability inherent in the contemporary environment. Consequently, they contribute to the development of effective approaches to supply chain management.

Therefore, the significance of concepts in the context of adaptation is paramount. SPOD-world serves as a foundational model, illustrating the limitations of the conventional approach when confronted with escalating uncertainty. VUCA-world underscores the imperative for agility, prompt responsiveness, and adaptability in the face of volatilities and uncertainties. BANI-world accentuates the significance of resilience, decentralization, and effective anxiety management in crisis-stricken environments. ANTIFRAGILE-world demonstrates that effective supply chains should not only exhibit resilience in the face of stress, but also leverage such challenges to enhance performance.

The supply chains of food retailers are encountering a series of challenges, including logistics disruptions, increased demand uncertainty, and associated risks. A lack of readiness for rapid change and insufficient integration of digital technologies impede adaptation. The application of concepts such as VUCA, BANI, and ANTIFRAGILE has been identified as a potential catalyst for the development of adaptive, flexible, and sustainable management models. The integration of digital technologies (Big Data, the Internet of Things, and artificial intelligence), multi-level forecasting, and the establishment of alternative routes are crucial for ensuring efficiency in crisis conditions.

In the contemporary environment, national retail chains and the Ukrainian system are classified as "ANTIFRAGILE" entities, indicating their resilience in crisis conditions and their capacity to leverage challenges as catalysts for enhancement. In the context of martial law, food retail chains exemplify these characteristics. Chains that have adapted to martial law gain

an advantage over less resilient competitors. The ANTIFRAGILE concept provides a multidimensional framework for analyzing current challenges and developing adaptive supply chain management models. The implementation of these models enables the identification of deficiencies inherent in conventional methodologies, the identification of novel adaptation instruments, and the establishment of supply systems that maintain efficacy under the most arduous circumstances, as evidenced by the context of martial law in Ukraine. The insights gleaned from this analysis facilitate a more profound comprehension of contemporary supply chain challenges and enable the formulation of novel management strategies. These strategies are expected to contribute to ensuring the country's food security, enhancing the resilience of retail food retailers, and mitigating risks in volatile environments.

REFERENCE/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Grigorak, M. (2017). *Intellectualization of the logistics services market: concepts, methodology, competence.* Kyiv: Sik Group Ukraine, 516 p.	Григорак, М. (2017). *Інтелектуалізація ринку логістичних послуг: концепції, методологія, компетентність.* Київ: Сік Груп Україна, 516 с.
Chalyuk, Yu. (2022). Global socio-economic development in the conditions of VUCA, SPOD, DEST AND BANI world. *Economy and Society,* (36). https://doi.org/10.32782/2524-0072/2022-36-21	Чалюк, Ю. (2022). Глобальний соціально-економічний розвиток в умовах VUCA, SPOD, DEST та BANI світу. *Економіка та суспільство,* (36). https://doi.org/10.32782/2524-0072/2022-36-21
Christopher, M. (2011). *Logistics and Supply Chain Management* (4th ed.). London: FT Prentice Hall, 276 p.	
Forbes Ukraine. (2024, March 8). ATB's revenue reached a record UAH 181 billion in 2023. Fozzy Group, METRO and Varus showed more modest results. https://forbes.ua/news/vitorg-atb-syagnuv-rekordnikh-181-mlrd-grn-u-2023-rotsi-fozzy-group-metro-i-varus-zrosli-v-serednomu-na-20-08032024-19741	*Forbes Ukraine.* (2024, 8 березня). Виторг "АТБ" сягнув рекордних 181 млрд грн у 2023 році. Fozzy Group, METRO і Varus показали скромніші результати. https://forbes.ua/news/vitorg-atb-syagnuv-rekordnikh-181-mlrd-grn-u-2023-rotsi-fozzy-group-metro-i-varus-zrosli-v-serednomu-na-20-08032024-19741
Harsun, L., & Patkovs'kyj, S. (2020). Cold food supply chains: determinants of management and development. *Visnyk KNUTE*, (2), 48–57. https://doi.org/10.31617/visnik.knute.2020(130)04	
IBM. (n. d.). *AI-Driven Supply Chain Solutions.* https://www.ibm.com/supply-chain	
Ilchenko, N., & Kochubey, D. (2017). Reference models of supply chain management of trade enterprises. *International Scientific and Practical Journal "Goods and Markets", 2*(24), (Vol. 2), 62–71. http://tr.knute.edu.ua/index.php?option=com_content&view=article&id=1504&catid=122&lang=uk	Ільченко, Н., & Кочубей, Д. (2017). Референтні моделі управління ланцюгами поставок підприємств торгівлі. *Міжнар. наук.-практ. журн. "Товари і ринки", 2*(24), (Т. 2), 62–71. http://tr.knute.edu.ua/index.php?option=com_content&view= article&id=1504&catid=122&lang=uk
Krykavskyi, Yu., & Chornopyska, N. **(**2012). Ukraine in global supply chains*. Logistics: theory and practice, 1*(2), 92–100.	Крикавський, Є., & Чорнописька, Н. (2012). Україна в глобальних ланцюгах поставок. *Логістика: теорія та практика. 1*(2), 92–100.
Li, Yanzhi. (2020). 14 Supply Chain Distribution Strategy. *The Oxford Handbook of Supply Chain Management* https://doi.org/10.1093/oxfordhb/9780190066727.013.19	
Nassim, Nicholas Taleb. (2013). *Antifragile: Things that Gain from Disorder.* Penguin, 546 p.	
ProConnect Integrated Logistics. (n. d.). 4 Ways to Add Value to Your Supply Chain. https://proconnectlogistics.com/blog/4-ways-to-add-value-to-your-supply-chain/#:~:text=A%20company's%20supply%20chain%20is,quickly%20and%20efficiently%20as%20possible.	

Retailers. (2024, August 19). Revenues of almost all major retailers increased in January-June 2024, except for Auchan Ukraine. https://retailers.ua/ news/menedjment/14153-vitorg-mayje-vsih-naybilshih-riteyleriv-za-sichen-cherven-2024-roku-zris-okrim-auchan-ukrayina-zvit-servisa-youcontrol	Retailers. (2024, 19 серпня). Виторг майже всіх найбільших ритейлерів за січень-червень 2024 року зріс, окрім Auchan Україна. https://retailers.ua/ news/ menedjment/14153-vitorg-mayje-vsih-naybilshih-riteyleriv-za-sichen-cherven-2024-roku-zris-okrim-auchan-ukrayina-zvit-servisa-youcontrol
Slovoidilo. (2024, September 11). How a full-scale war has affected the revenues of grocery supermarket chains. *Word and deed.* https://www.slovoidilo.ua/2024/09/11/ infografika/biznes/yak-povnomasshtabna-vijna-pozna-chylasya-doxodax-merezh-produktovyx-supermarketiv	Слово і діло. (2024, 11 вересня). Як повномасштабна війна позначилася на доходах мереж продуктових супермаркетів. https://www.slovoidilo.ua/2024/09/11/ infografika/biznes/yak-povnomasshtabna-vijna-pozna-chylasya-doxodax-merezh-produktovyx-supermarketiv

Steffes, Michelle. (2024, September 5). *What Real-Time Visibility Means for Supply Chain Resilience*. PubNub. https://www.pubnub.com/blog/what-real-time-visibility-means-for-supply-chain-resilience/

Waters, D. (2018). *Logistics An introductio to supply chain management*. Palgrave Macmillan, 511p.

Conflict of interests. The authors certify that they have no financial or non-financial interest in the subject matter or materials discussed in this manuscript, the authors have no association with government bodies, any organizations or commercial entities having a financial interest in or financial conflict with the subject matter or research presented in the manuscript. Given that one of the authors is affiliated with the institution that publishes this journal, which may cause potential conflict or suspicion of bias and therefore the final decision to publish this article (including the reviewers and editors) is made by the members of the Editorial Board who are not employees of this institution.

The authors received no direct funding for this research.

Ilchenko N., Sushchenko R. Adaptive supply chain models. *Scientia fructuosa*. 2025. № 1. P. 102–118. https://doi.org/10.31617/1.2025(159)07

Received by the editorial office 13.01.2025.
Accepted for printing 21.01.2025.
Online publication 17.02.2025.

DOI: 10.31617/1.2025(159)08
UDC 339.137:005.336.6]:338.48=111

BOVSH Liudmyla,
PhD (Economics), Associate Professor,
Associate Professor of the Department
of Hotel and Restaurant Business Management
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID: 0000-0001-6044-3004
l.bovsh@knute.edu.ua

RASULOVA Alla,
PhD (Economics), Associate Professor,
Associate Professor of the Department
of Hotel and Restaurant Business Management
State University of Trade and Economics
19, Kyoto St., Kyiv, 02156, Ukraine

ORCID:0000-0002-0498-3433
a.rasulova@knute.edu.ua

GREENWASHING AND REPUTATIONAL RISKS IN THE HOTEL INDUSTRY

To determine the development strategy, economic entities should take into account global trends in society and business. Therefore, the focus on sustainable development, environmental protection and adherence to the principles of environmental responsibility are relevant issues for creating and strengthening reputational capital nowadays. Behavioral patterns of consumers and stakeholders demonstrate an advantage in relations with hotels that implement a transparent policy of green entrepreneurship, support environmental and social initiatives. Visualization of false environmental declarations can lead to loss of loyalty, a decrease in the reputation of the hotel business entity, as well as a loss of trust in environmental initiatives in general. However, the lack of transparent criteria for assessing environmental friendliness and the spread of greenwashing significantly complicate the identification of such hotels. The main hypothesis is that the use of greenwashing is a short-term strategy that provides temporary consumer loyalty, but in the long term leads to a loss of customer trust, a deterioration in the reputation of the hotel brand and a decrease in its competitiveness. The research is based on the use of theoretical methods (analysis, synthesis, systematization, historical-

БОВШ Людмила,
к. е. н., доцент, доцент кафедри менеджменту
готельно-ресторанного бізнесу
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID: 0000-0001-6044-3004
l.bovsh@knute.edu.ua

РАСУЛОВА Алла,
к. е. н., доцент, доцент кафедри менеджменту
готельно-ресторанного бізнесу
Державного торговельно-економічного
університету
вул. Кіото, 19, м. Київ, 02156, Україна

ORCID:0000-0002-0498-3433
a.rasulova@knute.edu.ua

ГРІНВОШИНГ ТА РЕПУТАЦІЙНІ РИЗИКИ В ГОТЕЛЬНІЙ ІНДУСТРІЇ

Для формування стратегії розвитку економічні суб'єкти мають враховувати світові тенденції у суспільстві та бізнесі. Тому фокус на сталому розвитку, збереженні довкілля та дотриманні принципів екологічної відповідальності сьогодні є актуальним питанням створення та зміцнення репутаційного капіталу.

Поведінкові патерни споживачів та стейкхолдерів демонструють перевагу у відносинах з готелями, що здійснюють прозору політику зеленого підприємництва, підтримують екологічні та соціальні ініціативи. Візуалізація хибних екологічних декларацій може призвести до втрати лояльності, зниження репутації суб'єкта готельного бізнесу, а також втрати довіри до екологічних ініціатив загалом. Проте відсутність прозорих критеріїв оцінювання екологічності та поширення грінвошингу значно ускладнюють ідентифікацію таких готелів. Висунуто гіпотезу, що використання грінвошингу є короткостроковою стратегією, яка забезпечує тимчасову лояльність споживачів, але у довгостроковій перспективі призводить до втрати довіри клієнтів, погіршення репутації готельного бренду та зниження його конкурентоспроможності. У дослідженні на використано теоретичні методи (аналізу,

logical, content analysis), empirical research (surveys, case studies), as well as modeling and benchmarking.

The concept of greenwashing, its main types and mechanisms of use in the marketing strategies of hotel business entities are considered. The impact of false environmental claims on the formation of customer trust, competitiveness and long-term reputation of hotels is studied. Practical recommendations are proposed for identifying and combating the use of greenwashing through environmental audits, the introduction of transparent environmental standards and increasing business responsibility. The results of this research form practical recommendations for hotel management on how to avoid greenwashing and move towards real environmental initiatives.

Keywords: green business, anti-crisis strategy, reputation management, innovation, environmental awareness.

синтезу, систематизації, історико-логічного, контент-аналізу), емпіричні (опитування, кейс-стаді), а також моделювання й бенчмаркінгу. Розглянуто поняття грінвошингу, його основні види та механізми застосування в маркетингових стратегіях суб'єктів готельного бізнесу. Досліджено вплив неправдивих екологічних заяв на формування довіри клієнтів, конкурентоспроможність і довгострокову репутацію готелів. Запропоновано практичні рекомендації щодо виявлення та боротьби з використанням грінвошингу через екологічний аудит, впровадження прозорих екологічних стандартів і підвищення відповідальності бізнесу. Сформовано практичні рекомендації для менеджменту готелів, як уникнути грінвошингу та перейти до реальних екологічних ініціатив.

Ключові слова: зелений бізнес, антикризова стратегія, управління репутацією, репутаційні маніпуляції, інновації, екологічна свідомість.

JEL Classification: M14, M31, L83, Q56.

Introduction

Environmental pollution leads to sea level rise, freshwater pollution, the appearance of "garbage islands" in the world's oceans, extreme weather events, loss of biodiversity, etc. As a result, nature's recreational opportunities are decreasing, which negatively affects the health of society. For our own research, it is necessary to implement strict compliance control over the behavior of the population and business entities regarding their impact on the natural environment, as well as restore its ability to self-recover and reproduce.

Hotels are a significant consumer of resources, including water and energy, and generate a large amount of waste (food, plastic, and textile). Unethical practices can hide the real impact on the environment. Therefore, an effective solution to ensuring the environmental friendliness of business is to identify cases of greenwashing and implement state and public control to prevent territorial environmental disasters. Therefore, the development of a mechanism to counter greenwashing is an urgent task in the fight against misleading environmental marketing by business entities.

The concept of greenwashing is attracting increasing attention from society and government authorities, as businesses sometimes try to present themselves as environmentally responsible without backing up their statements with real actions. Sometimes they resort to greenwashing due to negligence or misunderstanding of the essence of environmental products and principles of behavior (Villhauer, 2023). Accordingly, greenwashing provokes conflicts between declared initiatives and actual behavior, and management must be responsible for the information that is made public.

Accusations of greenwashing are not only a reputational failure, but often also the basis for inspections by regulatory authorities and legal proceedings (Pears et al., 2023).

In this context, the attention of scientists and businesses to greenwashing has been justified in recent years. The term "greenwashing" was introduced by the American ecologist Jay Westerveld in 1986 (Samal & Bhalala, 2023), but there are historical examples from previous years that can be characterized as "greenwashing". In particular, the US tobacco industry in the 1950s funded studies that questioned the link between cigarettes and cancer; the forestry industry in the 1980s, under the slogan "sustainable logging" engaged in illegal deforestation (Mysirli & Axarli, 2021).

Regarding scientific research, greenwashing has covered not only environmental, but also financial aspects, communication management and regulatory regulation. The study of the essence of greenwashing is devoted to the work of Miller (2017), Vollero (2022), Villhauer (2023), who analyzed the concept of greenwashing from the perspective of business ethical behavior regarding the growth of environmental problems. The essential characteristics of greenwashing were in the scientific focus of such Ukrainian researchers as Smirnova (2017), Ivashura and Borisenko (2019), Nahirna (2021) and others. Greenwashing in advertising as a polyphonic means for manufacturers to create an ecological image of them and sell their products is considered by Vargas (2019), analyzing, at the same time, the types of communications and ways of argumentation. Ecobranding as an important tool of modern marketing was investigated in the scientific study of Bondarenko and Syazin (2024).

The consequences of greenwashing, in particular misleading consumers and undermining public trust in green business a priori, are studied by scientists Kassinis et al. (2022); Teichmann et al. (2023); Yang et al. (2020); Zych et al. (2021).

Some studies are so valuable because of having proposals how to combat greenwashing, the results of which should be implemented in business practices and environmental legislation of Ukraine. The arguments for the use of coercive measures by market regulators were studied by Peng et al. (2024). They proved that "despite the support of stakeholders and evidence of increased transparency after sanctions, regulatory interventions against "green laundering" have limitations and unintended consequences". The methodology for assessing greenwashing practices is supplemented by the study by Lagasio (2023), which combines natural language processing (NLP) methods, innovative ESG Focus Scores and the Greenwashing Severity Index (GSI) to assess companies' environmental, social and governance (ESG) commitments. Practical aspects of applying the concept of sustainable business through the integration of environmental, social and governance (ESG) issues are considered in the analytical report by Benjakul and

Santhiwasa (2022). The authors developed a mechanism for protecting "green" investors from misuse by ensuring clarity and transparency of information and its publication in accordance with the EU Taxonomy Regulation.

The use of the scientific analytic results by Ross (2024), who examined the directions of greening hotels, is applicable to the study of greenwashing as a tool of reputational manipulation in the hotel business. Scientists Alyahia et al. (2024), Chen et al. (2019) studied the moderating role of environmental authenticity (GA) and green transparency (GTR) in the relationship between greenwashing and guests' green trust (GT), which ultimately affects patronage intentions (PI) towards green hotels. The subject of the study by Srivastava et al. (2024) was the correlation analysis of the effects of greenwashing and attentiveness to the intentions of a green hotel by empirically testing negative and self-reflexive aspects of guests' behavior when choosing hotels.

Thus, according to the results of the scientific source analysis, the issue of greenwashing is constantly being updated with the emergence of new environmental challenges, changes in consumer behavior and new eco-initiatives of business that require verification of greenwashing. In addition, in the context of environmental pollution of the territories of Ukraine as a result of military actions, it is important to rethink the concept of "green" business and the integrity of hotels regarding environmental claims. The essence, forms and examples of greenwashing require comprehensive research, in particular for the positioning of Ukrainian eco-hotels in the global market of tourist services in the military and post-war period, which forms the scientific and practical value of the research.

The aim of this research is to determine the essence of greenwashing, the forms of its manifestation in the practice of the hotel business, as well as to develop an anti-greenwashing mechanism in the reputation risk management system. In this case, the key tasks are to determine the essence and directions of environmental activities of business entities; systematize the forms of greenwashing based on the analysis of practical insights; identification of environmental challenges faced by companies when implementing environmental solutions; as well as the formation of recommendations for businesses regarding anti-greenwashing policies in the context of digital communications.

The hypothesis is put forward that greenwashing is a powerful tool for reputation manipulation, which allows hotel business entities to maintain short-term advantages, but can be the cause of long-term risks of reputation loss. To confirm it, the methodology of processing information sources and empirical research results using analytical tools and scientific research methods was used.

The information base of the research is scientific and professional sources on "green" business and greenwashing, hotel business, online hotel platforms.

In the process of processing the material, general scientific methods were used, in particular, comparative analysis to determine the definition of "greenwashing"; historical-logical, to determine the trends and forms of greenwashing; content analysis, to process hotel marketing materials, compare them with the relevant regulatory requirements and synthesize theoretical assumptions and findings. The method of empirical research (surveys, case studies) was used to determine the tone and content of communications regarding green business by hospitality entities. The method of modeling and benchmarking was used to interpret the main directions of forming an anti-greenwashing strategy, based on best practices.

The scientific novelty lies in the development of the concepts of "green business" and "greenwashing", the systematization of forms of greenwashing, as well as the modeling of the anti-greenwashing strategy of business entities, which will ensure increased trust in hotel brands operating in Ukraine.

The limitations of the research were the lack of detailed data on environmental practices in hotels, while public statements on the official pages of hotels (hotel operators) were used. In the future, we plan to consider the areas of regulatory influence on declarations on green entrepreneurship. This will allow us to create additional tools for reputational compliance control in the system of anti-crisis management of business entities.

The content structure of the main part of the article has three sections: the first defines greenwashing and reveals its essential characteristics; the second is the processing of information on the "green" positioning of hotels; the third considers ways to avoid greenwashing in the hotel sector and sustainable development scenarios aimed at solving the problem of greenwashing.

1. Theoretical foundations of greenwashing in the context of marketing

The increased attention of society to ecology and sustainable development has led to trends in the implementation of "green" initiatives by business entities. Therefore, the analysis of manifestations of their conscious environmental behavior and greenwashing (false statements) from the point of view of communications with environmentally sensitive consumers and stakeholders is an important step in overcoming manipulation. In order to understand the phenomenon of greenwashing in more detail, it is worth determining the interpretations of the definition. Since there is no unified interpretation of greenwashing to date, the analysis of definitions common in the academic and professional field will allow us to summarize the main features and characteristics, which will contribute to its adequate use (*Table 1*).

Table 1

Comparative analysis of greenwashing

Source	Definition Characteristics	Context of use	Key elements
Vargas, 2015	Communication "regarding marketing that presents unrealistic or minimal environmental arguments, knowing that the company often spends more money on advertising and communication for this purpose than on actions effective for the climate and the environment	Marketing, advertising	Marketing communication presenting unrealistic or minimal environmental arguments
Vargas, 2019	A way to gain power and/or reduce possible opposition from stakeholders	Social aspects	A way to gain power and/or reduce potential opposition
Wu et al., 2020	A firm's emphasis on observable aspects of social responsibility and neglect of unobservable aspects	Social aspects, corporate governance	Emphasis on social responsibility
Pylypenko, 2019	A process by which manufacturers claim that their products are organic and environmentally friendly without proper justification	Consumer market	Misleading claims about organic and ecological purity of products
Ling & Aziz, 2021	It occurs when companies use buzzwords such as "green", "eco-friendly" to create a false impression of environmental responsibility		False impression of environmental responsibility
Nahirna, 2021	The process of highlighting the environmentally positive characteristics of a product without correspondingly confirming or masking the environmentally negative characteristics of the product in order to increase profits, reduce costs, or create a positive image for the company		A claim about the environmental friendliness of a product without appropriate confirmation or masking of environmentally negative features
Andreoli et al., 2022	A form of corporate deception that uses environmental claims to mislead consumers about an organization's environmental practices or the environmental benefits of its products and services		A form of corporate fraud that uses environmental claims
Pears et al., 2023	Distortion, misrepresentation, and false or misleading practices regarding environmental, social, and management credentials; claiming or creating the impression that activities, products, and services are more environmentally friendly or sustainable than they actually are	Social aspects, consumer market	Distorted, distorted, or misleading information about the environmental performance of products or activities
Alyahia et al., 2024	Inflating a hotel's environmental image and selectively publicizing positive environmental information and/or concealing information about the hotel's negative environmental impact or associating it with other factors	Marketing, advertising	Inflated environmental image, selective disclosure, withholding information
Oxford Learner's Dictionaries, 2025	A company or organization's actions that aim to make people think that it cares about the environment, even though its actual business is actually harmful to the environment		Misleading environmental claims, competitive advantages
European Commission, n. d.	Unsubstantiated or misleading environmental claims made by companies about their products or services	Regulatory policy	Unsubstantiated claims

End of Table 1

Source	Definition Characteristics	Context of use	Key elements
EBA (*European Banking Authority*), 2023	A practice where statements, declarations, actions or communications relating to sustainability do not clearly and fairly reflect the underlying sustainability profile of an organization, financial product or financial service	Regulatory policy	Unclear and dishonest representation of the sustainability profile

Source: compiled by the authors.

Regarding the approaches considered in the table, greenwashing is a manipulative practice of deliberately using unfounded, misleading or false claims about the environmental benefits of a product, service or company's activities in order to obtain a certain economic benefit and form a positive reputation among consumers and stakeholders.

The authors also have numerous aspects of the application of greenwashing in modern business practice (Szabo & Webster, 2021; Torelli et al., 2020; Vollero, 2022). In particular, the key motive for the use of greenwashing by companies is to improve their reputation in society, drawing attention to their complicity in the global trend of sustainable development. After all, social pressure, and in some countries also regulatory (state and public authorities), is the reason that encourages business to meet the growing demand for products and services that meet environmental and social standards.

Another reason is increased sales, as the created profile encourages environmentally conscious consumers to purchase products or services that are perceived as "green", thereby increasing the company's revenues. An economic motivation may be cost reduction, as the implementation of environmentally friendly methods can reduce the company's overall production and operating costs, in particular through an environmental tax or certain financial penalties for environmental pollution.

Another argument for the use of greenwashing is to gain a competitive advantage, as companies seek to stand out among competitors as leaders in the field of sustainable development, thus attracting more conscious and interested customers and attracting "green" investments.

Thus, greenwashing encompasses the communication processes of business entities with consumers, partners, investors and the public and provides for a number of marketing goals that they seek to achieve through the use of deceptive practices regarding environmental sustainability: influencing public opinion; increasing the trust of consumers and investors; diverting attention from environmentally harmful practices and avoiding public and regulatory environmental responsibility; increasing the value of the company by increasing reputational capital.

The concept of greenwashing is interdisciplinary in nature, as it touches on a number of important areas of activity of a hotel business entity (*Figure 1*).

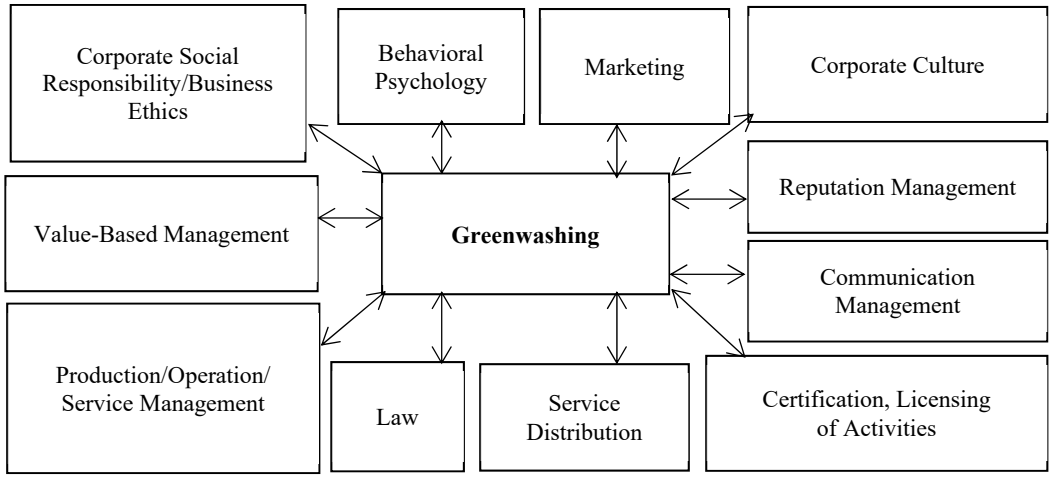

Figure 1. Interdisciplinary connections of the greenwashing concept in the hotel business

Source: compiled by the authors.

In the context of marketing theory, to recognize greenwashing, it is advisable to integrate the "7P" concept, which has components of conscious influence on consumer choice (*Figure 2*).

***P**roduct:* - "environmental" characteristics of the product; - "environmentally friendly" building materials, furniture, equipment; - "eco-friendly" containers, packaging, tableware, etc.	***P**rice:* - higher prices for environmentally friendly products; - discounts for using own packaging, reusing raw materials, etc.
***P**lace:* - use of green areas for advertising or product promotion (parks, squares, water bodies); - sales through specialised eco-stores or online platforms	***P**romotion:* - use of green colours, natural motifs, words like "eco", "bio", "natural", etc; - active participation in environmental movements, cooperation with influencers
***P**eople:* - "environmentally conscious" employees; - one-off environmental programmes for employees and customers; - manipulation of customer perception (ideal customer, creation of communities)	***P**rocess:* - implementation of environmental processes (waste sorting, water or energy saving, etc.); - cleaning with environmentally friendly products, etc.
***P**hysical evidence:* - certificates, logos, product packaging used to support green claims	

Figure 2. The "7P" model adapted to greenwashing

Source: systematised by the authors according to (Booms & Bitner, 1981; Ottman, 2017).

As we can see from *Figure 2*, the "7P" model allows us to identify greenwashing as a marketing tool that covers all aspects of business from products to communications, helping to identify discrepancies between the entity's statements about environmental friendliness and reality.

In addition, greenwashing is based on evoking emotions in consumers, in particular responsibility for the environment and "ecological" choices. Therefore, companies often use emotional marketing and neuromarketing tools, appealing to the desire for environmental behavior and desires for conscious consumption. For this, they use eco-labels, certificates or partnerships with environmental organizations as physical evidence to build trust among consumers.

2. Empirical evidence of greenwashing in the hotel business

A key aspect in identifying greenwashing is the application of the principles of "green" entrepreneurship. Hotel business entities, whose mission is to create living conditions using the recreational opportunities of the location and their own environmental proposals, are especially interested in the integration of green practices, partner environmental initiatives of local territorial communities. This contributes to improving the ecological quality of the environment, forms comfortable natural conditions for hotel customers. Therefore, the implementation of green entrepreneurship in business strategy will become an imperative in the near future.

To better understand the possibilities of "green" positioning in the strategic prospects of hotels, *Figure 3* shows its key aspects.

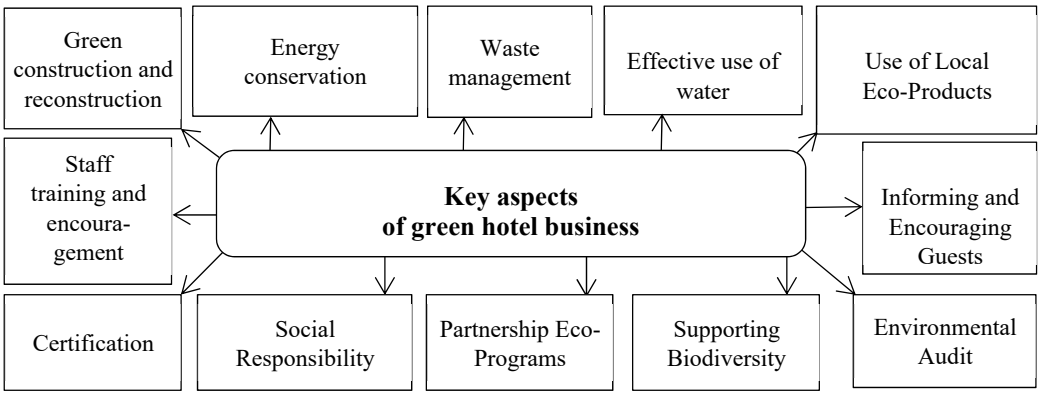

Figure 3. Key aspects of the green hotel business concept

Source: compiled by the authors according to (Tercan et al., 2021; Acampora et al., 2022; Hahn, 2022; Bouarar et al., 2024; DMG, 2024; Zeng et al., 2024).

Some of the aspects indicated in *Figure 3* should be studied deeply. Thus, at the stages of construction and renovation work in a hotel, it is important to take into account the aspects of ecological construction and the use of ecological building materials, as well as energy-efficient equipment: solar panels, thermal insulation, rainwater collection and disposal systems (Pushka & Tikhonova, 2017).

An important environmental goal is waste management, which primarily involves sorting and recycling waste, reducing the use of disposable items, plastic and polyethylene containers, composting organic waste, etc. (Tercan et al., 2021; Businesswaste, n. d.).

The most common practices in the hotel business are the economical use of water, which is achieved by installing economical plumbing fixtures, saving on washing bed linen, reusing water for watering plants, etc. (DMG, 2024).

Environmental goals also include the use of ecological products produced by local farmers and producers, etc. (Tercan et al., 2021; Acampora et al., 2022).

In addition, some hotels that have joined eco-initiatives position the concept of green business in their mission and undergo certification, confirming their environmental friendliness (for example, LEED, Green Globe) and inform guests about this, encouraging them to behave environmentally responsible.

An important component of environmentally conscious business is social responsibility, which involves maintaining a balance between the economic growth of the business entity, social well-being and environmental sustainability. That is, this means that the hotel brand takes responsibility and returns benefits to its community, society, and environment through various initiatives (Hahn, 2022).

The above areas can be used by hotel business entities for greenwashing (*Figure 4*).

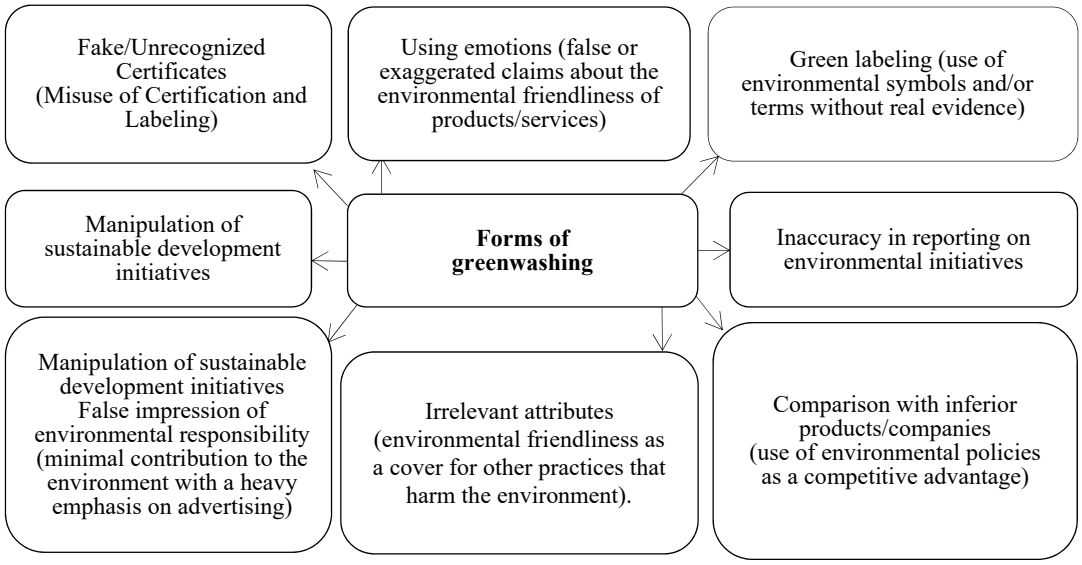

Figure 4. Forms of greenwashing in the hotel business

Source: compiled by the authors according to (Delmas & Burbano, 2011; Chen et al., 2019; Alyahia et al., 2024; Srivastava et al., 2024; Bondarenko & Syazin, 2024).

As we can see, the forms of greenwashing are quite diverse, which gives grounds to study the environmental claims of hotels in detail and detect manipulations.

Disclosure of the fact of greenwashing creates significant risks of losing consumer trust and harms the reputation of the company. At the same time, legal sanctions, such as fines and prosecution for deceptive actions, pose a serious threat. In addition, problems arise with attracting and retaining qualified employees, as they may refuse to work in a hotel with a deteriorated reputation (Vollero, 2022).

Therefore, it is important to monitor the activities of hotels for environmentally conscious consumers in order to support such establishments in sustainable development. Let us examine examples of well-known hotel brands operating in the Ukrainian market and actively declaring "green" practices. Let us take into account the public information of the most popular hotel brands (*Table 2*).

Table 2

Case analysis of greenwashing by hotel brands in Ukraine

Hotel Brand	Green claim	Real measures	Greenwashing Forms	Environmental certificates	Environmental programs
Fairmont	"…Three key initiatives: green design and construction; supporting biodiversity; integrating green procurement…to reduce our carbon footprint, energy consumption and waste generation"	An automated energy management system has been implemented. Energy saving and recycling programs have been implemented, but the scale is not always transparent	Exceeding achievements in scale	EarthCheck Gold	Accor's Planet 21 programme
Hyatt Hotels Corporation	Climate change and water conservation, carbon emissions, energy and water; waste and circularity; responsible sourcing; thriving destinations	Environmental goals are described and detailed, there is a guide to conducting events, but there is limited reporting on current achievements	Statements about participation in local community programs, water and energy savings	Nature Certified (for certain hotels only)	Science Based Target (SBTi)
Radisson Blu Hotel	"...Carbon Neutral Stay for all guests"	Statements about participation in local community programs, water and energy savings	Incomplete reporting on the impact program	Green Key Global LEED (in Odessa)	Hotel Sustainability Basics
Marriott International	"Sustainability is a key value, we support emission reduction goals by 2030"	Long-term plans developed, but limited reporting on current achievements	Manipulation of long-term goals without concrete results	LEED	Serve 360; Science Based Target (SBTi)
Optima (Reikartz) Hotel & Resorts	Reducing waste and emissions into nature	Abandoning plastic bottles of mini cosmetics, slippers, plastic bags	Manipulation through the lack of concrete results	Green Key Global	–

Source: compiled from company websites (Google, Travel, n. d.; Fairmont, n. d., Hotel Initiatives, Sustainable Hotels: Fairmont Promise; Hyatt, n. d.; Radisson Hotels, n. d.; Marriott, n. d.; Optima Hotels & Resorts, n.d.; Green Key, n. d.).

As we can see, the manifestations of greenwashing are insignificant and do not intend to mislead consumers and stakeholders. The main drawback of all the mentioned hotel brands is the lack of confirmation of specific results.

It should be noted that in countries with strict environmental legislation, greenwashing practices allow some business entities to obtain regulatory advantages. Such hotels seek to avoid stricter laws and regulations related to environmental protection in order to preserve their operational freedom and reduce the costs of environmental compliance control.

Although there are no specific court cases on greenwashing in Ukraine or the world, market distributors have made attempts to detect greenwashing. Thus, in 2021, Booking.com launched the Travel Sustainable program, which assigned ratings from 1 to 3+ to hotels (Booking.com, 2021, November 15), but due to imperfect rating and false statements, it was stopped. A well-known sanction was the ban on advertising with the slogan "Fly more environmentally" by Air France in the UK in 2023 (Cloos, 2024, April 15). However, with the adoption of Directive 2024/825 on greenwashing (EU, 2024), Ukrainian business entities, including hotels, should pay more attention to environmental claims and reporting.

Thus, a general trend is emerging in Ukraine and the world to protect the rights of consumers of services and investors, which increases attention to greenwashing. Thus, hotels should be careful in their marketing strategies to avoid legal consequences and maintain customer trust.

3. Practical insights of anti-greenwashing in the hotel business

The correlations of the impact of global trends in sustainable development and the environmental crisis due to the escalation of military operations in Ukraine create extraordinary conditions for hotel business entities, where simple solutions often do not work. On the one hand, hotels are forced to save on costs in order to have a development perspective, on the other hand, they must not ignore the issue of social and environmental responsibility, which, as the above-mentioned statements show, is an outpost of protecting business from public and regulatory sanctions and reputational losses.

Despite the military risks, the Ukrainian hotel services market is open to international tourists, which is why the principles of ecological entrepreneurship should be implemented today. The ecological agendas laid down in the pre-war period and the strategies of "green" entrepreneurship developed for the future create competitive advantages and demonstrate the readiness of hotel business entities for customer-oriented management and the perception of international principles of doing business. However, it is important to adequately develop and implement "green" initiatives in the operational processes and marketing policy of the hotel. Therefore, the formation and integration of an anti-greenwashing strategy into the company's overall development strategy is an effective management decision, taking

into account local and international environmental legislation and consumer sensitivity to environmental practices.

Given the considered essence and forms of greenwashing, we propose to interpret the anti-greenwashing strategy as a comprehensive approach to business management, aimed at building trust in the hotel brand by implementing clear and transparent, ethically sound and environmentally responsible practices in all aspects of the hotel's activities, which is a consistent process (*Figure 5*).

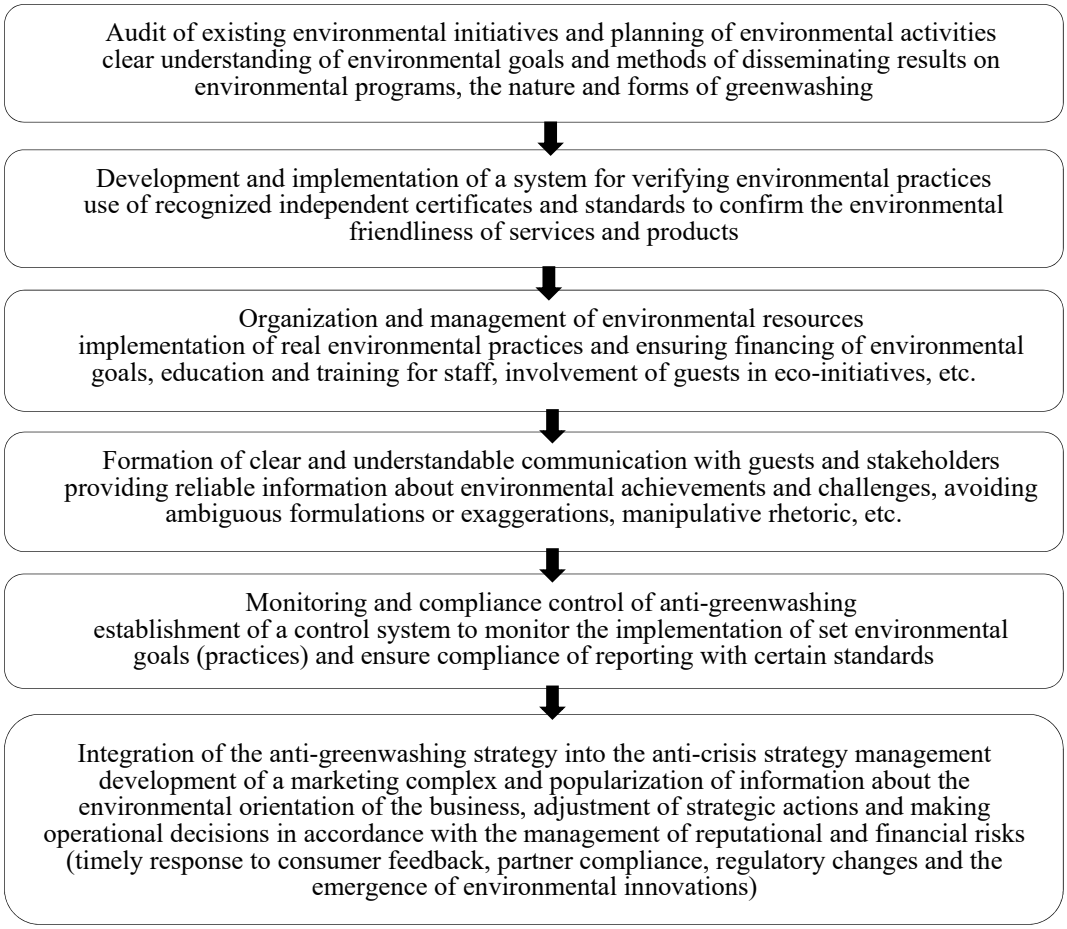

Figure 5. Formation of the anti-greenwashing strategy of the hotel business entity

Source: compiled by the authors according to (Bouarar et al., 2024; Bovsh et al., 2024; Zeng et al., 2024; Mazaraki et al., 2022; Bondarenko & Syazin, 2024).

As we can see, the implementation of the anti-greenwashing strategy goes through the stages of constant monitoring of environmental innovations, standardization and certification of environmental friendliness of products or processes, control over statements and reporting on environmental practices, marketing communications and local regulatory policy. Thus, anti-greenwashing allows not only minimizing the risk of reputational losses, but also to increase the competitiveness of the hotel, attract conscious customers, attract investments and promote its sustainable development.

The effectiveness and feasibility of implementing environmental initiatives is confirmed by the results of empirical research, which was conducted using the Google Form tool. From June to November 2024, a survey form was posted in the online environment in focus groups on social networks, Telegram channels and personal e-mail mailing lists to hotel business operators.

A survey of 243 respondent companies showed that 21% are familiar with environmental practices, of which 14% apply them in practice (*Figure 6*).

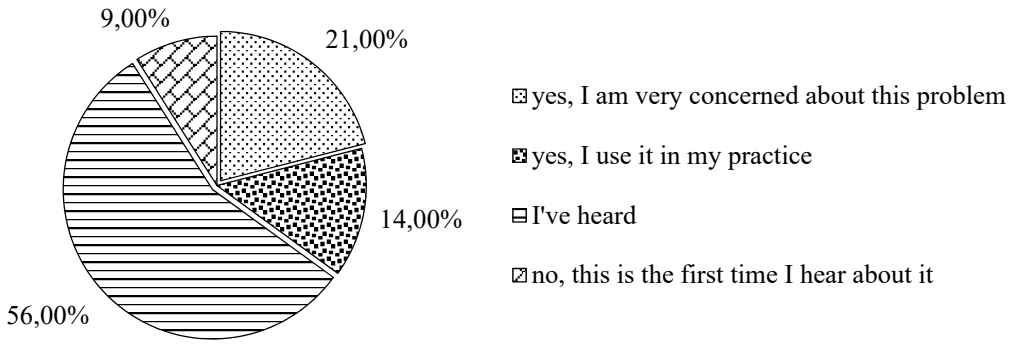

Figure 6. Interpretation of answers to the question
"Are you familiar with the concept of green business?"

Source: compiled by the authors based on the results of the survey on (Environmental practices of business entities in Ukraine, n. d.).

Respondent companies that implement green practices note a positive impact on their operations in many aspects (*Figure 7*).

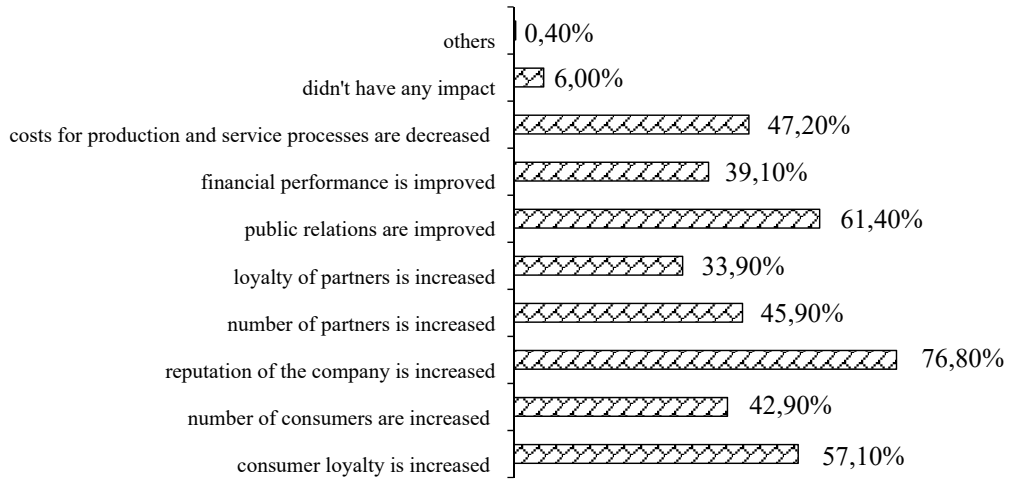

Figure 7. Interpretation of answers to the question
"What was the positive effect of implementing environmental practices
in the company's activities?"

Source: compiled by the authors based on the results of a survey on (Environmental practices of business entities in Ukraine, n. d.).

Thus, respondents mostly confirm the positive impact on the reputation of companies, relations with customers, partners and the public. In addition, more than a third of respondents recognized the positive impact on financial indicators. In the "Other" category, emphasis is placed on the possibility of obtaining grants or tax breaks for companies that adhere to environmental standards, which can be an additional incentive. In addition, there is a fairly high interest in environmental initiatives among customers (*Figure 8*), which confirms the importance of implementing environmental approaches in business.

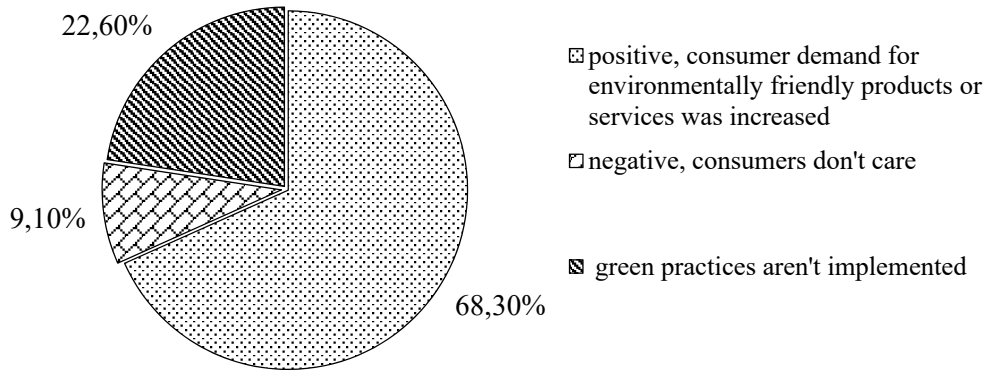

Figure 8. Interpretation of answers to the question
"How has the implementation of green practices affected interaction with customers?"

Source: compiled by the authors based on the results of a survey on (Environmental practices of business entities in Ukraine, n. d.).

Environmental responsibility was also noted as an important aspect in partnership interaction (*Figure 9*).

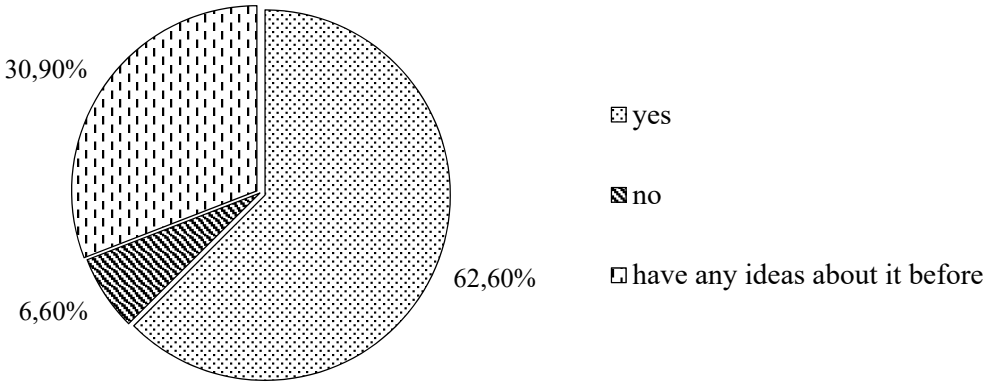

Figure 9. Interpretation of answers to the question
"Is it important for you that a partner be environmentally conscious and support environmental initiatives?"

Source: compiled by the authors based on the results of a survey on (Environmental practices of business entities in Ukraine, n. d.).

Considering the environmental crisis as a consequence of the war, which Ukrainian business has faced (blackouts, air pollution, soil, water sources, mining of territories, etc.), it is extremely difficult to implement environmental solutions. Therefore, it is advisable to assess which environmental initiatives are being implemented (*Figure 10*), and which ones are being determined by Ukrainian hotel business entities for the future (*Figure 11*).

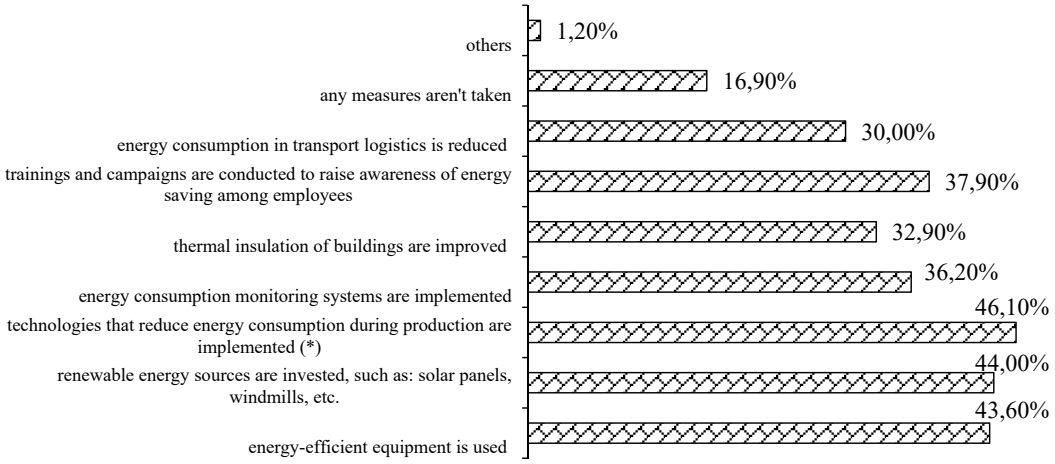

Figure 10. Directions of integration of green initiatives by hotel business entities

Note: * – automation, use of more efficient cooling and heating methods, etc.

Source: compiled by the authors based on the results of a survey on (Environmental practices of business entities in Ukraine, n. d.).

As we can see from Figure 10, the Ukrainian hotel business is adapting to difficult conditions and implementing energy-efficient technologies and solutions, and only a small proportion of entities do not take any action.

Regarding the priority of green entrepreneurship development, it should be noted positive thinking regarding its integration into practice.

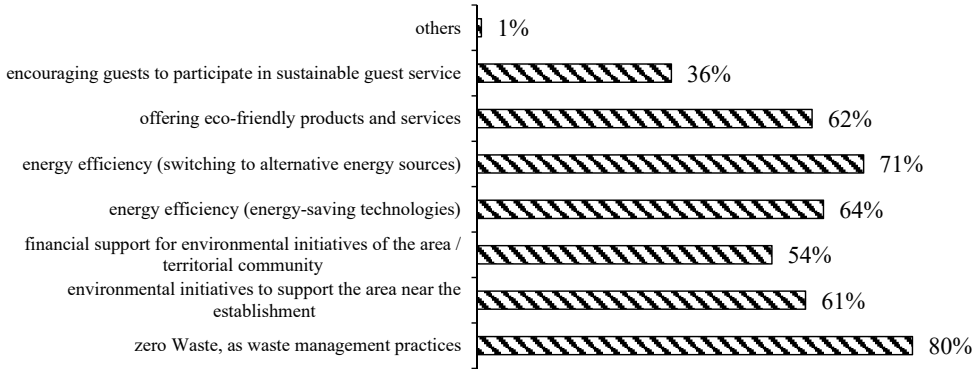

Figure 11. Promising directions of integration of environmental initiatives by business entities

Source: compiled by the authors based on the results of a survey on (Environmental practices of business entities in Ukraine, n. d.).

In particular, the priority areas are waste management, energy saving and the use of alternative energy sources. In the answers "other", respondents identified the importance of issues of social responsibility, training employees and clients in environmental practices.

Thus, the relevance of "green" entrepreneurship among hotel business entities is growing.

In addition, when modeling an anti-greenwashing strategy, it is worth considering the challenges of the environment and the influence of regulators on the behavior of business entities – whether compliance with environmental norms and standards is strictly controlled, or is there a loyal attitude to manipulation of the consciousness of consumers and stakeholders without any sanctions.

Initiatives of state bodies in managing green sustainable practices in business, noted by participants in the hotel services market, are shown in *Figure 12*.

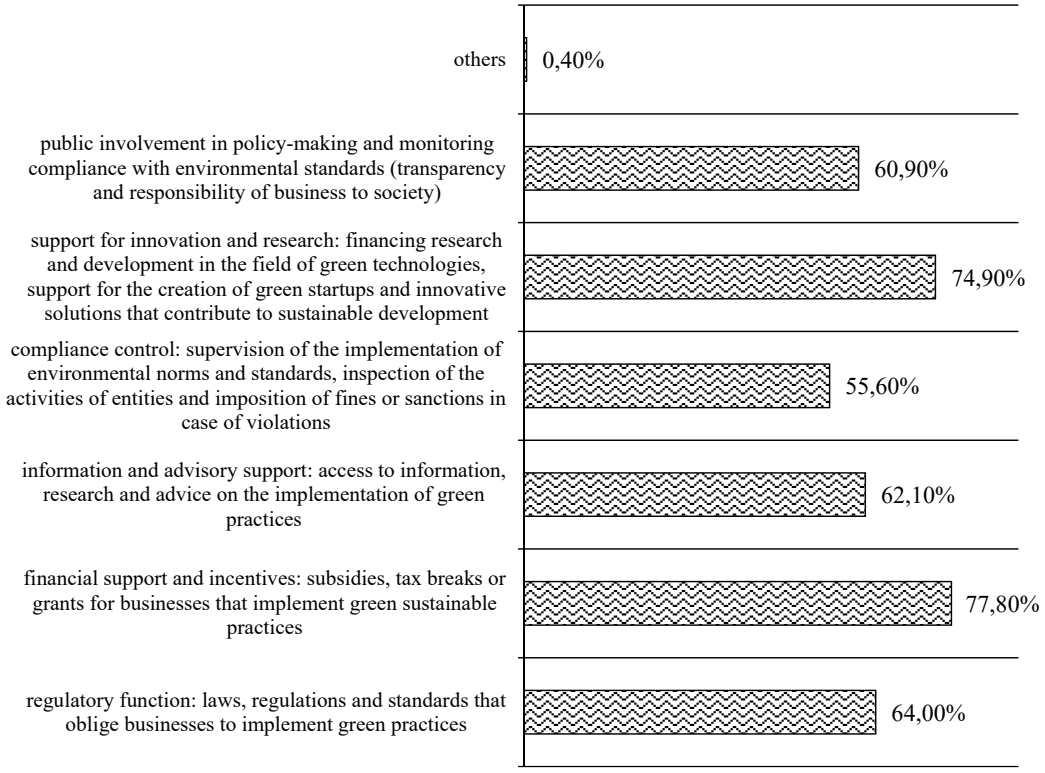

Figure 12. Teleological participation of state bodies in the management of green sustainable practices in business

Source: compiled by the authors based on the results of a survey on (Environmental practices of business entities in Ukraine, n. d.).

As we can see, respondents see a comprehensive participation of the state in supporting and developing "green" practices. In addition, the answer "other" indicates that state institutions can conduct educational programs for business and the public to raise awareness of the importance of

environmental practices and sustainable development. In our opinion, this is a valuable addition that requires an expanded study of the utilitarian approach to state management of environmental practices in business and society. Taking into account the processed data on assessing the prospects for the development of "green" entrepreneurship in the Ukrainian hotel business and the provisions of the anti-greenwashing strategy, we will consider scenario models for the implementation of design thinking depending on two key factors: changing customer environmental requirements (stable or variable), the level of innovation and implementation of green innovations (low or high), and the impact of state regulation (strict or loyal) (*Table 3*).

Table 3

Scenario model of implementing an anti-greenwashing strategy in the activities of hotel business entities

Key factors/scenarios	Optimistic Scenario ("Leaders of Change")	Realistic scenario ("Balanced development")	Pessimistic scenario ("Minimal progress")
Changing customer environmental requirements	Variable: customers actively support environmental initiatives by choosing hotels that demonstrate sustainability	Stable: customers are mostly interested in sustainable services, but make decisions based on price and comfort	Stable: weak interest in environmental services; customers' main focus is on price and basic hotel stay conditions
Level of innovation and adoption of green innovations	High: advanced energy-efficient technologies, carbon footprint monitoring systems, sustainable design and owner certification are implemented	Medium: limited introduction of innovations, including waste sorting, energy saving or environmentally friendly materials in selected processes	Low: minimal or no investment in innovation, activities limited to basic environmental initiatives to avoid sanctions
The impact of government regulation on environmental activities	Harsh: strict regulations and fines for non-compliance with environmental norms and standards, which forces businesses to actively develop and implement anti-greenwashing strategies	Loyal: regulation is more declarative, with gradual tightening of requirements and stimulation of voluntary implementation of environmental norms	Loyal: regulation is minimal, sanctions are absent, allowing businesses to ignore environmental obligations

Source: compiled by the authors.

Thus, the optimistic scenario is focused on the manifestation of initiatives by the hotel business entity to actively implement innovations (green transformations), which is subject to the variable influence of environmentally conscious customers and strict state regulation (existing or expected in the near future). If customer needs are changing rapidly, and the hotel has the opportunity to actively invest in environmental technologies and innovations, creating a unique customer experience, then resources are directed to the creation of new environmental services that exceed customer expectations, and the implementation of solutions based on sustainable development. They create "green rooms" using only environmentally

friendly materials and interactive systems for guests to measure their impact on the environment; implement innovative loyalty programs that encourage guests to behave environmentally responsible, and also develop their own environmental standards to attract partners and investors focused on sustainability. Ambassadors of this concept are the hotel brands Hyatt Corporation (projects for environmental, educational or social support of the location in which the hotel is located) and Sandos Hotels (environmental programs for recycling, careful water consumption and energy saving, hotel landscaping and "green" guest rooms that fully comply with environmental standards and allow reducing the use of carbon dioxide by 70%) (Rubryka, 2024).

In turn, the realistic scenario focuses on the hotel's environmental responsibility, as guest demand is based on the ratio of price and comfort. Such scenarios are practiced by the Marriott International network, which has a "Serve 360" program with an emphasis on environmental friendliness and sustainable development, as well as the Accor network, which launched the "Planet 21" program after increasing demand for environmentally conscious practices, focusing on reducing emissions and environmentally responsible consumption of resources.

Having the need to take into account the stable needs/requests of environmentally conscious guests and low motivation to introduce innovations, hotels can implement a pessimistic scenario that involves reactive greening only after the emergence of these needs or government sanctions. In this case, management resources are accumulated for the rapid implementation of environmental initiatives. Therefore, it is important to constantly monitor customer feedback to quickly adjust environmental policies to support the hotel's competitiveness. Such scenarios are practiced by national Ukrainian brands Optima (Reikartz), Premier Hotels and Resorts (Rubryka, 2024).

Thus, the scenarios proposed for review demonstrate the possibilities of hotels to adapt their anti-crisis strategies to environmental requirements and customer expectations.

Conclusions

In the scientific and practical business environment, along with the discovered, described and/or identified new concepts, theories or phenomena, their accompanying, often hidden or negatively highlighted, anti-prototypes appear. Such concepts include "greenwashing" as a manipulative practice of consciously using unfounded, misleading or false statements about the environmental benefits of a product, service or company's activities in order to obtain a certain economic benefit and form a positive reputation among consumers and stakeholders.

Specific manifestations of greenwashing in the hotel business include speculation on socially relevant and sensitive topics of business environmental sustainability, dissemination and promotion of deliberately false environmental statements, provoking conflicts between declared eco-initiatives and the actual

behavior of business entities, misleading the expectations of environmentally sensitive consumers and stakeholders, selective publication of positive environmental information and/or concealment of information about the hotel's negative impact on the environment, etc.

The hypothesis that greenwashing is a powerful tool for reputation manipulation, allowing hotel business entities to retain short-term benefits, for example, in the form of increased sales, since the created profile encourages environmentally sensitive consumers to purchase products or services, but can be the cause of long-term risks of reputation loss, in particular due to the negative image formed, was partially confirmed during the analysis of scientific and media sources, practical insights into the environmental practices of hotel business entities.

Greenwashing not only characterizes the activities/inaction of companies in implementing "green business" and intentions to follow global trends of sustainable development, but also has an interdisciplinary nature, as it touches on a number of important managerial, legal, and ethical areas of activity of a hotel business entity. The "7P" model proposed by the authors allows us to identify greenwashing as an emotional marketing tool that covers all aspects of business from products to communications, appealing to the desire for environmental behavior and desires for conscious consumption, helping to identify discrepancies between the subject's statements about environmental friendliness and reality.

The implementation of environmental entrepreneurship in the company's business strategy is a key aspect in identifying greenwashing, as it manifests its influence in the concept of "green" hotel business through environmentally friendly construction of facilities and energy-efficient infrastructure, the philosophy of waste management and the economical use of natural/recreational resources, eco-farming and the formation of environmental awareness among consumers and personnel, etc. It has been proven that the concept of greenwashing makes it possible to study in detail the environmental claims of companies and detect manipulations through the establishment and investigation of various forms of greenwashing, in particular, the demonstration of fake/unrecognized certificates, the use of green labeling symbols without real confirmation, unreliable reporting on the implementation of practices that harm the environment, misleading consumers through a false impression of environmental responsibility, etc.

As the case study of greenwashing by hotel brands in Ukraine showed, the main drawback of implementing "green" practices is the lack of evidence of specific results, which emphasizes the complexity of identifying greenwashing and emphasizes the need to form and integrate an anti-greenwashing strategy as a comprehensive approach to business management, aimed at building trust in the hotel brand by implementing clear and transparent, ethically sound and environmentally responsible practices in all aspects of the hotel's activities.

The effectiveness and feasibility of implementing environmental initiatives is confirmed by the results of empirical research on the attitudes,

intentions and results of implementing environmental practices among respondent companies. In addition, a sufficiently high interest in environmental initiatives among customers has been established, which confirms the formed favorable environment for implementing environmental approaches in business.

The authors considered scenario models for implementing an anti-greenwashing strategy in the activities of hotel business entities, depending on the adaptation of companies' anti-crisis strategies to environmental requirements and customer expectations, the level of implementation of green innovations, and the influence of government regulation.

It has been proven that full control over the manifestation of greenwashing is impossible without state management of environmental practices in business and society, clearly formulated state policy and legislation, as well as the adoption of communication and reporting standards to owners, staff, consumers and the public, so that environmental claims have arguments and confirmation. However, we see this as a future trend in the Ukrainian hotel services market and set the aim to analyze the deontic values of environmental sustainability of hotel business entities, as well as the regulatory framework of state and local authorities in managing environmental practices and sustainable development in future scientific research.

REFERENCE/СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

Acampora, A., Lucketti, M. Q., Merli, R., & Ali, F. (2022). Theoretical developments and research methodology of ecological hotels: a systematic review of the literature. *Hospitality and Tourism Management Journal*, (51), 512–528. https://doi.org/10.1016/j.jhtm.2022.05.007

Alyahia, M., Azazz, A. M. S., Fayyad, S., Elshaer, I. A., & Mohammad, A. A. A. (2024). Greenwashing Behavior in Hotels Industry: The Role of Green Transparency and Green Authenticity. *Sustainability*, *16*(3), 1050. https://doi.org/10.3390/su16031050

Andreoli, T., Costa, E., & Prearo, L. (2022). Consumer Judgment on the Practice of Greenwashing: Scale Development and Validation. *Braz. Bus. Rev*, *19*, 508–524. https://www.scielo.br/j/bbr/a/6YX43TqNTBx4CRSPYdvysyH/?lang=en

Benjakul, P. & Santhiwasa, S. (2022). Guidelines for relevant agencies and stakeholders in issuing debt instruments to promote sustainability to prevent greenwashing issues that affect investors' investment decisions. *Individual Studies (M.A.) – Chulalongkorn University*. https://doi.org/10.58837/CHULA.IS.2022.157

Bondarenko, O., & Syazin, S. (2024, December). Greenwashing in eco-branding of FMCG enterprises. *Scientia fructuosa*, *6*(158), 31–50. https://doi.org/10.31617/1.2024(158)03

Бондаренко, О., & Сязін, С. (2024, грудень). Грінвошинг в екобрендингу FMCG-підприємств. *Scientia fructuosa*, *6*(158), 31–50. https://doi.org/10.31617/1.2024(158)03.

Booking.com. (2021, November 15). *Booking.com Launches First-of-its-Kind Travel Sustainable Badge to Lead Industry in Showcasing a Wider Variety of Sustainable Stays*. https://news.booking.com/en/bookingcom-launches-first-of-its-kind-travel-sustainable-badge--to-lead-industry-in-showcasing-a-wider-variety-of-sustainable-stays-en/

Booms, B., & Bitner, M. J. (1981). Marketing Strategies and Organizational Structures for Service Firms. Marketing of Services, James H. Donnelly, William R. George, (Eds.). *Chicago. American Marketing Association,* 47–51.

Bouarar, Ah., Mouloudj, S., Rebbouh, H., Bovsh, L., Mouloudj, K., Hopkalo, L., & Rasulova, A. (2024). Antecedents of Sustainable Agriculture Entrepreneurial Intentions: Extending the Theory of Planned Behavior with Social Media Influencers. *Digitizing Green Entrepreneurship. IGI Global*. https://doi.org/10.4018/979-8-3693-7442-9.ch008

Bovsh, L., Hopkalo, L., Tonkonoh, I., & Mouloudj, K. (2024). Sustainable Competitive Edge in Rehabilitation Hospitality: Insights from Ukraine. *Compelling Storytelling Narratives for Sustainable Branding,* Ch. 18. *IGI Global.* https://doi.org/10.4018/979-8-3693-3326-6.ch018

Businesswaste. (n. d.). *How to Reduce Waste in Hotels and Hospitality.* https://www.businesswaste.co.uk/reduce-waste/how-to-reduce-waste-in-hotels-and-the-hospitality-industry/ (date of application: 05.01.2025)

Chen, H., Bernard, S., & Rahman, I. (2019). Greenwashing in hotels: A structural model of trust and behavioral intentions. *Journal of Cleaner Production*, (206), 326–335. https://doi.org/10.1016/j.jclepro.2018.09.168

Cloos, K. (2024, April 15). The Netherlands said no to Booking.com's greenwashing. Travelers need to be vigilant too. https://adventure.com/booking-com-greenwashing-sustainable-hotels/?utm_source

Delmas, MA, & Burbano, VC (2011). The Drivers of *Greenwashing.* California Management Review *54*(1). https://doi.org/10.1525/cmr.2011.54.1.64

DMG. (2024). Green Hospitality: Technology's Role in Revolutionizing Sustainable Practices. https://www.thehotelshow.com/green-hospitality-technologys-role-in-revolutionizing-sustainable-practices/

EBA. (2023). ESAs present common understanding of greenwashing and warn on related risks. https://www.eba.europa.eu/publications-and-media/press-releases/esas-present-common-understanding-greenwashing-and-warn

Environmental practices of business entities in Ukraine. (n. d.). *Analytical study*. https://docs.google.com/forms/d/1kNzHs5Okdn5cqhNubz9x5ERDrTJ555-DgatenTCcpmo/viewform?edit_requested=true#responses

Екологічні практики суб'єктів бізнесу в Україні. (б. д.). *Аналітичне дослідження*. https://docs.google.com/forms/d/1kNzHs5Okdn5cqhNubz9x5ERDrTJ555-DgatenTCcpmo/viewform?edit_requested=true#responses

EU. (2024). Directive (EU) 2024/825 of the European Parliament and of the Council of 28 February 2024 amending Directives 2005/29/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and through better information (Text with EEA relevance). https://eur-lex.europa.eu/eli/dir/2024/825/oj/eng

European Commission. Green claims. (n. d.). https://environment.ec.europa.eu/topics/circular-economy/green-claims_en (date of access: 10.01.2025).

Fairmont. (n. d.). https://www.fairmont.com/

Google Travel. (n. d.). http://google.com/travel

Green Key. (n. d.). https://www.greenkey.global/

Hahn, J. (2022). Corporate Social Responsibility: A guide for hotels and venues. *Hospitality Sales and Marketing*. https://www.cvent.com/uk/blog/hospitality/corporate-social-responsibility-hotels

Hyatt. (n. d.). Caring for the Planet. https://www.hyatt.com/world-of-care/en-US/caring-for-the-planet

Ivashura, A., & Borysenko, O. (2019). Conscious consumption as a way to solve regional environmental problems. *Technogenic and ecological safety of Ukraine: state and prospects for development: materials of the IX All-Ukrainian scientific and practical Internet conference*, TEB-2019, Irpin, 110.

Івашура, А., & Борисенко, О. (2019). Усвідомлене споживання як спосіб вирішення регіональних екологічних проблем. *Техногенно-екологічна безпека України: стан та перспективи розвитку: матеріали IX Всеукраїнської науково-практичної Інтернет-конференції*, ТЕБ-2019, Ірпінь, 110.

Kassinis, G. I., Kay, A. A., Papagiannakis, G., & Vlachos, P. A. (2022). Stigma as moral insurance: How stigma protects firms from the market consequences of greenwashing. *Journal of Management Research*, *59*(8), 2154–2190. https://doi.org/10.1111/JOMS.12873

Lagasio, V. (2023). Measuring Greenwashing: The Greenwashing Severity Index. https://doi.org/10.2139/ssrn.4582917

Ling, T. L., & Aziz, N. A. (2021). The Impacts of Perceived Greenwash Fear on Attitude, Reasons and Green Hotel Patronage Intention. *Asia-Pac. J. Innov. Hosp. Tour*, (10), 41–61. https://fslmjournals.taylors.edu.my/wp-content/uploads/APJIHT/APJIHT-2021-10-2/APJIHT-2021-P3-10-2.pdf

Marriott. (n. d.). Sustainability & Social Impact Goals. https://serve360.marriott.com

Mazaraki, A., Melnychenko, S., Bovsh, L., Tkachuk, T., Zikiy, N., & Romanchuk, L. (2022). Financial and investment predicates of security of hotel real estate development. *Financial and Credit Activity Problems of Theory and Practice*, *6*(47), 182–196. https://doi.org/10.55643/fcaptp.6.47.2022.3912

Miller, T. (2017). Introducing greenwashing. *Greenwashing Sports*, 1–21. https://doi.org/10.4324/9781315659244-1

Mysirli, T., & Axarli, D. (2021). The Impact of Greenwashing on Western Markets. *HAPSc Analytical Note Series, 2*(2), 95–101. https://doi.org/10.12681/hapscpbs.29496

Nahirna, M. (2021). Greenwashing: the essence of the concept and classification of varieties. Economics. Finance. Law. No. 6/3. https://doi.org/10.37634/efp.2021.6(3).5

Нагірна, М. (2021). Грінвошінг: сутність поняття та класифікація різновидів. *Економіка. Фінанси. Право*, *6*(3). https://doi.org/10.37634/efp.2021.6(3).5

Optima Hotels & Resorts. (n. d.). Caring about ecology in the hotel industry. Experience of the Reikartz company. https://blog.reikartz.com/article/turbota-pro-ekolohiyu-v-hotelniy-sferi

Ottman J. A. (2017) The New Rules of Green Marketing. Strategies, Tools and Inspiration for Sustainable Branding. New York: Routledge. *In book: The New Rules of Green marketing*, 43–55. https://doi.org/10.4324/9781351278683-3

Oxford Learner's Dictionaries. Greenwashing. (n. d.). https://www.oxfordlearnersdictionaries.com/definition/english/greenwash (date of access: 01.01.2025).

Pears, P., Baines, T., & Williams, O. (2023). *Greenwashing: Navigating the Risk.* https://corpgov.law.harvard.edu/2023/07/24/greenwashing-navigating-the-risk

Peng, S., Tan, S., & Zhou, S. (2024). Greenwashing on the Regulatory Agenda: How Regulators Make Greenwashing Governable. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4733765

Pushka, O. S., Tikhonova D. Yu. (2017). Development of modern eco-directions in the hotel industry of Kyiv. *Young Scientist*, (4), 39–742.

Пушка, О. С., Тихонова, Д. Ю. (2017). Розвиток сучасних еко-напрямків у готельному господарстві Києва. *Молодий вчений*, (4), 39–742.

Pylypenko, K. A. (2019). Regulatory influences on the formation of the supply of agricultural enterprises in compliance with food security. *Accounting and analytical support and taxation of the development of agribusiness entities and rural areas*, In L. O. Marmul (Ed.). Kherson: Ailant, 235–246.

Пилипенко, К. А. (2019). Регуляторні впливи на формування пропозиції продукції аграрних підприємств у дотриманні продовольчої безпеки. *Обліково-аналітичне забезпечення й оподаткування розвитку суб'єктів агробізнесу та сільських територій*, У Л. О. Мармуль (Ред.). Херсон: Айлант, 235–246.

Radisson Hotels. (n. d.). Sustainable stays https://www.radissonhotels.com/en-us/experience/sustainablestays

Ross, E. (2024). *Hotels and Holidaying – Making the Unnecessary, Sustainable. Communicating Climate*, 173–180. https://doi.org/10.1108/978-1-83753-640-520241022

Rubryka. (2024). *TOP eco-initiatives that Ukrainian hotels can use today*. https://rubryka.com/article/eco-hotels/

Рубрика. (2024). *ТОП екоініціатив, якими сьогодні можуть скористатися українські готелі*. https://rubryka.com/article/eco-hotels/

Samal, S., & Bhalala, T. (2023). Awareness of eco-friendly products and its impact on consumer purchasing behavior in Surat city. *International Journal of Engineering and Management Research*, *13*(2). https://doi.org/10.31033/ijemr.13.2.14

Smirnova, K. V. (2017). Greenwashing as a tool of pseudo-ecological marketing. *Economic and ecological problems of modernity in the research of young scientists: materials of the international scientific-practical* conference of young scientists. http://eprints.library.odeku.edu.ua/id/eprint/3107

Смірнова, К. В. (2017). Грінвошінг як інструмент псевдо екологічного маркетингу. *Економіко-екологічні проблеми сучасності в дослідженнях молодих науковців: матеріали міжнар.наук.-практ. конф. молодих вчених*. http://eprints.library.odeku.edu.ua/id/eprint/3107

Srivastava, S., Dey, S. K., Sharma, S., & Raina, A. (2024). The Business of Green Hotels in an Emerging Economy: Role of Greenwashing and Mindfulness. *International Handbook of Skill, Education, Learning, and Research Development in Tourism and Hospitality*, 1–18. https://doi.org/10.1007/978-981-99-3895-7_67-1

Szabo, S., & Webster, J. (2021). Perceptions of greenwashing: The impact of green marketing on environmental and product perceptions. *Journal of Business Ethics, 171*(4), 719–739. https://doi.org/10.1007/S10551-020-04461-0/FIGURES/3

Teichmann, F.M.J., Wittmann, C., & Sergi, B.S.S. (2023). What are the consequences of corporate greenwashing? A look at the consequences of greenwashing in consumer and financial markets. *Journal of Information, Communication and Ethics in Society*, *21*(3), 290–301. https://doi.org/10.1108/JICES-10-2022-0090

Tercan, T., Yeshenkulova, G., & Nurmanova, U. (2021). Analysing Waste Management and Recycling Practices for the Hotel. *Journal of Environmental Management and Tourism*, (3), 212–222. https://doi.org/10.14505//jemt.v12.2(50).07

Torelli, R., Ballucci, F., & Lazini, A. (2020). Greenwashing and environmental communication: impact on stakeholder perceptions. *Business Strategy and the Environment, 29*(2), 407–421. https://doi.org/10.1002/BSE.2373

Vargas, E. (2015). *Greenwashing as Textmuster: Analysis of discursive and semiotic strategies in French and German advertising?* HDR monograph (Habilitation to Direct Research), Université Grenoble Alpes, Grenoble.	Vargas, É. (2015). *Le Greenwashing comme Textmuster : Analyse de stratégies discursives et sémiotiques dans les publicités françaises et allemandes?* Monographie HDR (Habilitation à Diriger des Recherches), Université Grenoble Alpes, Grenoble.

Vargas, E. (2019). Greenwashing and polyphony: argumentative paths and voices. *Cahiers de Praxematique,* (73). https://doi.org/10.4000/praxematique.5787

Villhauer B. (2023). My bank is greener: The ecolies of the financial sector. Stuttgart. Hirzel, 57.	Villhauer, B. (2023). Meine Bank wäscht grüner: Die Ökolügen der Finanzbranche. Stuttgart. Hirzel, 57.

Vollero, A. (2022). Understanding Greenwashing. *Greenwashing,* 1–20. https://doi.org/10.1108/978-1-80117-966-920221001

Wu, Y., Zhang, K., & Xie, J. (2020). Bad Greenwashing, Good Greenwashing: Corporate Social Responsibility and Information Transparency. *Management Science*, *66*(7), 3095–3112. https://doi.org/10.1287/mnsc.2019.3340

Yang, Z., Nguyen, T. T. H., Nguyen, H. N., Nguyen, T. T. N., & Cao, T. T. (2020). Greenwashing behavior: causes, taxonomy, and implications based on a systematic literature review. *Journal of Business Economics and Management, 21*(5), 1486–1507). VSTU. https://doi.org/10.3846/jbem.2020.13225

Zeng, X., Kralj, A., Nimri, R., & Li, Ya. (2024). Past reflection and future selection: A study of green hotel choices. *International Journal of Hospitality Management*, (122). https://doi.org/10.1016/j.ijhm.2024.103880

Zych, G., Budka, B., Czarnecka, M., Kinelski, G., & Wójcik-Jurkiewicz, M. (2021). The concept, development and consequences of greenwashing. *European Research Studies Journal* , XXIV (4B), 914–922. https://doi.org/10.35808/ERSJ/2779

Conflict of interest. The authors certify that don't they have no financial or non-financial interest in the subject matter or materials discussed in this manuscript; the authors have no association with state bodies, any organizations or commercial entities having a financial interest in or financial conflict with the subject matter or research presented in the manuscript. Given that one of the authors are affiliated with the institution that publishes this journal, which may cause potential conflict or suspicion of bias and therefore the final decision to publish this article (including the reviewers and editors) is made by the members of the Editorial Board who are not the employees of this institution.

The authors received no direct funding for this research.

Bovsh L., Rasulova A. Greenwashing and reputational risks in the hotel industry. *Scientia fructuosa*. 2025. № 1. P. 119–142. https://doi.org/10.31617/1.2025(159)08

Received by the editorial office 17.01.2025.
Accepted for printing 20.01.2025.
Published online 17.02.2025.